

**Docket No. SA-538**

**Exhibit No. 14-I**

**NATIONAL TRANSPORTATION SAFETY BOARD**

**Washington, D.C.**

FAA Final Rule – Qualification, Service, and Use of Crewmember  
and Aircraft Dispatchers

(177 pages)

## Attachment 8

to the Human Performance Group Chairman's Factual Report

DCA13MA133

FAA Final Rule – Qualification, Service, and Use of Crewmember  
and Aircraft Dispatchers

[4910-13]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 121**

**Docket No.: FAA-2008-0677; Amdt. No. 121-366.**

**RIN 2120-AJ00**

**Qualification, Service, and Use of Crewmembers and Aircraft Dispatchers**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

**SUMMARY:** This final rule revises the training requirements for pilots in air carrier operations. The regulations enhance air carrier pilot training programs by emphasizing the development of pilots' manual handling skills and adding safety-critical tasks such as recovery from stall and upset. The final rule also requires enhanced runway safety training and pilot monitoring training to be incorporated into existing requirements for scenario-based flight training and requires air carriers to implement remedial training programs for pilots. The FAA expects these changes to contribute to a reduction in aviation accidents. Additionally, the final rule revises recordkeeping requirements for communications between the flightcrew and dispatch; ensures that personnel identified as flight attendants have completed flight attendant training and qualification requirements; provides civil enforcement authority for making fraudulent statements; and, provides a number of conforming and technical changes to existing air carrier crewmember training and qualification requirements. The final rule also includes provisions that provide opportunities for air carriers to modify training program requirements for flightcrew members

when the air carrier operates multiple aircraft types with similar design and flight handling characteristics.

**DATES:** Effective Date: [INSERT DATE 120 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** For information on where to obtain copies of rulemaking documents and other information related to this final rule, see “How To Obtain Additional Information” in the SUPPLEMENTARY INFORMATION section of this document.

**FOR FURTHER INFORMATION CONTACT:** For general questions contact Nancy Lauck Claussen, email: [Nancy.l.Claussen@faa.gov](mailto:Nancy.l.Claussen@faa.gov); for flightcrew member questions, contact Robert Burke, email: [Robert.Burke@faa.gov](mailto:Robert.Burke@faa.gov); Air Transportation Division (AFS-200), Flight Standards Service, Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591; telephone (202) 267-8166. For legal questions, contact Sara Mikolop, email: [Sara.Mikolop@faa.gov](mailto:Sara.Mikolop@faa.gov) or Bonnie Dragotto, email: [Bonnie.Dragotto@faa.gov](mailto:Bonnie.Dragotto@faa.gov); Office of Chief Counsel (AGC-200), Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC, 20591; telephone (202) 267-3073.

**SUPPLEMENTARY INFORMATION:**

**Authority for this Rulemaking**

The FAA’s authority to issue rules on aviation safety is found in Title 49 of the United States Code (U.S.C.). This rulemaking is promulgated under the authority described in 49 U.S.C. 106(f), which vests final authority in the Administrator for carrying out all functions, powers, and duties of the administration relating to the promulgation of regulations and rules, and 44701(a)(5), which requires the Administrator to promulgate regulations and minimum

standards for other practices, methods, and procedures necessary for safety in air commerce and national security.

Also, the Airline Safety and Federal Aviation Administration Extension Act of 2010 (Public Law 111-216) specifically required the FAA to conduct rulemaking to ensure that all flightcrew members receive ground training and flight training in recognizing and avoiding stalls, recovering from stalls, and recognizing and avoiding upset of an aircraft, as well as the proper techniques to recover from upset of an aircraft. Public Law 111-216 also directed the FAA to require air carriers to develop remedial training programs for flightcrew members who have demonstrated performance deficiencies or experienced failures in the training environment. In addition, Public Law 111-216 directed the FAA to issue a final rule with respect to the notice of proposed rulemaking (NPRM) published in the Federal Register on January 12, 2009 (74 FR 1280).

### **List of Acronyms**

To assist the reader, the following is a list of acronyms used in this final rule:

AC	Advisory Circular
AOA	Angle of Attack
AQP	Advanced Qualification Program
ARC	Aviation Rulemaking Committee
ATP	Airline Transport Pilot
AURTA	Airplane Upset Recovery Training Aid
CAB	Civil Aeronautics Board

CAP	Continuous Analysis Process
CAST	Commercial Aviation Safety Team
CFR	Code of Federal Regulations
CRM	Crew Resource Management
CTP	Certification Training Program
DOT	Department of Transportation
FAA	Federal Aviation Administration
FCOM	Flightcrew Operating Manual
FDR	Flight Data Recorder
FFS	Full Flight Simulator
FSB	Flight Standardization Board
FSTD	Flight Simulation Training Device
FTD	Flight Training Device
IAS	Indicated Airspeed
ICAO	International Civil Aviation Organization
ICATEE	International Committee for Aviation Training in Extended Envelopes
INFO	Information for Operators

IOS	Instructor Operating Station
LOC-I	Loss of Control In-Flight
LOFT	Line Oriented Flight Training
MDR	Master Differences Requirements
NPRM	Notice of Proposed Rulemaking
NTSB	National Transportation Safety Board
OEM	Original Equipment Manufacturer
OMB	Office of Management and Budget
PIC	Pilot in Command
POI	Principal Operations Inspector
PRIA	Pilot Records Improvement Act
PTS	Practical Test Standards
SAFO	Safety Alert for Operators
SIC	Second in Command
SMS	Safety Management System
SNPRM	Supplemental Notice of Proposed Rulemaking

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#### **I. Overview of Final Rule**

On May 3, 2004, the FAA established the Crewmember/Dispatcher Qualification Aviation Rulemaking Committee (ARC) as a forum for the FAA and the aviation community to discuss crewmember and aircraft dispatcher qualification and training. The ARC submitted recommendations to the Associate Administrator for Aviation Safety in April 2005.<sup>1</sup> These recommendations focused on changes to the regulatory requirements, the development of

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<sup>1</sup> The ARC recommendations are available at Regulations.gov, FAA-2008-0677-0049.

qualification performance standards (QPS) appendices specific to the qualification, training and evaluation of crewmembers (i.e. pilots, flight engineers, and flight attendants) and aircraft dispatchers, and reorganization of the existing regulations for traditional air carrier training programs, found in subparts N and O of part 121.

Based on the ARC's recommendations, the FAA proposed a comprehensive reorganization and revision to crewmember and aircraft dispatcher qualification, training, and evaluation requirements in a notice of proposed rulemaking (NPRM) published January 12, 2009 (74 FR 1280).

On February 12, 2009, shortly after publication of the NPRM, a Colgan Air, Inc. Bombardier DHC-8-400, operating as Continental Connection flight 3407, crashed into a residence in Clarence Center, New York, about 5 nautical miles northeast of the airport resulting in the death of everyone on board and one person on the ground. The National Transportation Safety Board (NTSB) determined that the probable cause of this accident was the pilot in command's (PIC) inappropriate response to the activation of the stick shaker, which led to an aerodynamic stall.

The Airline Safety and Federal Aviation Administration Extension Act of 2010 (Public Law 111-216), enacted August 1, 2010, included a number of requirements to form ARCs and conduct rulemaking related to the results of the NTSB investigation of the Colgan Air accident. For example, in § 208 of Public Law 111-216, Congress directed the FAA to conduct rulemaking to ensure that all flightcrew members receive ground training and flight training in recognizing and avoiding stalls, recovering from stalls, and recognizing and avoiding upset of an aircraft, as well as the proper techniques to recover from upset. Public Law 111-216 also directed the FAA to conduct rulemaking to ensure air carriers develop remedial training programs for flightcrew

members who have demonstrated performance deficiencies or experienced failures in the training environment. In addition, Public Law 111-216 included a number of related requirements for rulemaking.<sup>2</sup>

In light of the statutory mandate to conduct rulemaking related to stall and upset prevention and recovery training, as well as significant comments on the NPRM and the need to obtain additional data and clarify the proposal, the FAA published a supplemental notice of proposed rulemaking (SNPRM) on May 20, 2011 (76 FR 29336). The SNPRM included pilot training requirements intended to mitigate the causal factors related to pilot training identified by the NTSB in its investigation and report on the 2009 Colgan Air accident.

The FAA recognizes the critical safety roles and contributions of all crewmembers and aircraft dispatchers in today's integrated operating environment. The agency has taken steps in addition to this final rule to ensure that crewmember and aircraft dispatcher training reflects that integrated operating environment.

Since the publication of the SNPRM, however, there have been several changes within the aviation industry. These changes have resulted from work by the FAA and air carriers to implement the related rulemakings and guidance required by Public Law 111-216. Specifically, recent changes to the Airline Transport Pilot certification requirements for first officers (second in command pilots) have raised the baseline knowledge and skill set of pilots entering air carrier operations.

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<sup>2</sup> The rulemakings required by Public Law 111-216 include § 203, FAA pilot records database; § 206, Flight crewmember mentoring, professional development, and leadership training; § 215, Safety management systems; § 216, Flight crew member screening and qualifications; and § 217, Airline transport pilot certification. These rulemaking projects are in various stages of development, and updates on the status of these rulemakings can be found on the U.S. Department of Transportation's (DOT) Report on DOT Significant Rulemakings, available at <http://www.dot.gov/regulations/report-on-significant-rulemakings>.

In addition, while the agency finalizes the proposed rulemaking that will require part 121 operators to implement safety management systems (SMS), many air carriers have already begun to develop SMSs, which will assist air carriers in identifying risks unique to their own operating environments (including air carrier training programs), and establishing mitigations to address those risks. Implementation of the initiatives identified in the FAA's 2009 Call to Action to Enhance Airline Safety has also impacted the training environment.

As a result of these changes, the FAA believes it is necessary to consider the cumulative effects of these efforts across the aviation industry before additional regulations are imposed. Accordingly, at this time, the agency has decided to finalize certain provisions of the proposal that enhance pilot training for rare, but high-risk scenarios, and that provide the greatest safety benefit. The time required in order to publish a final rule that contained the comprehensive revisions and reorganization of existing training program requirements as proposed in the SNPRM would result in unacceptable delay in light of the risk presented by these scenarios.

The FAA will continue to assess the need for the comprehensive revisions and reorganization of pilot, flight engineer, flight attendant and dispatcher qualification and training requirements proposed in the NPRM and SNPRM as it evaluates the cumulative effectiveness of these various efforts outlined above. If this assessment indicates that additional action is warranted, the FAA will engage stakeholders on these important issues and work to develop additional safety measures as appropriate.

This final rule adds training requirements for pilots that target the prevention of and recovery from stall and upset conditions, recovery from bounced landings, enhanced runway safety training, and enhanced training on crosswind takeoffs and landings with gusts. Stall and upset prevention require pilot skill in manual handling maneuvers and procedures. Therefore,

the manual handling maneuvers most critical to stall and upset prevention (i.e., slow flight, loss of reliable airspeed, and manually controlled departure and arrival) are included in the final rule as part of the agency’s overall stall and upset mitigation strategy. These maneuvers are identified in the final rule within the “extended envelope” training provision.

Further, the final rule requires air carriers to establish remedial training and tracking programs for pilots with performance deficiencies or multiple failures; includes additional training for instructors and check airmen who conduct training or checking in a flight simulation training device (FSTD); and incorporates pilot monitoring training into existing requirements for scenario-based flight training. The final rule also provides for efficiencies in training flightcrew members who operate multiple aircraft types with similar design and flight handling characteristics. In addition, the rule finalizes other discrete SNPRM proposals, such as ensuring that personnel identified as flight attendants have completed flight attendant training and qualification requirements; requiring approval of training equipment; revising record keeping requirements for communication records between the flight crew and dispatch personnel; establishing civil enforcement authority for making fraudulent or intentionally false statements; and other technical and conforming changes.

Table 1, Summary of Final Rule Provisions, provides additional detail regarding the final rule provisions incorporated into existing subparts of part 121.

**TABLE 1. SUMMARY OF FINAL RULE PROVISIONS**

Final Rule Provision <sup>3</sup>	Description of Provision	Timeline for Compliance <sup>4</sup>
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<sup>3</sup> Table 1 does not include all technical or editorial amendments.

<sup>4</sup> All final rule provisions are effective 120 days after publication in the Federal Register. However, certain provisions have an extended timeline for compliance consistent with the proposal in the NPRM and SNPRM. The

<b>Final Rule Provision<sup>3</sup></b>	<b>Description of Provision</b>	<b>Timeline for Compliance<sup>4</sup></b>
Fraud and falsification (§ 121.9)	Although currently prohibited by criminal statute, this section authorizes the FAA to take certificate action or assess a civil penalty against a person for making a fraudulent or intentionally false statement.	Compliance is required on the effective date of the final rule.
Personnel identified as flight attendants (§ 121.392)	Prohibits part 121 operators from identifying persons as flight attendants if those persons have not completed flight attendant training and qualification.	Compliance is required on the effective date of the final rule.
Approval of flight simulation training devices (§ 121.407)	Conforms the requirements for the evaluation, qualification, and maintenance of flight simulation training devices used in part 121 to existing part 60 requirements.	Compliance is required 5 years after the effective date of the final rule.
Training equipment other than flight simulation training devices approved under part 60 (§§ 121.408, 121.403(b)(2))	Ensures that all equipment used in approved training programs adequately replicates the equipment that will be used on an aircraft.	Compliance is required 5 years after the effective date of the final rule.
Pilot monitoring (§§ 121.409, 121.544, appendix H)	Requires training on pilot monitoring to be incorporated into existing requirements for scenario-based training and establishes an operational requirement that flightcrew members follow air carrier procedures regarding pilot monitoring. The pilot not flying must monitor the aircraft operation.	Compliance is required 5 years after the effective date of the final rule.
Training for instructors and check airmen who serve in FSTDs (§§ 121.413, 121.414)	Requires check airmen and flight instructors who conduct training or checking in FSTDs to complete initial, transition, and recurrent training on the operation of the FSTD and the device's limitations.	Compliance is required 5 years after the effective date of the final rule.
Remedial training program (§§ 121.415(h))	Implements Congressional direction to require part 121 operators to	Compliance is required 5 years after the effective date

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FAA encourages early compliance and will work with all operators to ensure compliance with the final rule training provisions is achieved as soon as practicable but no later than 5 years after the effective date of the final rule.

Final Rule Provision <sup>3</sup>	Description of Provision	Timeline for Compliance <sup>4</sup>
and 121.415(i))	identify and correct pilot training deficiencies through remedial training programs.	of the final rule.
Proficiency checks for PICs (§ 121.441(a)(1)(ii))	Amends current provision to require PICs who fly more than one aircraft type to receive a proficiency check in each aircraft type flown.	Compliance is required 5 years after the effective date of the final rule.
Related aircraft differences training (§§ 121.400, 121.418, 121.434, 121.439, 121.441)	Allows air carriers to modify training program requirements for flightcrew members when the air carrier operates aircraft with similar flight handling characteristics.	Since the related aircraft provisions provide relief to operators, compliance is permitted on the effective date of the final rule.
Extended envelope flight training maneuvers and procedures (§§121.407(e), 121.423, 121.424, 121.427(d)(1)(i), 121.433(e), appendix E)	<p>Requires pilot flight training on the following maneuvers and procedures:</p> <ul style="list-style-type: none"> <li>• Upset recovery maneuvers</li> <li>• Manually controlled slow flight</li> <li>• Manually controlled loss of reliable airspeed</li> <li>• Manually controlled instrument arrivals and departures</li> <li>• Recovery from stall and stick pusher activation, if aircraft equipped.</li> <li>• Recovery from bounced landing</li> </ul> <p>This training is required in a full flight simulator (FFS) during all qualification and recurrent training and will require additional time to complete.</p>	Compliance is required 5 years after the effective date of the final rule.
Extended envelope ground training subjects (§§ 121.419(a)(2), 121.427)	Requires pilots to complete ground training during qualification and recurrent training on stall prevention and recovery and upset prevention and recovery. This training adds 2 hours to qualification ground training and 30 minutes to recurrent ground training.	Compliance is required 5 years after the effective date of the final rule.
Communication records for domestic and flag	Codifies details of content for records of communication between	Compliance is required on the effective date of the final rule.

<b>Final Rule Provision<sup>3</sup></b>	<b>Description of Provision</b>	<b>Timeline for Compliance<sup>4</sup></b>
operations (§ 121.711)	aircraft dispatchers and flight crew previously described in a legal interpretation.	
Runway safety maneuvers and procedures (Appendices E and F)	Expands existing taxi and pre-takeoff requirements.	Compliance is required 5 years after the effective date of the final rule.
Crosswind maneuvers including wind gusts (Appendices E and F)	Expands existing requirement for training on crosswind maneuvers to include gusts.	Compliance is required 5 years after the effective date of the final rule.

Table 2 shows the FAA’s estimate for the base case costs, including the low and high cost range, in 2012 dollars. Table 2 also shows the estimated potential quantified safety benefits using a 22-year historical accident analysis. The FAA conducted a sensitivity analysis to explore the effect of reducing the historical analysis period from 22 years to 10 years in response to comments disputing the use of a 22-year time frame. Using a shorter historical analysis period, the estimated benefits of this final rule increase by approximately 17 percent. This analysis can be found in Appendix 14 of the Regulatory Impact Analysis, which is available in the docket for this rulemaking.

**TABLE 2. TOTAL BENEFITS AND COSTS (2012 \$ Millions)  
From 2019 to 2028**

<b>Total Benefits and Costs (\$ Millions)</b>				
<b>Range</b>		<b>2012 \$</b>	<b>Present Value</b>	
			<b>7%</b>	<b>3%</b>
Low	Cost	\$274.1	\$130.8	\$197.5
High	Cost	\$353.7	\$168.8	\$254.8
<b>Base Case</b>	<b>Cost</b>	<b>\$313.9</b>	<b>\$149.8</b>	<b>\$226.1</b>
	<b>Benefit</b>	<b>\$689.2</b>	<b>\$317.1</b>	<b>\$488.7</b>

## II. Background

### A. Statement of the Problem



The agency has identified 11 aircraft accidents over a 22- year interval (between 1988 and 2009), including the 2009 Colgan accident, that may have been prevented or mitigated by the training requirements in this final rule. This final rule also responds to several requirements in Public Law 111-216 and addresses seven National Transportation Safety Board (NTSB) recommendations.

Several of the accidents that the FAA has determined could have been mitigated by the pilot training requirements in the final rule involved rare, but high-risk in-flight events. For example, on February 12, 2009, a Colgan Air, Inc., Bombardier DHC-8-400, operating as Continental Connection flight 3407, was on an instrument approach to Buffalo-Niagara International Airport, Buffalo, New York, when it crashed into a residence in Clarence Center, New York, about 5 nautical miles northeast of the airport resulting in the death of everyone aboard and one person on the ground. The NTSB determined that the probable cause of this accident was the pilot in command's (PIC) inappropriate response to the activation of the stick shaker, which led to an aerodynamic stall from which the airplane did not recover. The PIC's response was inappropriate because he pulled back on the control column rather than pushing it forward to reduce the angle of attack. As a result, the airplane's pitch increased and its airspeed decreased, resulting in the stall. A contributing factor relevant to this rulemaking was both pilots' failure to monitor airspeed via their primary flight display and thus their failure to recognize the impending stick shaker onset as airspeed fell and pitch increased. The NTSB noted that the "failure of both pilots to detect this situation was the result of a significant breakdown in their monitoring responsibilities and workload management." The PIC's poor response suggests he was surprised by activation of the stick shaker. Had the flightcrew been

required to complete the extended envelope training provisions required by this final rule, this accident would likely have been mitigated.

Prior to the Colgan Air accident, on November 12, 2001 American Airlines flight 587 crashed in a residential area of Belle Harbor, New York. The airplane accident occurred shortly after takeoff from John F. Kennedy International Airport, Jamaica, New York. All 260 people aboard the airplane and 5 people on the ground were killed, and the airplane was destroyed by impact forces and a postcrash fire. The NTSB found the probable cause of this accident to be the in-flight separation of the vertical stabilizer as a result of the loads beyond ultimate design caused by the second in command's (SIC) unnecessary and excessive rudder pedal inputs. The rudder input was a reaction to wake turbulence.

Characteristics of the Airbus A300-600 rudder system design and elements of the American Airlines Advanced Aircraft Maneuvering Program also contributed to the incorrect rudder pedal inputs. The NTSB found that the American Airlines Advanced Aircraft Maneuvering Program excessive bank angle simulator exercise could have caused the SIC to have an unrealistic and exaggerated view of the effects of wake turbulence; erroneously associate wake turbulence encounters with the need for aggressive roll upset recovery techniques; and develop control strategies that would produce a much different, and potentially surprising and confusing, response if performed during flight.

The provisions adding upset prevention and recovery training in this final rule (§§ 121.419 and 121.423) may have mitigated this accident because the training delivers recovery strategies which focus on primary control inputs and early intervention strategies. Further, the provisions that require pilots to complete upset prevention and recovery training in a full flight simulator (FFS) (§ 121.423) with an instructor who has been trained on the specific

motion and data limitations of the FFS (§ 121.414) would mitigate the possibility of delivering negative training in simulation.

In another in-flight accident on September 8, 1994, USAir (now US Airways) flight 427, a Boeing 737-3B7 (737-300), N513AU, crashed while maneuvering to land at Pittsburgh International Airport, Pittsburgh, Pennsylvania. Flight 427 was operating as a scheduled domestic passenger flight from Chicago-O'Hare International Airport, Chicago, Illinois, to Pittsburgh. The flightcrew did not report any problems with the airplane and radar data indicates that the closest other traffic was about 4.5 miles and 1,500 feet vertically separated from flight 427 at the time of the accident. About 6 miles northwest of the destination airport, the airplane entered an uncontrolled descent and impacted terrain near Aliquippa, Pennsylvania. All 132 people on board were killed, and the airplane was destroyed by impact forces and fire. The NTSB determined that the probable cause of the accident was a loss of control of the airplane resulting from the movement of the rudder surface to its limit. The rudder surface most likely deflected to its limit in a direction opposite to that commanded by the pilots as a result of a failed main rudder power control unit (PCU). The FAA has determined that the provisions regarding upset prevention and recovery training in this final rule may have prevented or mitigated this accident.

Also, on December 20, 2008, Continental Airlines flight 1404, a Boeing 737-500, N18611, departed the left side of runway 34R during takeoff from Denver International Airport, Denver, Colorado. At the time of the accident, visual meteorological conditions prevailed, with strong and gusty winds out of the west. The NTSB reported that, as the airplane crossed uneven terrain before coming to a stop it became airborne, resulting in a jarring impact when it regained contact with the ground. A postcrash fire ensued and the airplane was substantially damaged.

The PIC and 5 of the 110 passengers were seriously injured; the SIC, 2 cabin crewmembers, and 38 passengers sustained minor injuries.

The NTSB accident report revealed that before starting the takeoff roll the PIC verbally repeated the wind speed and direction; however, during the takeoff roll the PIC inconsistently applied cross wind correction. The NTSB found that the probable cause of the accident was the PIC's ceased rudder input, which was needed to maintain directional control of the airplane, about 4 seconds before the excursion, when the airplane encountered a strong and gusty crosswind that exceeded the PIC's training and experience. The FAA has determined that the expansion of existing requirements for training on crosswind maneuvers to include wind gusts in this final rule may have prevented or mitigated this accident.

The final rule also addresses preventable runway safety accidents and incidents that have occurred on a more frequent basis. For example, on August 27, 2006, Comair flight 5191, a Bombardier CL-600-2B19, crashed during takeoff from Blue Grass Airport, Lexington, Kentucky, resulting in the death of the PIC, a flight attendant, and 47 passengers. The SIC also received serious injuries. The flight crew was instructed to take off from runway 22 but instead proceeded to take off from runway 26, which was much shorter. The airplane ran off the end of the runway and crashed into the airport perimeter fence, trees, and terrain. The airplane was destroyed by impact forces and postcrash fire. The NTSB determined that the probable cause of this accident was the flightcrew members' failure to use available cues and aids to identify the airplane's location on the airport surface during taxi and their failure to cross-check and verify that the airplane was on the correct runway before takeoff. The enhanced runway safety training provisions in this final rule would likely have mitigated this accident.

## **B. Related Actions**

## **1. FAA Modernization and Reform Act of 2012 (Public Law 111-216)**

Public Law 111-216 contained a number of related requirements for rulemaking, resulting in the following rulemaking initiatives: Pilot Certification and Qualification Requirements for Air Carrier Operations; Safety Management Systems; Flight Crewmember Mentoring, Leadership and Professional Development; and Pilot Records Database. The rule related to pilot certification was recently published and the remaining initiatives are in various stages of development. Further, the agency determined that amendments to FSTD qualification and evaluation standards in part 60 are needed to support the provisions in this final rule.

On July 15, 2013, the FAA published the final rule on Pilot Certification and Qualification Requirements for Air Carrier operations (78 FR 42324) (Pilot Certification rule). This final rule creates new certification and qualification requirements for pilots in air carrier operations including operations conducted under part 121. As a result of this action, a second in command pilot (first officer) in domestic, flag, and supplemental operations must now hold an airline transport pilot (ATP) certificate and an airplane type rating for the aircraft to be flown. Further, the Pilot Certification rule adds to the training and experience requirements for an ATP certificate with an airplane category multiengine class rating or an ATP certificate obtained concurrently with an airplane type rating. To receive an ATP certificate with a multiengine class rating, a pilot must have 50 hours of multiengine flight experience and must have completed a new FAA-approved ATP Certification Training Program (CTP). This new training program will include academic coursework and training in an FSTD. The Pilot Certification rule raises the experience requirement and the baseline knowledge for incoming part 121 pilots in that it provides foundational knowledge on many topics including aerodynamics, meteorology, air carrier operations, leadership/professional development, and crew resource management (CRM).

On November 5, 2010, the FAA published an NPRM that proposes to require each part 121 operator to develop and implement a safety management system (SMS) to improve the safety of its aviation-related activities (75 FR 68224). The SMS NPRM proposed to require part 121 operators to develop systematic procedures, practices, and policies for the management of safety risk for all of its aviation systems. While crewmember and dispatcher training programs constitute aviation systems and as such must be addressed within the certificate holder's SMS, the requirements in this final rule do not duplicate the SMS proposal. For example, the remedial training requirements in this final rule may serve as an element of a robust SMS and provide specific solutions to identified pilot performance deficiencies, thereby complementing the SMS requirements for continuous monitoring, analysis, and corrective action.

In addition, the agency has initiated a separate rulemaking to implement the requirements of § 206 of Public Law 111-216 related to flight crewmember mentoring, leadership and professional development. The action is necessary to ensure that air carriers establish or modify training programs to address mentoring, leadership, and professional development of flight crewmembers in part 121 operations. Although the agency proposed certain academic training related to § 206(a)(1)(D) – (E) in the SNPRM preceding this final rule, the agency is not proceeding with those elements of the proposal in this final rule. These issues will be considered in the Flight Crewmember Mentoring, Leadership, and Professional Development rulemaking project (RIN 2120-AJ87).<sup>5</sup>

Also, the FAA has initiated a separate rulemaking project to define simulator fidelity requirements for several new and modified training tasks mandated for air carrier training

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<sup>5</sup> As provided in Appendix Q, Table 2A, of the SNPRM the agency proposed academic training on PIC authority, PIC responsibility, leadership and command, and conflict resolution every 18 months at an introductory level for SICs and a refresher level for PICs.

programs by Public Law 111-216 (Part 60 rulemaking).<sup>6</sup> This rulemaking would amend part 60 to establish new or updated FSTD technical evaluation standards for training tasks such as full stall training, airborne icing training, and upset recognition and recovery training. Furthermore, this rulemaking would improve the minimum FSTD evaluation requirements for crosswinds with gusts (takeoff/landing) and bounced landing recovery methods in response to NTSB and Aviation Rulemaking Committee (ARC) recommendations. The rulemaking will help ensure simulator fidelity when conducting various flight training tasks.

In addition, to address the requirements of § 203 of Public Law 111-216, the FAA has initiated a rulemaking project (RIN 2120-AK31) to develop a pilot records database and phase out the requirements of the Pilot Records Improvement Act (PRIA) found at 49 U.S.C. 44703(h). Although the FAA, in the SNPRM, had proposed to conform § 121.683 (proposed as § 121.684) to the PRIA provisions, the FAA will consider these requirements in the pilot records database rulemaking to avoid confusion and possible redundancy. Thus, the FAA has not included proposed § 121.684 in the final rule.

In connection with these rulemaking initiatives and this final rule, Public Law 111-216 also required the FAA to establish several ARCs and several Task Forces to further examine existing training program requirements and develop recommendations for improvements. The FAA chartered the Air Carrier Safety and Pilot Training ARC; the Training Hours Requirement Review ARC; and the Stick Pusher and Adverse Weather Event Training ARC (the 208 ARC) to respond to the directives in Public Law 111-216.

The 208 ARC also worked to develop effective upset prevention and recovery training methodologies. Subsequently, the International Civil Aviation Organization (ICAO), the

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<sup>6</sup> Flight Simulation Training Device (FSTD) Qualification Standards for Extended Envelope and Adverse Weather Event Training Tasks, RIN 2120-AK08.

European Aviation Safety Agency (EASA), and the FAA decided to combine efforts to identify and establish an acceptable approach to eliminating such occurrences. ICAO sponsored seven meetings in 2012 during which Civil Aviation Authorities and subject matter experts were encouraged to participate in focused discussions. Also, as a number of initiatives were underway simultaneously that sought to reduce the number of loss of control in-flight (LOC-I) events, ICAO brought many of the groups involved with these efforts into the ensuing discussions under what became known as the loss of control avoidance and recovery training (LOCART) initiative.

The ARCs have presented their recommendations to the FAA. The reports from the following ARCs have been placed in the docket for this rulemaking:

- Air Carrier Safety and Pilot Training ARC
- Stick Pusher and Adverse Weather Event Training ARC
- Training Hours Requirement Review ARC

The agency notes that many of the new requirements in this final rule are consistent with ARC recommendations, including pilot monitoring requirements; enhanced simulator instructor training; upset prevention and recovery training; manual handling training; and remedial training requirements.

Finally, the FAA recognizes that drafting proposals on related topics simultaneously can give the appearance of overlapping or duplicative requirements. As we have done in this rule and in prior rulemakings issued to address the discrete sections of Public Law 111-216, the FAA will continue to minimize any overlapping or duplicative requirements.

## **2. FAA Modernization and Reform Act of 2012 (Public Law 112-95)**

On February 14, 2012, following the publication of the SNPRM, the FAA Modernization and Reform Act of 2012 (Public Law 112-95) added certain flight attendant requirements similar



to those included in the SNPRM, such as English language proficiency and training on various aspects of flight attendant response to passenger intoxication. Specifically, § 304 of Public Law 112-95 (49 U.S.C. 44728) requires flight attendants to be proficient in English and identifies certain English language competencies that must be demonstrated. In current part 61, English language proficiency is an eligibility requirement for all pilot certificates. In current part 63, English language proficiency is an eligibility requirement for a flight engineer certificate. The statutory mandate therefore ensures that all crewmember communication complies with crew resource management objectives.

Compliance with § 304 has been required since the statute was enacted. The FAA has published an INFO for air carriers to use when complying with the statutory requirement. This INFO can be accessed at

[http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/info/all\\_infos/](http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/).

Additionally, § 309 of Public Law 112-95 (49 U.S.C. 44734) requires each air carrier to provide flight attendants with training on providing alcohol to passengers, recognizing intoxicated passengers, and dealing with disruptive passengers. Section 309 also requires air carriers to provide flight attendants with situational training on the proper method for dealing with intoxicated passengers. Currently, under 14 CFR §121.421, operators are already required to provide flight attendants with training on how to handle passengers whose conduct might jeopardize safety. To assist operators with meeting the specific statutory mandate in § 309, the FAA has published an INFO regarding compliance with the statutory requirement. This INFO can be accessed at

[http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/info/all\\_infos/](http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/).

### **3. Related agency initiatives**

In the time since the Colgan accident in 2009, the FAA has put forth several initiatives that support improved pilot training in part 121 operations. These initiatives, along with the requirements in the final rule, are intended to reduce the number of aviation accidents.

One major initiative was the FAA Call to Action to Enhance Airline Safety, which began in June of 2009. (The report “Answering the Call to Action on Airline Safety and Pilot Training” will be placed in the docket for this rulemaking). The Call to Action included a number of key initiatives including a two-part focused review of air carrier flightcrew member training, qualification, and management practices. First, the FAA assessed the capability of air carriers to identify, track, and manage low-time flightcrew members and those who have failed evaluations or have demonstrated a repetitive need for additional training. Second, the FAA conducted additional inspections to revalidate that the air carriers’ training and qualification programs met regulatory standards.

As part of the Call to Action, in 2009 the FAA inspected 85 air carriers to determine if they had systems to provide remedial training for pilots.<sup>7</sup> The FAA did not inspect carriers who train pilots under an Advanced Qualification Program (AQP) because AQP includes such a system. When the inspections began in June of 2009, not all air carriers had developed remedial training programs. However, by January 2010, after the completion of the inspections, all air carriers had some part of a remedial training system.

Also, on August 6, 2012, the FAA published Advisory Circular (AC) 120-109, Stall and Stick Pusher Training which was developed based on a review of recommended practices developed by major airplane manufacturers, labor organizations, air carriers, training

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<sup>7</sup> Due to airline mergers and bankruptcies, there are fewer total air carriers (83 as of February 2013) operating under part 121.

organizations, simulator manufacturers, and industry representative organizations.<sup>8</sup> This AC identified best practices and guidance for training, testing, and checking for pilots to ensure correct and consistent responses to unexpected stall warnings and stick pusher activations. This AC also included guidance regarding the development of stall and stick pusher event training.

Additional FAA actions to address pilot training requirements include the following:

- Information for Operators (INFO) 09007 Pilot Training and Checking – Pneumatic Deicing Boot Equipped Airplanes recommends that operators enhance pilot training and checking to ensure safe operations in icing conditions. All INFOs can be accessed at [http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/info/all\\_infos/](http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/)
- Safety Alert for Operators (SAFO) 09015 Training for Landing on Contaminated Runways highlights FAA guidance regarding training and procedures for landing on contaminated runways. All SAFOs can be accessed at [http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/safo](http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo)
- INFO 10002 Agency Best Practices consolidates guidance and resources that can be used by operators to improve pilot training.
- SAFO 10006 Inflight Icing Operations and Training Recommendations includes recommendations regarding Pilot and Dispatcher training to address severe icing conditions associated with freezing rain and freezing drizzle.

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<sup>8</sup>[http://www.faa.gov/regulations\\_policies/advisory\\_circulars/index.cfm/go/document.information/documentID/1020244](http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1020244)

- INFO 10010 Enhanced Upset Recovery Training highlights the availability of the Airplane Upset Recovery and Training Aid that all operators can use to develop an effective upset recovery training module.
- SAFO 13002 Manual Flight Operations recommends that in this age of aircraft automation, training and flight operations should emphasize manual handling when appropriate to ensure pilots retain the ability to manually fly the airplane.

### **C. National Transportation Safety Board (NTSB) Recommendations**

This final rule addresses the following NTSB recommendations for certificate holders operating under Title 14 of the Code of Federal Regulations (14 CFR) part 121:

- **A-96-120.** Require 14 CFR part 121 and 135 operators to provide training to flightcrews in the recognition of and recovery from unusual attitudes and upset maneuvers, including upsets that occur while the aircraft is being controlled by automatic flight control systems, and unusual attitudes that result from flight control malfunctions and uncommanded flight control surface movements.
- **A-05-14.** Require all 14 CFR part 121 air carrier operators to establish programs for flightcrew members 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-05-30.** Require all 14 CFR part 121 and 135 air carriers to incorporate bounced landing recovery techniques in their flight manuals and to teach these techniques during initial and recurrent training.

- **A-07-44.** Require that all 14 CFR part 91K, 121, and 135 operators establish procedures requiring all crewmembers on the flight deck to positively confirm and cross-check the airplane's location at the assigned departure runway before crossing the hold short line for takeoff. This required guidance should be consistent with the guidance in AC 120-74A and SAFO 06013 and 07003.
- **A-10-22.** Require 14 CFR part 121, 135, and 91K operators and 14 CFR 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-10-23.** Require all 14 CFR part 121, 135, and 91K operators of stick pusher-equipped aircraft to provide their pilots with pusher familiarization simulator training.
- **A-10-111.** Require 14 CFR part 121, 135, and 91K operators to incorporate the realistic, gusty crosswind profiles developed as a result of Safety Recommendation A-10-110 into their pilot simulator training programs.

In the analysis for the final rule, the FAA identified 11 accidents involving part 121 operations, resulting in fatalities or injuries that occurred between 1988 and 2009 that may have been prevented or mitigated if the proposed enhanced training requirements had been in effect at the time of those accidents. Causal factors that contributed to these accidents included inadequate pilot training regarding recovery from stall, upset recovery, runway safety, bounced landings, crosswind takeoffs with gusts, and pilot monitoring. These accidents resulted in 601 fatalities, 48 serious injuries, and 137 minor injuries. A detailed description of this accident analysis, and how it was conducted, is provided in the benefits section of the regulatory evaluation for this final rule.

#### **D. Sections 208 and 209 of Public Law 111-216**

This final rule responds to Public Law 111-216, sections 208 and 209. Under Public Law 111-216, Congress directed the FAA to conduct rulemaking to ensure that all flightcrew members receive ground training and flight training in recognizing and avoiding stalls, recovering from stalls, and recognizing and avoiding upset of an aircraft, as well as the proper techniques to recover from upset; directed the FAA to conduct rulemaking to ensure air carriers develop remedial training programs for flightcrew members who have demonstrated performance deficiencies or experienced failures in the training environment; and directed the FAA to issue a final rule with respect to the NPRM.<sup>9</sup>

#### **E. Summary of NPRM and SNPRM**

On January 12, 2009, the FAA published an NPRM (74 FR 1280), proposing major changes to the requirements for crewmember and aircraft dispatcher training programs in domestic, flag, and supplemental operations. The primary purpose of the NPRM was to establish new requirements for traditional air carrier training programs to enhance crewmember and aircraft dispatcher training. The NPRM proposed a significant reorganization of training and qualification requirements as new subparts to be added to part 121.

Upon review of the comments to the NPRM, the FAA identified several issues that were not adequately addressed in the NPRM. Furthermore, the FAA determined that additional data and clarification were necessary. Because of the substantive changes and reorganization of the

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<sup>9</sup> The FAA notes that § 201 of Public Law 111-216 states that “[t]he term ‘flight crewmember’ has the meaning given the term ‘flightcrew member’ in part 1 of title 14, Code of Federal Regulations.” Part 1 defines “flightcrew member” as “a pilot, flight engineer, or flight navigator assigned to duty in an aircraft during flight time.” Because flight engineers and flight navigators do not manipulate the aircraft controls and flight navigators are no longer used in part 121 operations, the FAA assumes that Congress did not intend to require these flightcrew members to complete training on recovery from full stall and upset. Further, because no accidents have been attributed to flight engineer performance and the agency has not identified any issues related to flight engineer training, the remedial training requirements in the final rule apply to pilots only.

NPRM, on May 20, 2011 the FAA published the rulemaking proposal in its entirety in an SNPRM (76 FR 29336).

#### **F. Differences Between SNPRM and Final Rule**

In the SNPRM, the agency included the NPRM proposals to reorganize and revise crewmember and aircraft dispatcher qualification, training, and evaluation requirements in existing subparts N and O of part 121. This reorganization would have resulted in the creation of two new subparts within part 121.

The agency has decided to finalize provisions proposed in the SNPRM that enhance pilot training for rare but high risk scenarios and provide the greatest safety benefit. The final rule also includes other discrete provisions proposed in the SNPRM and described in Table 1. As discussed in the Overview section of this preamble, the remaining proposals in the SNPRM require further deliberation. These remaining proposals include the following:

- The operational requirements pertaining to crewmembers and aircraft dispatchers, except for § 121.9 (Fraud and falsification), § 121.392 (Personnel identified as flight attendants) and § 121.711 (Communication records), which are reflected in Table 3 below.
- The reorganization and restructuring of crewmember and aircraft dispatcher training and qualification in proposed subparts BB and CC, including the crewmember and aircraft dispatcher qualification performance standards in proposed Appendices Q, R, S and T (except as specifically noted in Table 3 below).

Thus, the FAA may pursue additional rulemaking in the future to address the more comprehensive changes proposed in the NPRM and SNPRM.

The agency has incorporated the final rule provisions into existing subparts of part 121 rather than creating new subparts within part 121. Table 3 identifies the SNPRM source for each of the final rule provisions.

**TABLE 3. SNPRM SOURCE OF PROVISIONS INCLUDED IN FINAL RULE**

<b>Description of Final Rule Provision</b>	<b>Final Rule Provision</b>	<b>SNPRM Provision</b>
Fraud and falsification	§ 121.9	§ 121.9
Personnel identified as flight attendants	§ 121.392	§ 121.392
Approval of FSTDs	§ 121.407	§ 121.1345
Training equipment other than FSTDs approved under part 60	§§ 121.408, 121.403(b)(2)	§§ 121.1331, 121.1351
Pilot monitoring	§§ 121.409, 121.544, appendix H	§§ 121.1213, 121.1353
Training for instructors and check airmen who serve in FSTDs	§§ 121.413, 121.414	§§ 121.1377, 121.1381
Remedial training	§ 121.415(h) and § 121.415(i)	§ 121.1355(a)(4), (a)(5) and (b).
Proficiency checks for PICs	§ 121.441(a)(1)(ii)	§ 121.1223
Related aircraft differences training	§§ 121.400, 121.418, 121.434, 121.439, 121.441	§§ 121.1205, 121.1206, 121.1215, 121.1230
Extended envelope ground training subjects	§§ 121.419(a)(2), 121.427	Appendix Q, Attachment 2, Table 2A
Extended envelope training maneuvers and procedures (Including requirements to train in an FFS)	§§ 121.407(e), 121.423, 121.424, 121.427(d)(1)(i), 121.433(e), appendix E	Appendix Q, Attachment 3, Tables 3A and 3B
Communication records for domestic and flag operations	§ 121.711	§ 121.711
Runway safety maneuvers and procedures	Appendix E, Flight Training Requirements: I(c), I(d) Appendix F, Proficiency	Appendix Q, Attachment 3, Table 3A



Description of Final Rule Provision	Final Rule Provision	SNPRM Provision
	Check Requirements: I(c), I(d)	
Crosswind maneuvers including wind gusts	Appendix E, Flight Training Requirements: II(c), IV(d)  Appendix F, Proficiency Check Requirements: II (c), V(c)	Appendix Q, Attachment 3, Table 3A

### III. Discussion of Public Comments and Final Rule

#### A. General

The FAA received approximately 130 comments in response to the SNPRM. Commenters included air carriers, labor organizations, trade associations, training organizations, one aircraft manufacturer, Families of Continental Flight 3407, the NTSB, and individuals. Air carrier and trade associations commented that the SNPRM was overly prescriptive; the FAA underestimated costs and overestimated benefits; and the FAA underestimated the effect of the proposal on air carriers that use an AQP for training. Labor organizations' comments included concerns regarding the proposed integration of lower fidelity and non-motion simulators for pilot training; the standards by which CRM competencies would be integrated into job performance training and evaluated; and the proposed recordkeeping requirements. An aircraft manufacturer supported the related aircraft initiatives included in the SNPRM. The NTSB and Families of Continental Flight 3407 were generally supportive of the SNPRM but raised concerns regarding the efficacy of the remedial training proposal further discussed in section III. (Discussion of Public Comments and Final Rule) J. (Remedial Training Programs) of this preamble.

The agency received several comments on the proposed flight attendant and aircraft dispatcher training requirements. Labor organizations generally supported the proposed training

and qualification requirements, but air carriers asserted some provisions, such as the proposals regarding requalification requirements and check flight attendant and check dispatcher training and qualification, were unnecessary and would place an undue burden on operators.

As part of the FAA's effort to move forward with a rule that finalizes specific statutorily mandated requirements and provisions proposed in the SNPRM that enhance pilot training and provide the greatest safety benefit, but require time to implement, the final rule does not include the flight attendant and aircraft dispatcher training requirements proposed in the SNPRM. In the discussion that follows, the FAA has addressed those comments related to the provisions included in this final rule.

## **B. Compliance with Final Rule Requirements**

In the SNPRM, the agency proposed an effective date for the final rule of 120 days after publication of the final rule in the Federal Register. However, for the crewmember and aircraft dispatcher training and qualification revisions in proposed subparts BB and CC, the agency proposed to allow air carriers to come into compliance with the requirements no later than 5 years after the effective date of the final rule. As explained in the SNPRM, setting the effective date for 120 days after publication of the final rule and allowing use of the existing regulations for 5 years would provide existing certificate holders and the FAA time to smoothly transition to the new requirements.

Consistent with the proposal, all provisions in this final rule will become effective 120 days after publication of the final rule in the Federal Register. In the final rule, compliance is required on the effective date unless the regulatory text for a particular provision indicates the alternate date for compliance of 5 years after the effective date. Although the final rule allows air carriers up to 5 years to come into compliance, the FAA encourages air carriers to comply

with these provisions as early as possible to maximize the safety benefits that this rule will achieve.

In the final rule, the agency modified the compliance date for certain provisions as follows:

- The final rule eliminates the 5-year compliance date for the provisions regarding related aircraft (§ 121.418) because these amendments provide voluntary alternatives to certain requirements of subparts N and O.
- The final rule eliminates the 5-year compliance date for the provision regarding the prohibition on fraud and falsification (§ 121.9) because all persons subject to the final rule prohibitions on fraud and falsification are currently prohibited from committing fraud and falsification by criminal statute, 18 U.S.C. 1001.
- The final rule eliminates the 5-year compliance date for the provision regarding personnel identified as flight attendants (§ 121.392) because this requirement imposes a minimal burden on air carriers.

Consistent with the SNPRM, the final rule requires compliance with the agency proposals regarding dispatch communication records upon the rule's effective date. The applicable date on which compliance is required for each substantive final rule provision is summarized in Table 1 of this preamble.

The FAA recognizes that some air carriers may have implemented a number of the new training requirements in the final rule but the agency has determined that maintaining a 5-year compliance period as proposed in the NPRM and SNPRM continues to be appropriate for the training-related initiatives because it may not be feasible for most part 121 operators to achieve compliance by the effective date of the final rule.

To accomplish many of the new safety-critical flight training provisions, the FFSs in which the training must be completed must be updated. As discussed previously, the FAA has initiated the Part 60 rulemaking to develop the standards for updating these simulators to ensure the extended envelope training provided for in this final rule is conducted in a realistic, accurate training environment. The FAA believes the 5-year compliance period for these provisions will provide sufficient time for completion of that rulemaking project and the actual updates to the FFSs that would be required by that rulemaking. The FAA will continue to evaluate the time necessary for compliance with the training requirements set forth in this final rule based on the updates that are necessary for the FFSs and will seek public comment on this issue in the Part 60 rulemaking. In addition, based on the comments received to the SNPRM, the FAA recognizes that some operators may already have the technology and simulation knowledge necessary to incorporate these training requirements into their approved training programs. The FAA encourages these operators to initiate compliance with this rule as soon as practicable. To help facilitate these efforts, operators should contact the FAA's National Simulator Program to obtain the relevant guidance material on evaluating the FSTDs used to provide extended envelope training.

The FAA recognizes the public benefit associated with early implementation of the new safety-critical training requirements. The FAA will work with all operators to ensure compliance with the final rule training provisions is achieved as soon as possible but no later than 5 years after the effective date of the final rule. As originally proposed, we anticipated that air carriers would complete holistic changes to their training programs at one time. Upon further reflection and based on the revisions to the final rule and the simulator updates discussed earlier, we note that individual air carriers may submit proposed training program revisions for approval at any

point after the effective date. The agency will work with each air carrier to meet their implementation needs.

### **C. Applicability of Final Rule Requirements and Impact of Final Rule on Operators with Advanced Qualification Program Curriculums**

Air carriers that conduct operations under part 121 may train and qualify crewmembers and aircraft dispatchers in accordance with the provisions of current subparts N, O, and P.

Alternatively, air carriers may train and qualify crewmembers and aircraft dispatchers under an AQP in accordance with the provisions of subpart Y.

Subpart Y does not contain training and evaluation requirements, per se. However, an AQP developed in accordance with subpart Y allows air carriers to use alternative methods for training and evaluating pilots, flight engineers, flight attendants, and aircraft dispatchers based on instructional systems design, advanced simulation equipment, and comprehensive data analysis to continuously validate curriculums.

In accordance with § 121.909, to obtain approval of an AQP, an air carrier must develop a Qualification Standards Document that specifies which requirements of parts 61, 63, 65, 121 (including subparts N, O, and P), or 135, as applicable, will be replaced by the AQP curriculum. Each requirement contained in part 61, 63, 65, 121, or 135 that is not specifically addressed in an approved AQP curriculum continues to apply to the certificate holder.

The SNPRM principally affected part 121 operators that train and qualify crewmembers and aircraft dispatchers in accordance with the provisions of current subparts N, O, and P. However, commenters generally noted that the FAA underestimated the impact of the proposed requirements on AQP carriers. Additionally, some commenters noted that AQP should be

mandated as the sole training method to be used by all certificate holders conducting part 121 operations.

First, as previously discussed, AQP provides for an alternate method of compliance with the standards provided by parts 61, 63, 65, 121 (including subparts N and O), or 135, as applicable. This means that even if the agency mandated AQP for all part 121 operators, the agency would have to provide standards from which to create the compliance methods in an AQP. These standards would change as the technology used in training tools evolves and as the FAA learns more about factors contributing to accidents and effective training methodology. Further, the final rule includes training requirements that are mandated by statute (i.e., upset and stall prevention and recovery). Without a revision to the traditional training requirements in this final rule, the FAA would not be able to require these maneuvers and procedures for pilots as part of pilot AQP curriculums.

Second, commenters including Continental, American, USAirways, JetBlue, Delta, and ASTAR, stated that the agency did not fully consider all of the direct and indirect effects that the proposal would have on part 121 operators that currently conduct training under an AQP. The agency has reviewed its final rule cost analysis to determine whether carriers that currently train flightcrew members under an AQP would incur additional costs not previously considered. Upon further review of existing pilot AQPs and the final rule requirements, the agency has determined the new ground and flight training requirements in the final rule are generally not addressed by existing pilot AQPs. Therefore, in the final rule regulatory evaluation, the agency has revised its cost analysis and determined that it is appropriate to attribute costs to the additional ground and flight training requirements for all pilots who train under subparts N and O as well as those who train under an AQP.

Applicable requirements of part 121 that are not specifically addressed in the certificate holder's AQP continue to apply to the certificate holder and to the individuals being trained and qualified by the certificate holder. See § 121.903(b). This final rule differs from the SNPRM in that it does not alter the training and qualification principles established in subparts N and O, but rather adds discrete new pilot training subjects, procedures and maneuvers. Accordingly, an operator that uses AQP to train flightcrew members must submit a revised Qualification Standards Document if that operator seeks to address these additional ground training subjects and flight training procedures and maneuvers through alternative methods in accordance with subpart Y.

Third, in response to comments that AQP should be mandated for all part 121 operators, the FAA maintains its position as stated in the SNPRM. Although the FAA considers AQP to be an effective voluntary alternative for compliance with minimum training and qualification requirements, the FAA does not believe that it is appropriate to require all air carriers to train under AQP. The FAA recognizes that AQP may not be appropriate for every certificate holder. The AQP is a voluntary program established to allow a greater degree of regulatory flexibility in the approval of innovative training programs. Based on a documented analysis of operational requirements, a certificate holder under AQP may propose to depart from the traditional practices with respect to what, how, when, and where training and testing is conducted. Detailed AQP documentation requirements, data collection, and analysis provide the FAA and the operator with the tools necessary to adequately monitor and administer an AQP. See 70 FR 54810, 54811 (Sept. 16, 2005).

The FAA further recognizes that some air carriers may not wish to incur the costs associated with an AQP. Such costs include additional personnel and management infrastructure

to develop and facilitate the required data collection, analysis, and application required under AQP. Furthermore, some air carriers may prefer the structured requirements of a traditional program to the analytically-driven AQP training program. Other air carriers that use contract training facilities may not find AQP to be a suitable alternative to traditional training requirements. Accordingly, the final rule does not require all certificate holders to train under the AQP requirements in subpart Y of part 121. This determination is consistent with the recommendations provided by the Training Hours Requirement Review ARC findings. See Training Hours Requirement Review ARC Report.

#### **D. Fraud and Falsification**

In the SNPRM, the FAA proposed adding § 121.9, a new general requirement that would prohibit a person from making intentionally false or fraudulent statements on an application, record, or report required by part 121. The SNPRM also specified the consequences of making incorrect and intentionally false or fraudulent statements. Although the language would be added to part 121 for the first time, it is not a new concept in FAA regulations. Similar language already appears in 14 CFR §§ 61.59 and 67.403, and was recently added to part 139 subpart B at § 139.115. Moreover, 18 U.S.C. 1001 currently prohibits fraud and intentional falsification in matters within the jurisdiction of the executive branch.

The FAA proposed adding the requirement to part 121 to emphasize the importance of truthful statements, especially with regard to training and checking of crewmembers and aircraft dispatchers. The FAA considers the making of intentionally false or fraudulent statements a serious offense. Falsification has a serious effect on the integrity of the records on which the FAA's safety oversight depends. If the reliability of these records is undermined, the FAA's ability to promote aviation safety is compromised.



Airbus requested clarification regarding to whom the proposed sanctions would apply. Continental supports the prohibition of fraudulent or intentionally false statements, but commented that the assignment of responsibility and potential sanctions go too far. For example, it is Continental's understanding that the proposal adopts a strict liability standard for a part 121 operator by imposing denial of a training program application or removal of a training program approval for infractions. Continental further commented that the FAA should hold a carrier responsible for fraudulent or intentionally false statements only when it can prove carrier approval or endorsement of such actions; individual employee or contractor actions should not be automatically attributed to a carrier. They conclude that penalties against carrier training programs should only be levied when FAA can prove carrier approval of such actions. In addition, Continental stated that the proposal to impose penalties for incorrect statements or entries is inconsistent with FAA enforcement policy, because Order 2150.3B, FAA Enforcement and Compliance Program, and case law recognize that not all acts warrant enforcement action, especially unintended acts. Continental notes that the introduction of penalties for incorrect statements or entries, which may have been made inadvertently, will serve no deterrent purpose and recommends eliminating paragraph (c) of proposed § 121.9.

The agency agrees with comments that not all certificate holder actions necessarily warrant the strictest agency response and clarifies that § 121.9 does not set forth a strict liability standard. Section 121.9 identifies the potential consequences for intentional falsification or fraud. However, the potential sanctions set forth in § 121.9(b) are limited to cases of intentional falsification or fraud that violate § 121.9(a). As discussed in the following paragraph, proposed § 121.9(c) regarding consequences for making incorrect statements has not been included in the final rule.

Further, in response to comments that § 121.9 is inconsistent with agency guidance, the agency responds that the addition of § 121.9 does not alter the agency's policy in Order 2150.3B regarding the factors it considers in assessing whether to pursue enforcement action, the type of enforcement action (i.e. administrative, legal, etc.) to pursue, and the nature of the sanction that will be pursued, if any. In fact, § 121.9(b)(3)-(4) of the proposal recognize that a more flexible response by the agency may be warranted in certain circumstances. Not all action taken as a result of a regulatory violation is punitive as is the case with the proposal to deny an application or approval of a training program upon the discovery of incorrect training-related information upon which the agency relied. Rather, as is the case today, the agency may withdraw an approved training program to assess the safety and effectiveness of the program based on accurate information. Therefore, proposed paragraph (c) is not necessary and has not been included in the final rule.

In response to commenters' concerns that certificate holders may be held liable for the actions of any person under § 121.9 as proposed, the regulatory language of § 121.9(b) applies to certificate holders as well as any person acting on behalf of a certificate holder who commits an act prohibited by § 121.9(a). Commenters' concerns regarding liability for the acts of their employees have been addressed by case law. Part 119 certificate holders are ultimately responsible for compliance with the duties required to satisfy part 121 requirements and are expected to oversee the conduct of persons they employ. If a certificate holder could be considered liable only upon proof that it was at fault independently, it would have an incentive to minimize oversight of persons it employs.

Currently, 18 U.S.C. 1001 prohibits fraud and falsification in matters within the jurisdiction of the executive branch. Accordingly, there is no cost or additional burden to the

certificate holder to comply with this provision, and there is no reason to delay compliance with this section by 5 years.<sup>10</sup> In the final rule, this provision will become effective 120 days after publication in the Federal Register.

#### **E. Personnel Identified as Flight Attendants**

In existing § 121.391, the FAA requires flight attendants on an aircraft operated under part 121 when the agency determines that the presence of a flight attendant is required to ensure the safety of the aircraft and its occupants. When such a determination has been made, the agency also identifies the minimum number of flight attendants required. However, a certificate holder may choose to provide a flight attendant when one is not required or a certificate holder may choose to provide additional flight attendants in excess of the required minimum number of flight attendants.

Historically, there has been an inconsistent application of the rules regarding training and qualification requirements for these flight attendants who are not required to be on the aircraft. In part 121, the agency requires flight attendants to complete training that will enable them to perform safety-related functions in a normal operating environment as well as to increase passenger and crewmember survivability in an accident. However, the identification of any crewmember as a flight attendant implies that the crewmember is fully qualified to perform all safety-related flight attendant duties and responsibilities upon which other crewmembers or passengers may rely.

Accordingly, in § 121.392 of the SNPRM and the final rule, the agency requires any person identified by the certificate holder as a flight attendant on an aircraft in operations under

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<sup>10</sup> 18 USC 1001 is a criminal statute prohibiting fraud and intentional falsification in matters within the jurisdiction of the executive branch. This regulation will allow the agency to pursue civil enforcement in instances in which a person has committed fraud or falsification.

part 121 to have completed the part 121 flight attendant training and qualification requirements. This requirement applies whether or not the person serves as a required crewmember. The agency further clarifies that certificate holders must identify a person serving as a crewmember who has not yet completed all flight attendant training and qualification requirements to serve as a required crewmember on a particular aircraft, such as a person who is gaining the aircraft operating experience required by § 121.434(e), as a qualifying flight attendant. Air carriers may determine how they want to identify these individuals to passengers, as appropriate for their operation. Some possible methods would be to differentiate their uniform from that of fully qualified flight attendants, identify flight attendants in training as “trainees” via nametags or to make an announcement to passengers before the aircraft pushes back from the gate.

The FAA did not receive any comments on this section as proposed in the SNPRM. Proposed § 121.392 appears in the final rule with a modified compliance date as discussed in section III.B. of this preamble.

#### **F. Approval of Airplane Simulators and Training Devices**

Currently, existing § 121.407 requires a certificate holder to obtain the agency’s approval for the use of airplane simulators and other training devices in a training program approved under part 121.<sup>11</sup> In the NPRM (§ 121.1347) and in the SNPRM (§ 121.1345), the agency proposed to require each FSTD used in a part 121 training program to be qualified and maintained in accordance with 14 CFR part 60 – Flight Simulation Training Device Initial and Continuing Qualification and Use, and approved by the Administrator for use in training or

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<sup>11</sup> The agency notes that the terms “visual simulator” and “airplane simulator” as used throughout part 121, are currently referred to as “full flight simulators” in part 60. A “training device” or “flight training device,” as used throughout part 121 are currently referred to as “flight training devices” in part 60. A “non-visual simulator” or a “simulator without a visual system” is a motion simulator without a visual presentation. These types of devices have either been retired or upgraded to FFSs with the installation of visual displays.

evaluating the particular flight training maneuver or procedure. This proposal aligned the existing requirements for approval of airplane simulators and other training devices in a part 121 training program with the requirements regarding the evaluation, qualification, and maintenance of FSTDs added to title 14 in 2006. The part 60 FSTD requirements currently apply to all persons using or applying to use an FSTD to meet any requirement of title 14, chapter 1, Federal Aviation Administration, Department of Transportation, including the training and qualification requirements of subparts N and O. See 14 CFR 60.1(b).

Southwest, American, USAirways, Continental, FedEx, and a number of other commenters questioned how the proposal would affect devices qualified in accordance with ACs that predate part 60. These commenters recommended a blanket statement on simulation and various types of simulator qualification that states an FFS could be either qualified under part 60 or grandfathered into regulation by § 60.17 although not actually qualified under part 60.<sup>12</sup>

This final rule does not modify the existing part 60 requirements for the evaluation, maintenance, and qualification of FSTDs. In the final rule, the agency clarifies that § 60.17 will continue to address previously qualified devices that may be used in part 121 training programs.

Through modifications to existing § 121.407, the final rule incorporates the proposal to conform part 121 requirements regarding the use of FSTDs in approved training programs with the existing part 60 requirements that already apply to the use of FSTDs in part 121 training programs.

## **G. Approval of Training Equipment Other Than Flight Simulation Training Devices**

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<sup>12</sup> Although this comment was made in connection with the use of an FSTD to maintain pilot recent experience requirements, it is generally applicable to a number of other conforming references to part 60 throughout the SNPRM.

Current regulations do not provide specific requirements for training equipment other than FSTDs, but the regulations generally require training equipment to be adequate. To ensure that all equipment used in approved training programs is adequate for the particular task for which it is used, in § 121.1351 of the NPRM and SNPRM, the FAA proposed requirements for training equipment other than FSTDs. The FAA has retained this provision as § 121.408 of the final rule. Section 121.408 states that the FAA must approve training equipment (e.g. cockpit procedures trainers, door/exit trainers, water survival equipment, etc.) used to functionally replicate aircraft equipment required to be used as part of the approved training program.

In the SNPRM, the agency explained that this provision would apply to training equipment including, but not limited to, portable emergency equipment, including life vests and fire extinguishers, aircraft exit trainers, and equipment for overwater operations. In response to comments to the NPRM that the proposed requirements in § 121.1351 were overly broad and open to interpretation, the agency restated the purpose of this requirement in the SNPRM was focused on ensuring that crewmembers receive training on emergency equipment that replicates the actual equipment they would use in emergency situations in aircraft operations. The proposed requirements in § 121.1351 appear in § 121.408 of the final rule with the clarifications described in the following paragraphs.

In response to the SNPRM, American, the Air Transport Association of America, Inc. (ATA) (now known as Airlines for America), USAirways, Continental, ASTAR, FedEx, and Southwest requested more specificity about the types of training equipment that would be covered under this section. American, ATA, USAirways, Continental, ASTAR, and FedEx further stated that it would be difficult to comply with the provision that requires the training equipment to replicate the form, fit, function, and weight, as appropriate, of the aircraft

equipment, because much of the data, which must come from the manufacturers, is not part of the information currently provided by the manufacturers.

In the final rule, the FAA maintains the existing requirements in § 121.403(b)(2) that all training devices mockups, systems trainers, procedures trainers and other training aids be listed in the air carrier's approved training program. The final rule also includes a new provision, proposed in the SNPRM, which clarifies the FAA's intent regarding the criteria that must be met by this training equipment. This provision requires that training equipment used to accomplish the training requirements of this part meet the form, fit, function, and weight, as appropriate, of the actual equipment that crewmembers will be using during normal and/or emergency aircraft operations. In addition, the equipment must replicate the normal operation (and abnormal and emergency operation, if appropriate) of the aircraft equipment including the required force, actions and travel of the aircraft equipment and variations in aircraft equipment operated by the certificate holder, if applicable. It must also replicate the operation of the aircraft equipment under adverse conditions, if appropriate.

The FAA has qualified the requirement with "as appropriate" to allow for flexibility in cases where manufacturer's data is not available or it is impracticable or unnecessary to meet this requirement. The FAA clarifies that the requirements in section § 121.408 apply to training equipment used to accomplish job performance requirements only where replication of the actual equipment used in operations is key to the learning objectives of the drill. Further, certain criteria do not affect the efficacy of training equipment as a training tool. For example, the weight of the entire door trainer would not have to match the weight of that size section of an actual aircraft fuselage, but the weight of the door/window that the crewmember is opening would have to replicate the weight of the actual exit on an aircraft in order to prepare a

crewmember adequately to react in an emergency. The key objective of this requirement is that the training equipment reflects the equipment that would be used by the crewmember in normal and/or emergency aircraft operations in order to accomplish the learning objectives of the drill.

Additionally some commenters noted that the FAA has not required the official approval of training equipment outside of the National Simulator Program or part 60. In response, the FAA clarifies that existing § 121.403(b)(2) already requires that all training device mockups, systems trainers, procedures trainers, and other training aids be listed in the air carrier's approved training program. The requirements of § 121.408 simply clarify the functional attributes and requirements that must be met by this training equipment.

Commenters (American, ATA, USAirways, Continental, ASTAR, FedEx and Southwest) have assumed that this provision would apply to door and window trainers, but question whether it would also include unique slat/flap handle trainers, intruder resistant cockpit door latch trainers, and many other cockpit or cabin items for which a hands-on trainer would be beneficial, but not necessarily required.

The FAA agrees that it is important to clarify what training equipment must meet the requirements of § 121.408. In the final rule, the FAA has amended § 121.408(b) to require that the provisions of this section apply to training equipment used to meet the training requirements of this subpart. This includes portable emergency equipment (e.g. fire extinguishers, portable oxygen bottles, and protective breathing equipment), aircraft exit trainers, equipment for overwater operations, and other equipment used to meet hands on training requirements.

The agency notes that air carriers may find it useful to create hands on training opportunities for crewmembers to enhance training in a certain area, even when hands on performance training is not required by regulation. When a device (e.g. unique slat/flap handle



trainers, intruder resistant cockpit door latch trainers, and many other cockpit or cabin items) is not required by the training requirements of this subpart, the functional attributes and requirements for the equipment of § 121.408 do not apply. However, the device must still be listed in the air carrier's approved training program, under the requirements of § 121.403, and contribute to training objectives.

Southwest also asserts that the requirement proposed in § 121.1351(d) that all training equipment must have a method of documenting discrepancies in close proximity, precludes the use of technology to maintain an electronic log book for discrepancies unless a recording device is located in close proximity to each piece of equipment. Southwest proposed changing "close proximity" to "within the training facility."

The FAA agrees with the commenter and in the final rule has amended the requirements of § 121.408(d) to only require a method for documenting discrepancies for all training equipment. This provision will allow the greatest flexibility for air carriers to develop, and submit for approval, a method that works effectively in their particular training environment.

## **H. Pilot Monitoring Duties and Training**

Existing regulations do not explicitly address development of pilot monitoring skills. However, pilot monitoring duties are currently included in the operating manual required by § 121.133. Therefore, the FAA expects that they are incorporated in air carrier standard operating procedures.

Historically, the FAA has referred to the individual completing pilot monitoring duties as the pilot not flying. In FAA AC 120-71A, Standard Operating Procedures for Flight Deck Crewmembers, the agency provides guidance regarding a means to incorporate standard operating procedures for the pilot not flying and pilot flying duties into the operating manual.

The FAA amended this AC in 2003. In one notable change, the agency replaced the term “pilot not flying” with the term “pilot monitoring” to convey that the pilot not flying should be actively engaged in the safe operation of the aircraft and as such, should be trained and evaluated in performing active pilot monitoring skills.

In § 121.1213 of the NPRM and SNPRM, the agency proposed to codify the use of the term “pilot monitoring” to reflect the activities conducted by the pilot who is seated at the controls, but not flying the aircraft or the FSTD. The agency further proposed to require a pilot to accomplish pilot monitoring duties in accordance with the operating manual. The proposals did not change the current duties and responsibilities of the pilots at the controls.

The Air Line Pilots Association, International (ALPA) supported the use of the term "pilot monitoring," as incorporated in the NPRM and SNPRM, as it better describes the function of the pilot who is not actually controlling the aircraft. Southwest, Fed Ex, Continental, American, ATA, and USAirways commented that the agency should include a definition of “pilot monitoring” in the final rule to clarify the term. The agency is not persuaded by commenters that a definition of “pilot monitoring” is required. In the final rule, § 121.544 of subpart T includes the proposed description of the pilot who must complete pilot monitoring duties with sufficient detail such that an additional definition is not necessary.

In § 121.1213 of the SNPRM, the agency’s proposal combined operational and training requirements for the pilot monitoring. Southwest, Continental, ASTAR, American, ATA, USAirways, and FedEx commented that the agency should remove language in the proposal that would require pilots to accomplish pilot monitoring duties in accordance with the operating manual while at the controls of an FSTD during training. These commenters stated that there may be times when a pilot is instructed to behave in a way other than specified by the operating

manual to complete a training objective (e.g., incapacitated pilot, get into upset event for training purposes, check pilot training, etc.).

In response to comments, the agency clarifies that training requirements must be based on operating manual contents and standard operating procedures so that pilots can receive comprehensive training on the procedures that must be followed during operations. However, the agency recognizes that it may not always be feasible or practical to maintain consistency with the operating manual for the “set up” of certain maneuvers and procedures in a training environment. Therefore, the final rule addresses pilot monitoring duties and training in separate provisions. Section 121.544 of the final rule provides pilot monitoring duties and § 121.409 and appendix H provide pilot monitoring training.

The agency’s determination regarding the need for training on pilot monitoring is supported by the NTSB final report on the Colgan accident. In the NTSB final report on this accident, the NTSB stated, “The flight crewmembers failed to monitor the airplane’s pitch attitude, power, and especially its airspeed and failed to notice, as part of their monitoring responsibilities, the rising low-speed cue on the IAS display. Multiple strategies can be used to protect against catastrophic outcomes resulting from these and other monitoring failures, including flight crew training, flight deck procedures, and low-airspeed alert systems...” The NTSB concluded that “the monitoring errors made by the accident flight crew demonstrate the continuing need for specific pilot training on active monitoring skills.” See NTSB Rep. AAR–10/ 01, at p. 94.

In the SNPRM, the agency proposed to require pilots to serve as pilot monitoring during Line Oriented Flight Training (LOFT) to facilitate opportunities for pilots to practice and demonstrate proficiency in pilot monitoring skills and workload management under the

supervision of a flight instructor or check airman. The final rule includes requirements for part 121 operators to provide opportunities for pilot monitoring training during LOFT.

Currently, the agency requires LOFT, a scenario-based training event with minimal check pilot or flight instructor interruption, for all pilots who complete training in an advanced simulation training program. In accordance with appendix H, LOFT must consist of two representative flights for each pilot. In addition, air carriers may substitute LOFT that meets the requirements of § 121.409, for the recurrent proficiency check requirement specified in § 121.441. Further information regarding LOFT can be found in AC 120-35C, which provides guidelines for the design and implementation of LOFT.

In § 121.1353 of the SNPRM, the agency proposed to add specificity to existing LOFT requirements by requiring each pilot to serve as pilot flying and pilot monitoring any time a part 121 operator uses LOFT in a training curriculum. Similar to existing LOFT requirements in appendix H, the agency proposed that LOFT must consist of two operating cycles. However, the SNPRM defined “operating cycle” as a gate-to-gate operation. Further, the agency proposed that one of the required operating cycles would be a “pilot flying cycle” and one cycle would be a “pilot monitoring cycle.”

Southwest, ASTAR, American, ATA, USAirways, Continental, UPS, and FedEx, stated that the two operating cycles that must be completed during LOFT should not be required to include two full gate-to-gate (taxi-in and taxi-out) scenarios. These comments were provided in response to the proposal for two operating cycles for all LOFT and with particular concern regarding recurrent LOFT. These commenters state two gate-to-gate operating cycles would reduce the effectiveness of LOFT due to more time and emphasis on ground operations and less on flight operations.

Further ASTAR, American, ATA, USAirways, Continental, UPS, and FedEx stated that, for those carriers engaged in long haul, international flights, the requirement to design LOFT with two operating cycles representative of the certificate holder's operation will be challenging. Commenters recommend that for purposes of a LOFT, "Operating Cycle" should be defined to include only takeoff, climb, en route, descent and landing.

The FAA concurs with commenters that two gate-to-gate operating cycles are unnecessary for the reasons cited by commenters. In response to carriers' concerns regarding the effect of requiring two operating cycles for LOFT, the agency clarifies that LOFT is intended to be representative of a certificate holder's operation, not a replication of the flight. As described in FAA AC 120-35C Line Operational Simulation: Line Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation, LOFT is conducted as a line operation and allows for no interruption by the instructor during the session except for a non-disruptive acceleration of uneventful en route segments. Accordingly, the crew completing LOFT must complete one taxi-out and one taxi-in during the 4-hours required for LOFT in current § 121.409. Additional segments need only consist of takeoff, climb, en route, descent, and landing.

Commenters state that the proposed requirement for two operating cycles during which a pilot serves exclusively as pilot monitoring or pilot flying was not representative of actual line operations. This proposal would force crews into predetermined pilot flying and pilot monitoring roles irrespective of actual line operations in order to meet the regulatory requirements.

The agency agrees with comments that the LOFT training should be representative of actual line operations. During typical line operations, a pilot may not serve exclusively as either

the pilot flying or the pilot monitoring. Therefore, the final rule does not require exclusive pilot monitoring and flying cycles during LOFT. Instead, the final rule requires pilots who must complete LOFT in accordance with appendix H or who complete LOFT as an alternative to the proficiency check requirement specified in § 121.441, to complete two representative flight segments and to serve as pilot monitoring for a period of time during the LOFT. This change ensures pilots will have an opportunity to practice pilot monitoring under the supervision of a flight instructor or check airman while maintaining a representative scenario-based training environment.

In addition, in the SNPRM, the agency proposed to require part 121 operators to evaluate active pilot monitoring skills. American, ATA, USAirways, Continental, and ASTAR commented that the proposed evaluation requirements § 121.1213 will require the development of new pilot monitoring standards, and grading and data collection methods making the requirement burdensome.

Based on review of the comments and the proposal, the agency clarifies that pilot monitoring is most appropriately assessed in the LOFT environment which is intended to represent a normal operation. Therefore, it would not be appropriate to require monitoring as a discrete training and evaluation item.

The final rule requirement to include pilot monitoring during LOFT does not place any additional simulator time burden on operators who use advanced simulation training programs to train their pilots or substitute LOFT for recurrent proficiency check requirements because the requirement can be met during the ordinary course of any LOFT that is currently part of a part 121 operator's training program. However there may be some burden due to the need to amend an air carrier's training program. This burden has been reflected in the information collection

requirements that are discussed in the Paperwork Reduction Act discussion in Section IV of the preamble. The FAA has included this requirement in the final rule as amendments to paragraph 6 in appendix H and § 121.409.

### **I. Flight Instructor (Simulator) and Check Airmen (Simulator) Training**

Existing §§ 121.413 and 121.414 require flight instructors and check airmen to complete initial and transition ground and flight training. The ground training focuses on instruction and evaluation methods, procedures, and techniques. Sections 121.413 and 121.414 do not currently require ground training on the specific operation and limitations of the simulator or training device.

However, appendix H to part 121 requires certificate holders to provide enhanced instruction for flight instructors and check airmen that serve in advanced simulation training programs. Flight instructors and check airman who serve in a part 121 advanced simulation training program must complete the training required by §§ 121.413 and 121.414, as applicable, as well as annual training identified in appendix H that includes simulator operation, limitations, and minimum equipment required for each course of training.

In §§ 121.1377 and 121.1381 of the SNPRM, the agency proposed requirements for all flight instructors and all check airmen who serve in FSTDs to complete ground training on FSTD use, operation, and limitations based on existing appendix H annual training requirements. To coincide with the SNPRM proposal for flightcrew member recurrent training, the agency proposed an 18 month interval for recurrent flight instructor and check airman training.

Aviation Performance Solutions (APS) expressed specific concern about the qualifications of instructors conducting training in upset recognition and recovery. APS stated

that the delivery of upset recognition and recovery training by instructors who have not first been provided with such information themselves and qualified in the delivery of information and techniques in this area has a high probability of propagating incorrect or unsafe information and techniques. APS recommended that the FAA require instructors to receive training and be specifically qualified to deliver training in the area of upset recognition and recovery.

The FAA agrees with this commenter's concerns regarding the importance of instructor training for upset recovery training. Similar concerns were raised by the 208 ARC, which identified the lack of instructor knowledge, qualification, and standardization as a major hazard for the delivery of upset recovery training.

In the final rule, the FAA has determined that instructor and check airman training must not only contain initial and recurrent training for maneuvers, concepts and techniques but must also include training on both the data and motion limitations of the FSTD. Accordingly, the agency added these enhanced training requirements for flight instructors and check airmen to current §§ 121.413 and 121.414. Further, the FAA has established the recurrent interval for flight instructor and check airmen training at 12 months to coincide with appendix H recurrent training that flight instructors and check airmen who conduct training or checking in FSTDs must complete.

Training on the limitations of the specific FSTD will enable instructors and check airmen to provide upset recovery training consistent with the capabilities and performance of the specific aircraft type. This comprehensive instructor training will not only increase instructor standardization and the quality of upset recovery training, but also reduce the risk of negative training which could easily occur with an untrained instructor. These enhanced instructor and check airmen training requirements are consistent with recommendations of the 208 ARC.



Current training for check airmen and instructors is extensive and the FAA has determined that these new final rule requirements can be integrated into the part 121 certificate holder's current curriculum for check airmen and instructor training.

Commenters including Continental and American stated that the proposed check airmen recurrent training requirements in the SNPRM would result in additional cost to air carriers. The FAA has revised the projected benefits and costs based on the specific provisions that are adopted in this final rule. The final rule recurrent training requirements for flight instructors and check airmen who serve in FSTDs can be accomplished within the instructor and check airman requirements in existing appendix H. Therefore, costs are limited to those costs that may accrue from the revision to existing manuals and training courseware. This burden has been reflected in the information collection requirements that are discussed in the Paperwork Reduction Act discussion in Section IV of the preamble.

#### **J. Remedial Training Programs**

In § 208(a)(2) of Public Law 111-216, Congress directed the Administrator to conduct a rulemaking to require part 121 operators to establish remedial training programs for flightcrew members who have demonstrated performance deficiencies or experienced failures in the training environment. See footnote 2. This statutory requirement for rulemaking is consistent with NTSB recommendation A-05-14 and existing FAA guidance regarding pilot remedial training.

The Congressional direction is similar to NTSB recommendation A-05-14, issued following the Federal Express flight 647 accident in Memphis, Tennessee on December 18, 2003. See NTSB/AAR-05/01. The NTSB's review of Federal Express's pilot training procedures and oversight at the time of the accident revealed that Federal Express's pilot training

program focused on a pilot's performance on the day of the check with little or no review of that pilot's performance on checks months or years earlier. In January 2004, as a result of a series of operational accidents and incidents, Federal Express implemented an enhanced oversight program to identify and track pilots who have demonstrated performance deficiencies or failures in the training environment. The NTSB's report on the accident concluded that a similar proactive program would provide safety benefits for other part 121 operators. Accordingly, in recommendation A-05-14, the NTSB recommended that the FAA require all part 121 operators to establish programs for flightcrew members who 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. The NTSB reiterated recommendation A-05-14 in the Colgan Air flight 3407 accident report (NTSB/AAR-10/01) after the investigation revealed that the pilot demonstrated continued weaknesses in basic aircraft control and attitude instrument flying during multiple evaluations within a 3-year period.

On October 27, 2006, the agency issued SAFO 06015, "Remedial Training for Part 121 Pilots." Consistent with NTSB recommendation A-05-14, in this SAFO, the agency recommended a process to identify pilots with persistent performance deficiencies or who have experienced multiple failures in training and checking. The agency explained that the process should accomplish three objectives: (1) review the entire performance history of any pilot in question; (2) provide additional remedial training as necessary; and (3) provide additional oversight by the certificate holder to ensure that performance deficiencies are effectively addressed and corrected. Following the Administrator's Call to Action to Enhance Airline Safety, in January 2010, the agency confirmed that all part 121 operators had implemented

remedial training consistent with the objectives of SAFO 06015. See FAA Fact Sheet, January 27, 2010.

In the SNPRM, the agency explained that the statutory requirement for the development of remedial training programs for flightcrew members who have demonstrated performance deficiencies or experienced failures in the training environment was included as part of the continuous analysis process (CAP) proposed in § 121.1355. See 76 FR 29336, 29340 (May 20, 2011).

In the SNPRM, the FAA revised the CAP process to include more detailed requirements to ensure that all part 121 operators regularly analyze flightcrew member training and checking and that any deficiencies in flightcrew member performance or operation of the training program are identified and corrected. See 76 FR at 29361. The agency further proposed to require part 121 operators to monitor flightcrew members who completed remedial training. See 76 FR at 29361.

Commenters, including the Regional Airline Association (RAA), questioned whether the proposed CAP was generally duplicative of activities that would be required in accordance with a certificate holder's SMS. Specifically, RAA commented that the CAP proposal unnecessarily duplicates activities that more appropriately fall within the purview of an airline SMS. RAA suggested that, rather than maintaining CAP and SMS as "separate silos" for analyzing a certificate holder's training program, the agency withdraw proposed §§ 121.1355 (applicable to crewmembers) and 121.1441 (applicable to aircraft dispatchers) and incorporate the CAP into the agency's proposed SMS rule.

The agency agrees that elements of the proposed CAP were similar to the proposed SMS requirements. Accordingly, in the final rule, the agency has only retained the pilot-specific

remedial training components of the proposed CAP that complement the proposed SMS requirements. The agency clarifies that the analysis process element of the remedial training program requirement may serve as a component of a robust SMS.

### **1. Analysis Process**

Section 121.415(h) of the final rule retains the SNPRM proposal that each approved training program must include a process for the regular analysis of individual pilot training and checking performance to identify pilots with performance deficiencies during training and checking or multiple failures during checking. The agency recommends that air carriers analyze an individual pilot's performance after completion of any qualification curriculum or recurrent training/checking event. To meet the intent of a regular analysis, the agency expects an air carrier to analyze an individual pilot's performance at least annually. The agency expects this analysis to include a review of the pilot's performance during all training and checking with the air carrier to identify performance deficiencies or multiple failures.

### **2. Remedial Training and Tracking**

The purpose of remedial training and tracking is to ensure that the failures or identified performance deficiencies are addressed and corrected. Therefore, effective remedial training must be tailored to the individual pilot. Possible methods of remedial training include, but are not limited to, one-on-one training with an instructor, repeat of ground or flight training modules, additional LOFT, or a combination of methods. The remedial training requirements in the final rule are consistent with the Air Carrier Safety and Pilot Training ARC recommendations, which called for implementing structured remedial training programs, while retaining flexibility for air carriers to tailor tracking to the individual pilot.

Section 121.415(i) of the final rule requires the approved training program to include

methods for remedial training and tracking<sup>13</sup> of pilots that have been identified during the analysis process required under 121.415(h).

In § 121.1335(b) of the SNPRM, the agency proposed to require that the air carrier monitor (identified as tracking in the final rule) an individual who has completed remedial training until the individual satisfactorily completes the following recurrent training session to ensure the crewmember's competent performance during this period. ATA, American, USAirways, Continental, FedEx, and Southwest commented that the duration of the monitoring (identified as tracking in the final rule) of an individual who completed remedial training was unclear.

After further review of the SNPRM and consideration of the comments, the agency has determined that the certificate holder must have the flexibility to establish the duration of pilot tracking. Pilot tracking is an element of the remedial training process to manage pilots with performance deficiencies or multiple failures to ensure that the performance deficiencies or failures are effectively corrected. The agency expects air carriers to conduct additional observation of pilot performance following completion of remedial training to determine whether the pilot has mastered the maneuver(s), procedure(s) or subject area(s), in which he or she has previously demonstrated weakness. Possible methods of tracking include, but are not limited to, additional PIC line checks, SIC line checks or observations, additional proficiency checks, additional flight training, or a combination of these methods. Given the potential range of identified areas of weakness, the individual pilot performance during remedial training and tracking and the frequency of opportunities to continuously demonstrate proficiency in those

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<sup>13</sup> After further review of the SNPRM, in the final rule remedial training requirements, the agency has replaced the term, "monitoring" with the term, "tracking." The agency made this substitution because the term "monitoring" was inconsistent with existing guidance and to avoid confusion with "pilot monitoring" duties described elsewhere in the final rule.

areas, the agency determined that the necessary time frame for tracking these pilots' performance will vary. The agency expects certificate holders to continue to track a pilot until the performance deficiencies or failures are effectively corrected. The agency also expects each certificate holder's approved training program to include specific indicators used to determine that the pilot has mastered the maneuver(s), procedure(s), or subject area(s) in which the pilot has previously demonstrated weakness.

The agency clarifies that tracking is separate from required recurrent training and checking. Regardless of any additional training or checking that a pilot completes during tracking, recurrent training and checking is still required at the intervals specified in part 121. A pilot's due month for recurrent training or checking may not be changed based on completion of any additional training or checking required by the certificate holder's remedial training and tracking program.

The NTSB and Families of Continental Flight 3407 commented that once a pilot completes a "checkride" there will be no further tracking of this individual even if he or she subsequently experiences difficulty performing a maneuver, similar to the scenario identified during the investigation of the Colgan accident. The requirement for additional tracking of pilot performance is not the only opportunity for a certificate holder to consider a pilot's overall training and checking performance. As previously discussed, the final rule includes the requirement for regular analysis of individual pilot training and checking performance. If a pilot completes tracking and subsequently demonstrates weakness again, this pilot would again be identified during the analysis process. Then, this pilot would again be required to complete remedial training and tracking in accordance with the certificate holder's approved training program.

Families of Continental Flight 3407 commented that enhanced recordkeeping requirements are necessary for a complete assessment of a pilot's performance. The agency believes that existing air carrier training and checking recordkeeping practices provide sufficient information for operators to successfully implement the remedial training program requirements in the final rule. In addition, § 121.683 requires operators to maintain records to demonstrate pilot compliance with the training and qualification requirements of subparts N and O.<sup>14</sup> Records regarding an individual's performance in the training or checking environment are of the type that could be used to satisfy the requirements of § 121.683(a)(1). Accordingly, these records should be currently available for operator use in implementing an effective remedial training program including the regular analysis of pilot training and checking performance.

#### **K. Related Aircraft Differences Training**

Under existing regulations, flightcrew members must complete the training, checking, and qualification requirements for each aircraft type they operate. In addition, due to differences in instrumentation and installed equipment, the skills and knowledge required to operate aircraft of the same type may be different. Therefore, crewmembers trained on one variant of an aircraft type may require additional training to safely and efficiently operate other variants of that aircraft type. This additional training is identified in existing regulations as differences training.

The FAA, through Flight Standardization Boards (FSB), provides analysis of the differences between the variations of existing aircraft types during certification. The analyses are published in a Master Differences Requirements (MDR) document in each FSB report. Under existing regulations, an operator preparing a training program must review the MDR,

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<sup>14</sup> As discussed in section II.B.1. of this preamble, the FAA has initiated a rulemaking project (RIN 2120-AK31) to develop a pilot records database and phase out the requirements of the PRIA found at 49 U.S.C. 44703(h) and will consider the requirements of § 121.683 in the pilot records database rulemaking.

determine the differences between the variants of the aircraft type, and develop a training program, subject to FAA approval, that addresses these differences.

With the rapid advancement in modern technologies, both in manufacturing techniques and systems design and application, industry now incorporates products and processes that have redefined the relationships between and within aircraft types. For example, the technological development of flight guidance computers has produced “fly-by-wire” control laws embedded in computer software that increasingly determine and control the handling or flight characteristics of an aircraft. The use of such technology can produce aircraft types of differing models and aerodynamic airframes, with similar handling or flight characteristics. In addition, modern aircraft systems and displays may allow different type certificated aircraft to have common flight deck and systems designs, such that minimal differences training may be warranted.

Given this technological advancement, when requested by industry, the FSB will analyze and compare aircraft with different type certificates and their associated systems. Through this analysis, the FSB may recommend training reduction for identified similarities between aircraft types. These recommendations are documented in FSB reports for each aircraft and have been used by certificate holders to develop training program curriculums.

In the SNPRM, the agency proposed to extend the differences training concept to aircraft with different type certificates. This proposal would not change existing requirements pertaining to differences training for variants of a single aircraft type.

To address the relationships among aircraft with different type certificates, in the SNPRM, the FAA proposed to add to part 121 a definition for “related aircraft” for use exclusively in the context of flightcrew member training, checking, and qualification. Related aircraft refers to two or more aircraft of the same make (with either the same or different type



certificates) that have been demonstrated and determined by the Administrator to have commonality to the extent that flightcrew member training, checking, recent experience, operating experience, operating cycles, and line operating flight time for consolidation of knowledge and skills may be reduced while still meeting the training and qualification requirements for service on the other aircraft. This definition is consistent with the related aircraft definition in AC 120-53A – Guidance for Conducting and Use of Flight Standardization Board Evaluations. The agency has provided an update to this advisory circular (AC 120-53B) in the docket for this final rule.

Based on the FAA’s experience with evaluating aircraft similarities in the training, checking and operations contexts, in § 121.1206 of the SNPRM, the FAA proposed to allow certificate holders to seek related aircraft designation for aircraft with different type certification for use in part 121 training program development. Having such a designation would allow certificate holders to take advantage of any similarities that may exist between different aircraft types in its operation. Certificate holders could develop a related aircraft differences training program (inclusive of training and checking), make modifications to existing training programs, or seek a deviation from the SNPRM’s proposed recency, operating experience and consolidation requirements.

In the final rule, the agency has added the proposal for related aircraft differences training to § 121.418 and has retained the proposed deviation authority with modifications. Further, consistent with § 121.1223 of the SNPRM, § 121.441(a)(1)(ii) of the final rule requires a PIC to complete a proficiency check in each aircraft type in which the PIC is to serve. Compliance with this provision will be required 5 years after the effective date of the final rule.

A certificate holder may seek a deviation to allow credit for related aircraft operating experience and consolidation, recency of experience and proficiency checking through a deviation request submitted in accordance with §§ 121.434, 121.439, and 121.441 respectively.

Currently, in accordance with § 121.433(d), a PIC who serves on more than one aircraft type must complete either recurrent flight training or a proficiency check on each aircraft type. To ensure PICs operating multiple aircraft types (whether designated as related or not designated as related) maintain proficiency on each aircraft type, the FAA has carried forward the proposal from the SNPRM to require a proficiency check on each aircraft type in which a PIC serves.

The recurrent frequency for a PIC proficiency check in this final rule aligns with the existing recurrent checking frequency of 12 months. The agency does not believe this requirement results in any additional burden or cost to a certificate holder. Section 121.433(d) currently requires a PIC to satisfactorily complete either recurrent flight training or a proficiency check on each aircraft type in which a PIC serves within the preceding 12 calendar months. Therefore, this amendment to § 121.441 does not require any additional time in an FSTD during flightcrew member recurrent training. Additionally, the FAA expects that any training program updates needed to reflect this change are minimal and are subsumed in the paperwork costs for the collective amendments made to the recurrent training provisions.

However, the final rule does allow a certificate holder to seek a deviation from this requirement for aircraft that are designated related. In accordance with § 121.441(f), a certificate holder may apply for a deviation that would allow reduced frequency and/or reduced content of the designated related aircraft proficiency check for PICs. Although the final rule does not amend the existing requirements applicable to SICs in § 121.441(a)(2), the deviation authority

added to § 121.441(f) also permits a certificate holder to seek a deviation from the proficiency check requirements applicable to SICs for designated related aircraft.

The agency notes that, consistent with current practice, the FAA has not established a limit on the number of aircraft types, or variants within a type, on which a flightcrew member may be qualified to serve provided a flightcrew member is able to demonstrate proficiency and complete the training and checking requirements set forth in the certificate holder's approved training program.

Airbus supported the proposal to allow certificate holders to modify their pilot training programs based on FSB related aircraft designation. However, FedEx, Southwest, Continental, ASTAR, American, ATA, and USAirways questioned the necessity for the designation of related aircraft because existing FSB reports already define the relationship between aircraft. Commenters further asserted that they should not be required by regulation to seek approval from the FAA for related aircraft designation a second time outside the FSB process.

The agency clarifies that neither the proposal nor the final rule make any substantive changes to the process by which FSB analysis of aircraft with the same or different type certificates is currently conducted. Currently, part 121 requires differences training for variants of aircraft with the same type certification, but it does not specifically address a differences training concept for aircraft with different type certification. Thus, the agency determined codification of the related aircraft policy in AC 120-53A is necessary.

ASTAR, Continental, American, ATA, USAirways, and Southwest asked the agency to clarify the proposed recurrent training requirements for flightcrew members qualified on related aircraft that required an alternating sequence of flight training and checking for each related aircraft type.

Upon further review of the proposal, the agency has determined that the concept currently in place for recurrent differences training and recurrent evaluations should apply to training on aircraft designated as related. In the final rule, flightcrew member recurrent training must include all required ground training, flight training and checking and crewmember emergency training on a “base aircraft.” For an aircraft designated as related to the base aircraft, each flightcrew member must be trained or trained and checked on the differences as described in the FSB report.

ATA, USAirways, FedEx, Continental, ASTAR, Southwest, and American expressed confusion regarding the use of the term “classification of related aircraft” as proposed in the SNPRM provision that would allow part 121 operators to seek deviations from operating experience, consolidation, and recent experience requirements. These commenters also stated that there is no clear guidance on acceptable reasons for the agency to authorize a deviation from operating experience, consolidation and recent experience based on related aircraft designation.

In response to commenters’ concerns regarding the term “classification of related aircraft,” the agency has amended the final rule deviation language to refer to “designation of related aircraft” for clarity and consistency. Regarding commenters’ concerns about the basis for authorizing deviations from operating experience, consolidation and recent experience, the agency will evaluate a deviation request based on the recommendations in the FSB report. Additionally, the agency notes that under existing requirements and in the final rule, separate operating experience, operating cycles, and line operating flight time for consolidation of knowledge and skills are not required for variations within the same type airplane. See 14 CFR 121.434(a).

ATA, USAirways, FedEx, Continental, ASTAR, Southwest, and American noted that the deviations are now required to be approved by the FAA Director of Flight Standards. These commenters suggest that the deviation authority should remain at the principal operations inspector (POI) level, asserting that a POI who is familiar with the airline's operation, experience levels, and training programs is critical to making a well-founded decision regarding a deviation.

The agency generally agrees with commenters that POIs are the most familiar with the operation, experience levels and training programs of the certificate holder they oversee. However, upon further review of the proposal, the agency has determined that it is more appropriate to address the Administrator's delegation of authority for specific functions associated with related aircraft designations and deviations in guidance material. Accordingly, the final rule reflects this change.

The agency emphasizes that the related aircraft provisions do not create a requirement for an operator to seek designation of related aircraft. A part 121 operator's determination whether to pursue a related aircraft designation or develop related aircraft differences training is voluntary. The alternative to related aircraft differences training is for the part 121 operator to develop comprehensive training programs for any new aircraft type as is currently required.

#### **L. Extended Envelope Flight Training**

Currently, the agency does not require ground or flight training on recovery from aerodynamic (full) stall or upset conditions. In § 208 of Public Law 111-216, enacted August 1, 2010, Congress directed the FAA to require part 121 operators to provide flightcrew members with ground and flight training on the recognition and avoidance of stalls and upsets as well as full stall and upset recovery maneuvers. Public Law 111-216 also directed the agency to implement the recommendations of the expert panel convened to report on methods to increase

flightcrew member familiarity with and response to stick pusher systems and adverse weather events.

Public Law 111-216 followed the Colgan accident in which the flight crew incorrectly responded to both a stall warning and a stick pusher activation resulting in an aerodynamic stall. Additional improper response to the stalled condition precipitated an upset condition from which the flight crew did not recover, resulting in the death of everyone on board as well as one person on the ground and a catastrophic loss of the aircraft.

In the SNPRM, the agency proposed to require flightcrew members to receive flight training on upset recognition and recovery, as well as recovery from full stall and stick pusher activations. The SNPRM also proposed to require pilot ground training on recognition and recovery from stall and upset.

As required by Public Law 111-216, the final rule includes stall and upset ground and flight training. Consistent with Public Law 111-216 and the 208 ARC recommendations, the agency has determined that the greatest safety benefit can be achieved by adjusting the focus of the training requirements to “avoid” or prevent the upset or stall. Accordingly, the final rule promotes pilot manual handling skill development to prevent stall and upsets, coupled with training which allows pilots to quickly recover from developed stalls and upsets. The final rule also includes the proposed requirement for flight training on recovery from bounced landings.

In the final rule, the agency identifies the stall and upset prevention and recovery maneuvers and procedures as “extended envelope training.” The term "extended envelope training" refers to maneuvers and procedures conducted in a FSTD that may extend beyond the limits where typical FSTD performance and handling qualities have been validated with heavy reliance on flight data to represent the actual aircraft. In instances when obtaining such flight

data is hazardous or impractical, engineering predictive methods and subject-matter-expert assessment are used to represent the aircraft adequately in the simulator.

The final rule extended envelope flight training maneuvers and procedures are required in qualification curriculums as proposed in the SNPRM, as well as in recurrent curriculums. The time required to complete the extended envelope training is in addition to existing programmed hour requirements for inflight training.<sup>15</sup>

In the SNPRM, the agency proposed to require all pilots in part 121 operations to complete recurrent training for the extended envelope flight training tasks at either 9 month or 36 month intervals. The agency also proposed to require all pilots to complete recurrent training or evaluation on approach to stall in at least one configuration (clean, takeoff or maneuvering, or landing) every 9 months. A number of commenters raised concern generally regarding the totality of required recurrent training proposed in the SNPRM. However, commenters did not provide specific objections to the proposed training or evaluation frequency for approach to stall or the extended envelope flight training tasks.

In the final rule, the agency replaces the term “approach to stall” with “stall prevention training.”<sup>16</sup> This change does not alter the substantive requirements of existing approach to stall training. The FAA has adopted this terminology change in concert with ICAO and as a result of the FAA/ICAO/EASA joint initiative to study the contributing factors of loss of control inflight, internationally recognized as the LOCART initiative.

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<sup>15</sup> The programmed hours identified in § 121.424 refer to “inflight” training. As defined in 121.401, “inflight” refers to maneuvers, procedures or functions that must be conducted in the airplane. Extended envelope training does not fall within this definition because this training must be completed in a FFS. Therefore, the pilot inflight training programmed hours have not been amended to account for the additional time required for these new training requirements.

<sup>16</sup> The agency considers stall prevention training and approach to stall training as synonymous. As such, the FAA is not requiring certificate holders to adopt this new nomenclature in any documentation. However, the FAA will revise AC 120-109 and make other conforming changes to adopt this terminology in future rulemakings and guidance.

The FAA has determined that the term “stall prevention training” more accurately describes the training objective intended by the existing “approach to stall” maneuvers. This terminology change also draws a clearer distinction from the full stall recovery training introduced in this final rule. As described in AC 120-109, pilots should continue to be trained that the primary response at the first indication of a stall is to reduce the angle of attack.

The recurrent frequency for stall prevention (approach to stall) training and evaluation and the extended envelope maneuvers training in this final rule aligns with the existing recurrent training and evaluation frequency of 6 months for PICs and 12 months for SICs. The extended envelope maneuvers training focuses on manual handling skills for proper response to development of slow flight, stall prevention and loss of reliable airspeed. Accordingly, in the final rule, the agency has increased the frequency for these manual handling maneuvers from the proposed rule and decreased the frequency of recurrent training proposed for stall and upset recovery from the proposed rule to target resources to the areas in which the greatest safety benefit can be achieved. As a result, and in order to encourage a cohesive training approach, the agency has determined that every 24 months, upset and stall recovery should be trained together with the manual handling skill development. The agency further notes that this frequency is consistent with the 208 ARC recommendation that upset recovery should be trained no less frequently than every 36 months.

Additionally, in furtherance of stall prevention, the agency ensures that the existing requirement to train or evaluate approach to stall every 12 months is maintained even if a part 121 operator substitutes line-oriented simulator training or LOFT for alternating SIC recurrent training. Training and checking on stall prevention (approach to stall) provides the greatest



benefit in that proficiency in this area provides the highest likelihood that the pilot will be able to avoid the onset of stall or upset.<sup>17</sup>

Also, in the final rule, the agency is furthering the training concepts developed in the Pilot Certification rule. The requirements in both this final rule and the Pilot Certification rule use academic training to develop foundational knowledge and then consolidate that knowledge with FSTD training and experience. Together, these final rules require certificate holders to effectively provide a building block approach to learning for pilots. Developing the broad concepts of aerodynamics in the ATP CTP to the type specific aerodynamic concepts now required in an air carrier's training program, serves as an effective method to deliver the training mandated by Public Law 111-216 and recommended by the 208 ARC.

Enhanced academic knowledge, emphasis on prevention training, and the recommended recovery techniques developed by the Original Equipment Manufacturer (OEM) constitute a complete training solution. The agency expects that if this solution is properly delivered, it will have a significant effect on the LOC-I statistics.

### **1. Upset Prevention and Recovery**

Existing regulations do not specifically require pilots to receive flight training on upset prevention and recovery. The Colgan Air flight 3407 and American Airlines flight 587 accidents reinforced the need for this training because each involved sudden or unexpected aircraft upset.

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<sup>17</sup> The agency notes that currently, line-oriented simulator training (also referred to as line oriented flight training or LOFT) may be substituted for alternating SIC recurrent training which may exclude stall prevention (approach to stall) training. See §§ 121.409 and 121.441. For this reason, the final rule ensures that stall prevention training must be conducted every 12 months even if a part 121 training program substitutes LOFT for alternating SIC recurrent training.

In the NPRM, the agency proposed to require flight training for upset recognition and recovery during every qualification curriculum and during recurrent training. In the SNPRM, the agency added a requirement for pilots to be evaluated on this task.

*Upset prevention:* The greatest safety benefit can be achieved if an upset condition is prevented through proper pilot intervention. Although the agency supports training pilots on recovery skills for a developed upset, the probability of recovery from the upset condition decreases with the magnitude of the divergence from the desired flight path. Accordingly, the final rule extended envelope flight training includes both training on manual handling skills to enhance a pilot's ability to prevent upset, as well as training to recover from an upset condition. Each of these concepts is derived from recommendations received from the 208 ARC.

The purpose of requiring manual handling skills is to ensure correct pilot control inputs to avoid undesired flightpath deviations. Manual handling skills are essential to the prevention of stall and upset because they allow a pilot to master the aircraft's flight path without the use of total automation. Development and maintenance of these skills are necessary to keep pilots engaged in the operation of the aircraft and more easily allow them to become re-engaged if an abnormal problem arises which prohibits automation or typical flight path guidance. Thus, the final rule maintains the SNPRM proposal to require, as part of the extended envelope flight training, manual handling training throughout all phases of flight to better develop a pilot's core manual handling skills and consolidate the principles of airplane energy management.

Pilots must know the common errors to avoid and why they occur, as well as the importance of cross-checking and verifying inputs and communication and coordination between pilots. It is also critical for pilots to know how the airplane responds to inputs across all flight regimes (e.g., high and low altitudes, airspeeds, and energy states).

Accordingly, the training requirements in the final rule include manually flown arrival and departure, slow flight, and flight with loss of reliable airspeed. The agency expects that training on these maneuvers and procedures will provide pilots with the manual handling skills necessary to prevent undesired flight path divergence.

*Manually controlled arrival and departure:* In the SNPRM, the agency proposed to require pilots to complete training on manually controlled departure and arrival. The agency did not receive any comments on the proposal to train these maneuvers.

Existing appendices E and F of part 121 currently require area departure and area arrival for both training and checking, but these maneuvers need not be performed manually. Modern aircraft are commonly operated using autoflight systems (e.g., autopilot or autothrottle/autothrust). Autoflight systems are useful tools for pilots and have improved safety and workload management, and thus enabled more precise operations. However, continuous use of autoflight systems could lead to degradation of the pilot's ability to quickly recover the aircraft from an undesired state. Therefore, the agency has retained the provisions regarding manually controlled arrival and departure in the final rule.

*Slow flight:* In the SNPRM, the agency proposed to require "slow flight" training during qualification and recurrent training to provide pilots with an understanding of the performance of the airplane and "hands-on" exposure to the way the airplane handles at airspeeds that are just above the stall warning. Similarly, the 208 ARC recommended slow flight as a task which can develop a pilot's manual handling skill.

ALPA and an individual supported the proposed addition of slow flight to pilot training curriculums. However, ALPA expressed concern regarding the target speeds specified for slow flight in the draft advisory circular published with the SNPRM (AC 120-FCMT), which are set

as those between the onset of stall warning and aerodynamic stall. ALPA believes that the airspeed for slow flight should be established by the manufacturer (such as  $V_{ref}$ ) and be near the onset of stall warning indication, but fast enough that stall warnings would rarely, if ever, be activated. ALPA further states that requiring slow flight practice at speeds that require pilots to continuously fly while ignoring impending stall indications would result in negative training and could cause pilots to become desensitized by the approach to stall warnings.

The FAA agrees that encountering continuous stall warnings during slow flight practice without initiating an immediate stall recovery procedure would result in negative training. The target speed for slow flight must be below the speeds that are normal and appropriate for the various configurations, but targeted to avoid stall warning devices. Further, the FAA concurs with the use of  $V_{ref}$  for the configuration which should allow for the necessary experience in low speed/low energy handling characteristics with sufficient margins to avoid stall warning/stall onset with proper airspeed control. The agency will revise draft guidance contained in AC 120-FCMT on slow flight accordingly.

*Loss of reliable airspeed:* Finally, practice and experience with the recognition of and appropriate response to a system malfunction that results in loss of reliable airspeed is essential to minimizing the risk of stall and upset. Failure or erroneous display of critical flight information, such as airspeed, can lead to an upset if loss of energy is not quickly recognized and aircraft control is not maintained. As such, loss of reliable airspeed has been included in the final rule extended envelope training requirements.

The training of an airspeed indication system malfunction is critical for a pilot's understanding of type specific failure modes. Additionally, cascading failure of other dependent systems provides a training environment, which allows a pilot to practice manually handling an

aircraft with varying degrees of automation and capabilities that may be present during upset. In many instances, the loss of reliable airspeed results in an aircraft which must be flown primarily by relying on pitch and power. Further, these maneuvers require an understanding of the aerodynamic qualities of large transport category aircraft. Therefore, this training requirement covers a broad spectrum of conditions that could be encountered during the period in which the upset could be prevented as well as during recovery. The training is also consistent with 208 ARC recommendations regarding pilot awareness of how system malfunctions affect their specific aircraft and the recommendation to provide more manual handling skill training with emphasis on the aircraft's pitch and power relationship.

*Checking extended envelope flight training maneuvers:* In the SNPRM, the agency proposed to require evaluation of two components of the extended envelope training – recovery from full stall and upset. Atlas Air recommended against any evaluation of upset recovery or any other maneuvers and procedures in this area. This commenter stated that the requirement to evaluate upset recognition and recovery skills will not improve pilot response and will likely have a negative unintended consequence that will far outweigh any perceived benefit of evaluating the maneuver.

Upon further review of the proposal and comments, the agency has removed the requirement to evaluate upset recovery from the final rule because the agency agrees that a successful recovery is somewhat difficult to quantify due to the multitude of variables involved. This final rule increases the academic knowledge of pilots, requires increased instructor training to deliver these concepts, develops pilot's manual handling skills which aid in upset prevention, and trains the pilots in proper recovery techniques. Achieving the learning objective defined in the recovery maneuvers is paramount.

*Evaluation and approval of upset training programs:* Commenters also raised concerns regarding upset training. APS recommended that the FAA produce guidance for the evaluation and approval of programs of instruction in upset recognition and recovery that includes stipulations for appropriate content, methodology, and delivery of training.

The FAA concurs with the commenter's recommendation and will provide operators and training providers with sufficient and comprehensive guidance on the academic content, validated maneuvers, and appropriate cautions for the delivery of upset prevention and recovery training. In developing guidance, the agency has considered the recommendations of the 208 ARC on many aspects of training upset prevention and recovery in FSTD, including the scope and objective of conducting this training in an FSTD; the training device requirements; the instructor requirements; the academic training elements required before beginning upset prevention and recovery training in an FSTD; the flight training elements required including slow flight and manual handling training; and, the completion criteria for upset prevention and recovery training in an FSTD. In making its recommendations, the 208 ARC considered information provided by experts on LOC-I causal factors and reviewed previous guidance such as the Airplane Upset Recovery Training Aid (AURTA) produced by Airbus/Boeing and endorsed by the Flight Safety Foundation. The FAA has included a copy of the ARC recommendations in the docket for this rulemaking.

*Data and qualification of FSTDs:* FlightSafety commented that most data packages do not contain the information and data necessary to model a FFS to accomplish the required upset recognition and recovery training. FlightSafety further commented that a mandate to train a recovery technique to use for a specific aircraft type without OEM data and/or FAA approved procedures would not improve training or safety. APS raised the same concern based in part on

the expectation that extreme pitch and roll angles would necessarily be part of upset recognition and recovery training.

The FAA shares the commenter's concerns on the use of validated aircraft data and addresses this concern later in this section of the preamble. However, the agency disagrees with the assertion that upset recovery training must contain extreme pitch and roll angles. The FAA sought recommendations on this issue from the 208 ARC. The 208 ARC reviewed the work completed by such groups as the developers of the AURTA, the Industry/FAA Stall Work Group, and the International Committee for Aviation Training in Extended Envelopes (ICATEE). The 208 ARC validated much of the previous work done by each of these groups and used the AURTA Revision 2<sup>18</sup> and the FAA AC 120-109<sup>19</sup> as the basis of their recommendations. The ARC recommended the FAA use these two documents as source documents for the development of advisory material for upset prevention and recovery training.

Further, an airplane OEM group was also established within the 208 ARC to develop recommended standard OEM guidance for the recovery from nose-high/nose-low upsets. Airbus, ATR, Boeing, Bombardier, and Embraer developed the upset prevention and recovery template contained in the advisory material published with this final rule.

The FAA is satisfied the upset recovery techniques developed in conjunction with this final rule are appropriate. Each maneuver and associated recovery was developed by OEMs and has been validated to remain in both the data and motion limitations of a Level C or Level D FFS if conducted properly. The FAA also stresses that the increased instructor and check airmen training will allow instructors and check airmen to recognize any excursions outside of the data or motion capabilities of the device and debrief pilots on any such event.

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<sup>18</sup> [http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/training/media/AP\\_UpsetRecovery\\_Book.pdf](http://www.faa.gov/other_visit/aviation_industry/airline_operators/training/media/AP_UpsetRecovery_Book.pdf)

<sup>19</sup> [http://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC%20120-109.pdf](http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%20120-109.pdf)

*Expand "Upset" definition:* Calspan recommends the following expanded definition of upset: "An aircraft upset is further defined as an airplane unintentionally exceeding the parameters normally experienced in line operations or an event that alters the normal response of the airplane to pilot input such that the pilot must adopt an alternate control strategy to sustain or regain controlled flight."

Calspan commented that the definition of upset used in the NPRM does not capture how the precipitating event may impact the pilot's ability to control the aircraft. A number of accidents have occurred where a control failure or disturbance significantly altered the normal response of the airplane to pilot input such that conventional control strategies proved to be inadequate. Calspan further commented that the NPRM cited numerous NTSB recommendations developed from accidents that resulted in extreme upset conditions precipitated by an underlying control system issue. Calspan stated that these accidents were in fact controllable had the crew executed proper alternate control responses, but without upset recovery training they did not possess the knowledge and skill necessary to safely recover.

The FAA agrees that alternate control strategies are a component of a well-developed upset prevention and recovery training program. In guidance material developed for upset prevention and recovery, the agency will discuss the advantages and cautions for using alternate control strategies when primary control responses are not effective. However, the FAA disagrees with the commenter's assertion that most cited upset accidents were a result of control system issues. In the most recent accidents such as Colgan Air flight 3407, American Airlines flight 587 and USAir flight 427, the NTSB identified improper pilot response as a contributing factor.



Further, the FAA is not persuaded that the description of upset should be changed as recommended by the commenter. The agency continues to recognize the description of upset proposed in the NPRM. This description is also consistent with the AURTA and the 208 ARC recommendations.<sup>20</sup>

## **2. Stall Prevention and Recovery**

In the SNPRM, the agency proposed to require pilots to train on recovery from full stall. Further, the agency proposed to require that, for pilots operating aircraft equipped with stick-pusher, stall recovery training must be completed by going through stick pusher release. Although the agency did not receive any comments objecting to the proposed requirement to train recovery from full stall in general, the agency did receive a number of technical comments regarding this proposed flight training. For example, ALPA commented that ICATEE has concluded that there is a need and a benefit for training pilots to the full aerodynamic stall because aircraft behavior in a full aerodynamic stall is very different from the aircraft behavior in an approach to stall condition. However, ALPA cautioned that the ICATEE recommendation for full-stall training should be put into place only if the aerodynamic model of the aircraft in the FFS is representative of a full aerodynamic stall in flight; the instructor pilot is given enhanced training in upset recovery training; and the FFS has feedback capability to assist the instructor and pilots in ensuring the stall training is conducted and evaluated properly. The agency agrees

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<sup>20</sup> In the NPRM Upset Recognition and Recovery is described as follows:

6.5 Task: Upset Recognition and Recovery

(d) Reference the most current version of the Industry's Airplane Upset Recovery Training Aid. An aircraft upset is almost universally described as exceeding one or more of the following:

(1) Pitch attitude greater than 25° nose up.

(2) Pitch attitude greater than 10° nose down.

(3) Bank angle greater than 45° or within these parameters, but flying at airspeeds inappropriate for the conditions.

with ALPA's comments and addresses these comments throughout the preamble. The separate part 60 rulemaking initiative previously noted is also responsive to the issues raised by ALPA.

*One recovery procedure:* ALPA commented that the FAA-Industry Stall/Stick Pusher Work Group concluded that successful recovery from an impending stall and a full aerodynamic stall, require the same procedure. ALPA supports an approach in which pilots are trained to treat an "approach to stall" the same way as a "full stall." Further, ALPA commented that this would simplify pilot recognition and response to an impending stall and allows for a single pilot conditioned response (i.e., one recovery procedure) to both approach to stall warning and full aerodynamic stall.

The agency agrees with the comments regarding one procedure for recovery from an impending stall and full aerodynamic stall. In AC 120-109, Stall and Stick Pusher Training, the agency stresses that pilot training should emphasize treating an "approach to stall" the same as a "full stall." This common recovery procedure is also consistent with the recommendations from the 208 ARC for stall prevention and recovery.

*Stall training methods and evaluation:* FlightSafety commented that, in practice, a pilot should initiate a stall recovery at the first indication of a stall or at least at the stick shaker warning. However, in the SNPRM, the agency proposed to require stick pusher training that would give a pilot the experience of allowing an aircraft to go through early warning signs of stall, including stick shaker, so that they experience stick pusher. Thus, FlightSafety believes the requirement as proposed will not enhance safety. Further, FlightSafety recommends conducting stick pusher recovery as a demonstration, with training emphasis placed on recovery well before stick pusher activation.

Similarly, while ALPA agrees with industry experts that full-aerodynamic stall training and recovery should be demonstrated as a “train to proficiency maneuver,” ALPA states that full-aerodynamic stall should not be an evaluated item. ALPA states that only stall recoveries initiated at the first sign of the stall should be evaluated. ALPA recommends that the final rule incorporate the recommendations from the FAA-Industry Stall/Stick Pusher Work Group by maintaining the training requirement as a demonstration maneuver but removing the requirement to evaluate full stalls and stalls to stick pusher activation.

The FAA agrees with the FlightSafety and ALPA comments regarding evaluation and traditional training methods for recovery from full stall and stick pusher release. As discussed earlier, given that recovery procedures for approach to stall and full stall are the same, to avoid the potential for negative training that might occur by having pilots avoid early warning signs of stall, the FAA is not requiring evaluation of recovery from full stall.

In § 121.423, added to subpart N by this final rule, the agency has revised the recovery from full stall and stick pusher activation tasks. In the final rule, recovery from full stall and stick pusher activation are instructor-guided hands-on experience tasks only. This training will emphasize the recovery by the pilot incorporating the same angle of attack (AOA) principles from the stall prevention (approach to stall) training. Accordingly, in the final rule, neither full stall nor stick pusher is evaluated during a proficiency check.

Further, just as with upset training, the FAA has focused training on maneuvers that develop a flightcrew member’s skill of preventing stalls. The FAA will continue to emphasize training and checking of prompt recovery at the first indication of a stall. Approaches to stalls (stall prevention training) are critical maneuvers which gauge a pilot’s understanding and early

response to stall indications including stall warning; as such the final rule maintains existing requirements for evaluation of this task.

*High altitude approach to stall maneuver:* ALPA recommends splitting the proposed requirement to complete training on stalls in a “clean configuration” into two separate tasks: one for high altitude and one for low altitude because high altitude stalls have unique issues that should be separately trained. Although the FAA agrees with the comment regarding differences between high altitude stalls and low altitude stalls, in the final rule, the agency continues to require recovery from approach to stall as it exists in current appendices E and F (i.e., requiring training in at least takeoff, clean and landing configuration). The agency does not specify the scenarios for stall prevention (approach to stall) in order to provide part 121 operators with the flexibility needed to develop a training methodology most appropriate for their operation.

However, in AC 120-109, the FAA recommends that air carriers incorporate high altitude stall prevention training into their training programs. This AC also recommends training on the differences between low altitude and high altitude stall prevention and appendix 2 of the AC includes a sample training scenario of a clean configuration high altitude approach to stall.

*Manufacturer stall recovery procedures:* ALPA notes that the SNPRM did not consider that manufacturers are developing and publishing stall recovery procedures for each specific aircraft. ALPA recommends that the final rule and stall recovery guidance recognize this development by including language to ensure that the pilot correctly executes the manufacturer-recommended stall recovery procedure in the Flightcrew Operating Manual (FCOM) and returns the aircraft to a safe flying condition. The agency agrees with ALPA and in AC 120-109 emphasizes that the manufacturer’s recommended stall recovery procedure takes precedence over the generic recovery template.

*Recovery and training criteria:* ALPA commented that stall recovery training and evaluation criteria should not mandate a predetermined altitude or emphasize a “minimum loss of altitude.” Similarly, Atlas Air stated that it has difficulty with overemphasis on “minimizing altitude loss” for approach to stall training.

In response to commenters’ concerns regarding stall recovery training and evaluation criteria, the agency notes that it has recently issued a number of information and guidance documents to assist air carriers with properly and consistently evaluating pilots’ recovery from approach to stall. The agency initially issued SAFO 10012, Possible Misinterpretation of the Practical Test Standards (PTS) Language “Minimal Loss of Altitude,” to clarify the intent of the requirement for “minimal loss of altitude” during evaluation of recovery from approach to stalls. Then, in August 2012, the agency published AC 120-109, Stall and Stick Pusher Training, emphasizing that the primary goal of testing or checking recovery from approach to stall is to evaluate a pilot’s immediate recognition and response, which should be an immediate reduction of AOA. Additionally, the agency has revised the approach to stall evaluation criteria in the ATP PTS. The ATP PTS revision eliminates the language referring to “minimum loss of altitude,” emphasizes reduction of AOA over maintaining altitude, and also recommends that one of the three required approach to stalls should be accomplished while the autopilot is engaged.

### **3. Recovery from Bounced Landing**

In the SNPRM, the agency proposed to add training on recovery from bounced landing to initial and transition curriculums. The agency also proposed to require that pilots complete recovery from bounced landing in recurrent training. The agency determined that the appropriate recurrent training interval for this task was 36 months based on the agency’s balancing of the potential risk with the frequency of such an event.

The FAA determined that training on recovery from bounced landing is necessary based on FAA review of accident history including FedEx flight 859. On September 14, 2004, a Boeing McDonnell Douglas MD-11F operating as FedEx flight 859 experienced a tail strike during a go-around maneuver from Memphis International Airport. Neither of the two flightcrew members was injured. In its investigation of this accident, the NTSB found the probable cause was the pilot's over-rotation during a go-around maneuver initiated because of a bounced landing. See NTSB Event ID DCA04MA082.

Upon further review of the accident history related to bounced landings, and comments submitted by the NTSB, the agency agrees with the NTSB that the bounced landing proposal is responsive to NTSB recommendation A-05-30 issued following the American Eagle flight 5401 accident in San Juan, Puerto Rico. On May 9, 2004, American Eagle flight 5401 skipped on initial contact with the runway. Then, after the initial touchdown, the PIC took control of the airplane. Flight data recorder (FDR) data indicated that after taking control, the PIC made several abrupt changes in pitch and power, which led to two bounces before the airplane crashed at Luis Muñoz Marin International Airport. The PIC was seriously injured; the SIC, 2 flight attendants, and 16 of the 22 passengers received minor injuries. The NTSB concluded that company guidance on bounced landing recovery techniques would have increased the possibility that the PIC could have recovered from the bounced landings or handled the airplane more appropriately by executing a go-around. The NTSB recommended that the FAA take action to require all part 121 and part 135 operators to incorporate bounced landing recovery techniques in their flight manuals and to teach these techniques during initial and recurrent training.

On June 9, 2006, the FAA issued SAFO 06005, Bounced Landing Training for certificate holders operating under Title 14 of the Code of Federal Regulations (14 CFR) parts 121 and 135.

This SAFO recommends that each part 121 or 135 operator check to see that bounced landing recovery techniques are included in the manuals used by their pilots and in their initial ground training for each of the airplane types that the operator flies. The SAFO also recommends that those same techniques are reinforced by briefings and debriefings during flight training, supervised operating experience, and line checks. The SAFO includes instructions on how to develop bounced landing recovery techniques if not already addressed by the operator.

In 2009, the FAA enlisted the assistance of the ATA and the RAA to poll part 121 and 135 member carriers to find out if they incorporated recovery from bounced landing into their training program as SAFO 06005 suggests. Both organizations reported 100 percent implementation of the SAFO's recommendations.

The final rule requirements for flight training in an FFS on recovery from bounced landing supplements the ground training recommended by SAFO 06005. The agency has included the proposal for bounced landing training in the final rule subject to the modification described in the following discussion. In the final rule, the FAA has determined that recovery from bounced landing must be trained during all qualification training curriculums, including upgrade. The agency notes that any maneuver or procedure that is trained in recurrent must be covered in the pilot's qualification training because the pilot's base month for recurrent is reset upon the completion of the qualification curriculum. If an upgrade curriculum does not also include all maneuvers and procedures required by the recurrent curriculum, then the recurrent interval for a maneuver or procedure may be extended.

FlightSafety questioned how training would be developed for an aircraft that does not have written procedures for recovery from bounced landings and whether the FAA developed a training tool and syllabus for simulator training. FlightSafety further commented that if the

agency has developed a training tool and syllabus for simulator training, it would question the data that forms the basis for the tool.

In the draft Flightcrew Member AC (AC 120-FCMT) published for comment with the SNPRM, the agency developed generic procedures and performance expectations for recovery from a bounced landing, including techniques for avoiding overcontrol and premature derotation during bounced landings. These procedures were based on a review of the accidents and extensive FAA and industry experience with these accidents and incidents. However, the FAA expects that the recommendations of the aircraft OEM to take precedence regarding procedures that may differ from any published FAA guidance.

#### **4. Use of Full Flight Simulators for Extended Envelope Flight Training**

Currently, air carriers may voluntarily use simulators for varying amounts of the training and checking required by subparts N and O. The agency requires an airplane simulator for windshear training only. See § 121.409(d). However, the FAA has long recognized that the use of simulation in flight training provides an opportunity to train, practice, and demonstrate proficiency in a safe, controlled environment.

In the SNPRM, the agency proposed to require all flight training and evaluation to be completed in an FSTD. This requirement included a range of FSTDs from Level 4 flight training devices (FTDs) through Level D FFSs depending on the maneuver or procedure. For the extended envelope maneuvers and procedures, the agency proposed to allow the use of FFSs ranging from Level A to Level D.

For certain maneuvers required in part 121 pilot training, such as the maneuvers included in the extended envelope training requirements, motion provides cues that may affect pilot control strategies and subsequently, vehicle performance. Motion serves as an essential element



of a task when, in order to complete the task, the flightcrew member must make continual adjustments based on any number of sensory inputs. Accordingly, for those training tasks where motion is critical to achieving the training objective, such as “recovery from stall,” an FFS is essential to successful training outcomes.

Although commenters generally supported the agency’s proposal to require FSTDs for all flight training and evaluation, some air carriers such as Continental, United, and JetBlue were generally critical of the agency’s reliance on FFSs, noting that effective training programs currently in place use a combination of FFSs and FTDs to deliver training. Other commenters such as the International Association of Machinists and Aerospace Workers (IAMAW) and the Transport Workers Union of America (TWU), ALPA, and APS stated that only the highest levels of FSTDs should be used to deliver training citing concerns including the risk for negative training. APS commented specifically that operators should be required to use the highest level of device available to train upset recognition and recovery because, considering the high consequence nature of aircraft upset events, every effort should be made to provide pilots with the greatest fidelity possible in order to learn the skills necessary for prevention and recovery from a LOC-I situation.

The agency has not included the proposal to require all flightcrew member training to be completed in an FSTD although currently, most operators use FSTDs in pilot training programs. The final rule does, however, require the extended envelope training required in § 121.423 to be completed in a FFS. The agency addresses the APS comments regarding the use of the highest level of device available for training upset events in the discussion on the requirement for Level C FFSs.

*Level C FFS:* In the final rule, the agency continues to require the extended envelope flight training maneuvers and procedures to be completed in an FFS. However, the final rule requires a minimum of a Level C FFS because these devices provide the highest level of aerodynamic modeling, visual fidelity and motion cueing to replicate the aircraft for motion based pilot training. The requirement to use a Level C or higher FFS is consistent with current appendix H requirements for Advanced Simulation Programs that do not permit Level B devices except in limited circumstances. Further, the 3-degree-of-freedom motion cues provided by Level A and B devices do not provide the level of fidelity required to meet the training objectives of the extended envelope flight training maneuvers and procedures as compared to the 6-degree-of-freedom requirements for Level C and higher devices.

In response to comments suggesting that the highest level of device is required for training in a simulated environment, the FAA has determined that the current distinction in capabilities between a Level C and Level D FFS is negligible for the extended envelope training included in this final rule. The primary difference that exists today between a Level C and a Level D FFS is the evaluation of vibration and sound. Level D evaluation involves objective criteria while Level C evaluation of vibration and sound is subjective.

*Deviation Authority:* Although the final rule applies the requirement to train in an FFS to a limited number of tasks, the agency has considered comments on the FSTD deviation authority proposed in the SNPRM as they relate to the final rule requirements. In the SNPRM, the agency proposed a means by which certificate holders could seek a deviation from the requirements to complete all flight training in an FSTD. The proposed deviation authority contemplated the use of an aircraft as an alternate training platform.

ASTAR commented on the SNPRM deviation authority, stating that the FSTD requirements in the SNPRM did not recognize that some operators fly older aircraft for which the level of simulator required exists in limited numbers or does not exist at all. The National Air Carrier Association, Atlas Air, and six individuals commented on deviation authority generally, opposing a deviation authority that allows training in lower level devices than those specified for each flight training task in the SNPRM.

The agency agrees that the challenges identified by ASTAR may arise with respect to the requirement to use a Level C or higher FFS for extended envelope flight training, although currently over 95% of FAA-evaluated FFS devices that replicate part 121 aircraft are either a Level C or higher FFS. Therefore, in those limited instances in which a Level C or higher FFS does not exist (e.g., certain older fleets such as the Convair 580) or for extraordinary reasons, access to a Level C or higher FFS is limited, a carrier may apply for FAA consideration of a deviation in accordance with the process described in § 121.423(e) of the final rule. Conducting extended envelope flight training inflight presents significant safety risks. Therefore, the extended envelope maneuvers and procedures must be trained in a controlled simulated environment or through another means by which the learning objectives can be achieved.

*Training in Other Devices:* Two training providers, ETC and Calspan, commented that current capabilities of existing FSTDs are limited in their ability to fully train crewmembers in the competencies needed to prevent and recover from LOC-I events because they cannot replicate the stressors that will be present. These commenters and APS suggested using alternate training resources (e.g., in-flight simulation aircraft or a continuous-g motion platform) in conjunction with FSTD and academic training. Calspan commented that academic training should be augmented with both an in-flight simulator and ground-based FFS training.

The agency intends for the extended envelope training to include ground training and flight training in a FFS. At this time the agency does not have sufficient information by which to determine the safety and effectiveness of the alternate training devices proposed by commenters. Enhanced academic knowledge, emphasis on prevention training and the recommended recovery techniques developed by the OEM constitutes a complete training solution. The agency has determined that if this solution is implemented properly, it will have a significant effect on the LOC-I statistics.

*Consistency with International Civil Aviation Organization (ICAO) 9625:* United, Continental, and USAirways stated that the FSTD requirements proposed in the SNPRM are inconsistent with some of the more progressive concepts in contained in ICAO Document 9625 which seeks to align simulator standards and training tasks on a global basis. It is designed to address all levels of pilot training and licensing, which is outside of the scope of the SNPRM.<sup>21</sup> Although the final rule does not contain many of the maneuvers contemplated by the SNPRM, the remaining maneuvers and FSTD requirements are consistent with the standards contained in the ICAO Document 9625.

*Device Qualification:* ALPA, FlightSafety, and Families of Continental Flight 3407 commented that existing FFSs lack the data package containing the information required to create the aerodynamic model necessary to accomplish full stall and upset recovery training. ALPA further commented that modifications to part 60 are also necessary for existing FSTDs to

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<sup>21</sup> International Civil Aviation Organization (ICAO) Document 9625 addresses the use of Flight Simulation Training Devices (FSTDs). The methods, procedures and testing standards contained in this manual are the result of the experience and expertise provided by National Aviation Authorities (NAA), aeroplane and FSTD operators and manufacturers. Document 9625 may be obtained from ICAO at [www.icao.int](http://www.icao.int).

address bounced landings, as well as tasks such as icing, microburst and windshear, so as to avoid negative training in these areas.

APS stated that there are Instructor Operating Station (IOS) capabilities that could enhance training in upset recognition and recovery. APS recommends that an FSTD specification be created for the qualification of newly manufactured devices which calls for information to be provided to the instructor indicating whether or not the FSTD is being operated within the valid training envelope for that device.

The FAA agrees with commenters that modifications to part 60 are necessary to train the extended envelope flight training tasks, but such modifications are outside of the scope of this rulemaking. Imposing new FSTD evaluation requirements will require revisions to the qualifications standards in part 60 (for newly qualified FSTDs) or an FSTD Directive (for previously qualified FSTDs). Accordingly, the FAA has initiated rulemaking to address the necessary changes to part 60 which will be needed to deliver the FFS fidelity and IOS tools needed to effectively deliver many of the extended envelope training tasks. Amendments to part 60 qualification standards for extended envelope training and the IOS panel upgrades are also responsive to the recommendations for simulation improvements from the 208 ARC.

The FAA believes that the 5 year compliance period in this rule provides an ample amount of time for an FSTD sponsor to conduct any necessary modifications as may be required by amendments to part 60 to ensure the FSTD validation limits are sufficient to conduct the required training tasks.

#### **M. Extended Envelope Ground Training**

Currently, the agency does not require specific ground training on stall or upset recovery concepts. As stated above, § 208 of Public Law 111-206 directed the FAA to require part 121

operators to provide flightcrew members with ground and flight training on the recognition and avoidance of aerodynamic stalls and upsets as well as aerodynamic stall and upset recovery maneuvers. The agency proposed to require training on these two ground training subjects in the SNPRM (Table 2A in attachment 2 of appendix Q). The agency did not receive any comments on this proposal.

The final rule includes training on stall prevention and recovery as well as upset prevention and recovery. In the final rule, the agency identifies upset ground training as upset prevention and recovery. The modification focuses the training requirements on knowledge to create awareness and the ability to prevent an occurrence of upset, rather than focusing solely on training after the upset has already occurred and recovery is necessary. Prevention serves to avoid incidents and includes any pilot action to avoid a divergence from a desired airplane state prior to entering an upset event. Recovery training serves to reduce accidents as a result of an unavoidable upset event. Accordingly, recovery refers to pilot actions that return an airplane that is diverging in altitude, airspeed, or attitude to a desired state. This change to ground training is consistent with the recommendations of the 208 ARC, convened by the FAA as required by § 208 of Public Law 111-216.

In the final rule the agency included ground training on full stalls and upset as additions to current § 121.419, Pilots and flight engineers: Initial, transition, and upgrade ground training. Section 121.427 requires that the subjects covered in § 121.419 are covered in recurrent training as well. Due to the addition of these subjects, the agency has adjusted the existing required programmed hours for initial and recurrent ground training. The agency has determined that 2 additional hours are required for initial training and 30 additional minutes are required for

recurrent training, based on a review of the content required for training these subjects and the agency's experience evaluating and approving training programs.

#### **N. Communication Records for Domestic and Flag Operations**

Under the current regulations, § 121.711 requires certificate holders conducting domestic or flag operations to record all en route radio contacts between the certificate holder and its pilots and to keep the record for at least 30 days. Existing § 121.711 recodified 14 CFR 40.512, which provided that "[e]ach air carrier shall maintain, and retain for a period of 30 days, records of radio contacts by or with pilots en route." The rationale behind this rule, as stated in the preamble to the NPRM that proposed § 40.512, was to "enable the [Civil Aeronautics] Board and the Administrator to discharge fully their respective accident investigation and safety regulatory responsibilities." See 23 FR 7721, 7723 (October 7, 1958).

The FAA issued a legal interpretation of this section setting forth the minimum content that must be included in a § 121.711 communication record, including: the date and time of the contact; the flight number; aircraft registration number; approximate position of the aircraft during the contact; call sign; and narrative of the contact. See Legal Interpretation to John S. Duncan, Division Manager, Air Transportation Division, FAA Flight Standards Service, from Rebecca B. MacPherson, Assistant Chief Counsel, Regulations Division (Feb. 2, 2010), a copy of which is included in the docket for this rulemaking

In the SNPRM, the FAA proposed revisions to § 121.711 to clarify the contents of the record required for each en route radio contact between the certificate holder and its pilots, based on the agency's February 2010 legal interpretation. The agency also proposed to extend the record requirement in § 121.711 to supplemental operations. In the SNPRM, the FAA proposed

that these additional recordkeeping requirements be effective 120 days from the publication of the final rule.

The FAA received comments on the proposed revisions to § 121.711 from Continental, USAirways, Southwest, American, ATA, FedEx, ASTAR, and one individual. Commenters stated that the time frame for implementation is too short because it requires carriers to incorporate new functionality into existing software systems, and the agency did not identify a safety benefit that would result from this new requirement. The commenters asserted that this requirement does not enhance safety or increase efficiency, but increases complexity and cost for operators, with no positive cost/benefit. Based on the foregoing, Continental, USAirways, Southwest, ATA, FedEx, and American recommend striking this proposal from the SNPRM.

As discussed in the background section of the preamble, the FAA has determined it is necessary to move forward at this time with a final rule that contains certain discrete provisions proposed in the SNPRM. As a result, this final rule does not change the operational control requirements for supplemental operations. Since the final rule does not provide for supplemental operators to share in operational control, it would be incongruous to impose the requirements of § 121.711 to communications in supplemental operations. Therefore, the communication record requirements in § 121.711 will not be extended to supplemental operations as part of this final rule.

In the final rule, the FAA has retained the proposed changes to § 121.711 as they apply to domestic and flag operators. As set forth previously, the agency has interpreted the current provision of the regulations as requiring certain minimum details regarding the contact between a certificate holder and its pilots. The approach in the SNPRM has merely codified the agency's interpretation of the level of detail required to comply with existing regulations. Accordingly, in



the final rule, the agency has retained the 120-day timeline for compliance with this provision because the final rule no longer extends the § 121.711 recordkeeping requirement to supplemental operations.

The communication record requirements in § 121.711 apply to communications that take place while an aircraft is “en route” to its destination. In the SNPRM preamble, the agency clarified that in this specific context, an aircraft is considered to be “en route” from the time the aircraft pushes back from the departing gate until the aircraft reaches the arrival gate at its destination. See 76 FR 29336, 29352 (May 20, 2011). One individual commenter noted that the agency’s interpretation of “en route” in this context was inconsistent with a legal interpretation previously issued by the FAA and suggested that § 121.711 be revised to clearly state that communication records are required from the time the aircraft has pushed back from the origin gate until the time it arrives at the destination gate. See Legal Interpretation to Mr. Charles Lewis from Donald P. Byrne, Assistant Chief Counsel, Regulations Division (April 17, 1997); see also, Legal Interpretation to Ansel McAllaster, Manager, Flight Standards Division from John H. Cassidy, Assistant Chief Counsel, Regulations Division (September 21, 1988), copies of which are included in the docket for this rulemaking.

The FAA agrees with the commenter that clarification is necessary given the context in which the term “en route” is primarily used in existing regulations and the conflicting intent of the SNPRM. Therefore, the final rule revises § 121.711 to reflect the meaning of “en route” in this context, consistent with the meaning asserted in the SNPRM preamble.

The same individual further suggested removing the word “radio” from current § 121.711 “if the intent is for the certificate holder to maintain records of all contact from pushback at origin to arrival at destination gate.” As the commenter points out, if a pilot communicates with

dispatch via a means of communication other than radio, a record may not be required under current § 121.711. The agency agrees with this commenter. Since the meaning of en route in the context of § 121.711 includes time when the aircraft is on the ground, the potential exists for non-radio communications to occur between dispatch and the flightcrew. Such a result would be contrary to the clear intent of the SNPRM and the original premise of § 121.711, which was to ensure that appropriate records of all en route communications between aircraft dispatchers and the flightcrew are created and maintained. Moreover, it would be inconsistent with the provisions of current § 121.99.

Sections 121.711 and 121.99 were added to part 121 in the same rulemaking and both provisions were recodifications from the Civil Aeronautics Board (CAB) regulations. See 29 FR 19186, 19195, and 19228 (Dec. 31, 1964). Section 121.99 describes the type of communication system each certificate holder is required to have for purposes of communications in domestic and flag operations. Although these provisions are not currently cross-referenced, they are closely intertwined because the requirements of § 121.711 contemplate the type of communication system that is required in § 121.99.

In 2007, § 121.99 was revised to change the previous requirement for a “two-way radio communication system...” to a requirement of a “two-way communication system under normal operating conditions.” See 72 FR 31662, 31668 (Jun. 7, 2007). This revision, removing the word “radio,” was made in recognition that advancements in technology have provided for other communication methods for contacting an aircraft other than radio. The agency explained the revision in the preamble to the NPRM stating that “these changes would make the regulation more flexible for modern means of communication and would allow for future changes in technology.” See 67 FR 77326, 77333-34 (Dec. 17, 2002). To ensure that § 121.711 is not

rendered meaningless by the use of non-radio communication technology, the FAA has removed the word “radio” from § 121.711 in the final rule and included a cross-reference to § 121.99.

## **O. Runway Safety**

Currently, the maneuvers “taxi” and “pre-takeoff checks” appear in appendices E and F and are required training and evaluation maneuvers. Upon review of accident and runway incursion history, the FAA determined that it was necessary to include additional procedures within “taxi” and “pre-takeoff checks” to reduce the causal factors that led to accidents and runway incursions.

For example, on August 27, 2006, Comair flight 5191 crashed during takeoff from Blue Grass Airport in Lexington, Kentucky. See NTSB/AAR-07/05. The flight crew was instructed to take off from runway 22 but instead lined up the airplane on runway 26 and began the takeoff roll. The airplane ran off the end of the runway and impacted the airport perimeter fence, trees, and terrain. The PIC, flight attendant, and 47 passengers were killed, and the SIC received serious injuries. The airplane was destroyed by impact forces and postcrash fire.

Existing agency guidance and advisory material identify procedures that part 121 operators should use to enhance runway safety. See AC 120-74B, Parts 91, 121, 125 and 135 Flightcrew Procedures During Taxi Operations; SAFO 06013 Flight Crew Techniques and Procedures That Enhance Pre-takeoff and Takeoff Safety; and SAFO 07003, Confirming the Takeoff Runway. The taxi and pre-takeoff procedures proposed in the SNPRM and included in the final rule are consistent with this guidance and advisory material.

In the SNPRM, the agency proposed to include three additional procedures during the execution of the “taxi” maneuver. The agency proposed that, to comply with the maneuver requirement, “taxi,” a flightcrew member must complete the procedures “Use of airport diagram

(surface movement chart),” “Appropriate clearance before crossing or entering active runways,” and “Observation of all surface movement guidance control markings and lighting.” Although some certificate holders may already train and evaluate taxi at this level of specificity, the FAA has determined that this maneuver must be targeted by all certificate holders to ensure that flightcrew members consistently use available cues and aids to identify the airplane’s location on the airport surface during taxi and verify proper clearances before crossing or entering active runways.

Further, in response to the accident involving Comair flight 5191 and NTSB recommendation A-07-044, the FAA determined it was necessary to add pre-takeoff procedures, “receipt of takeoff clearance” and “confirmation of aircraft location and FMS entry for departure runway prior to crossing hold short line for takeoff.” The purpose of these procedures is to positively confirm and cross check the airplane’s location at the assigned departure runway before crossing the hold-short line for takeoff.

The final rule incorporates the proposals in the SNPRM for airport runway safety training into existing taxi and pre-takeoff checks requirements in appendices E and F of part 121. The FAA has determined that the training and evaluation time required to complete these taxi and pre-takeoff procedures would not take any longer than the time currently required to complete those maneuvers because the procedures are incorporated into the existing taxi and pre-takeoff maneuver requirements.

In incorporating the final rule runway safety requirements into appendices E and F, the agency has eliminated the option to complete pre-takeoff procedures in a non-visual simulator. Flightcrew members use visual cues, signs, and markings to confirm the aircraft’s location prior to crossing the hold short line for takeoff. Accordingly, if an operator chooses to train and

evaluate pre-takeoff procedures in a simulator instead of inflight, a simulator with a visual system must be used. The agency does not believe this change causes any additional cost to operators since there are currently no non-visual simulators qualified by the FAA's National Simulator Program.

#### **P. Crosswind Maneuvers Including Wind Gusts**

Existing training requirements for a PIC and SIC include the requirement to perform multiple takeoffs and landings until the PIC or SIC achieves proficiency. Currently, as part of the required training and evaluation of takeoffs and landings, flightcrew members must successfully complete crosswind maneuvers, as set forth in appendices E and F to part 121.

In the NPRM, the proposed Qualification Performance Standards for pilots specifically provided that while performing landings during training, pilots must demonstrate the ability to “apply gust and wind factors and take into account meteorological phenomena...” See 74 FR 1280, 1366 (Jan. 12, 2009). This requirement was inadvertently left out of the SNPRM, but remains consistent with the SNPRM's incorporation of existing crosswind training into the proposed training requirements for flightcrew members.

In its comments on the SNPRM, the NTSB stated that this rulemaking should include the requirements to train high gusty crosswinds. The agency agrees that wind gust maneuvers are a critical component of crosswind takeoffs and landings and that the training requirement should clearly reflect the incorporation of this variable into crosswind takeoff and landing training.

The final rule clarifies that crosswind training for flightcrew members in takeoff and landing maneuvers includes training on maneuvers necessary to respond to wind gusts. Wind gusts are a key variable of crosswind training given that a pilot must be able to rapidly respond to changes in speed and direction of winds to maintain the correct flight path to the runway.

Moreover, crosswind training that includes the wind gust variable will improve training in areas identified as probable causes of accidents by the NTSB, including the accident involving Continental Airlines flight 1404. The NTSB determined that the probable cause of this accident was the PICs “cessation of rudder input, which was needed to maintain directional control of the airplane, about 4 seconds before the excursion, when the airplane encountered a strong and gusty crosswind that exceeded the captain’s training and experience.” In connection with this accident, the NTSB issued a number of safety recommendations including A-10-111, which advised the FAA to require part 121, 135, and 91K operators to incorporate realistic, gusty crosswind profiles into their pilot simulator training programs.

In the final rule, the FAA has amended appendices E and F to include the requirement for training and evaluation in crosswind takeoff and crosswind landing with gusts. The FAA has determined that this level of specificity is necessary to ensure that all flightcrew members have the necessary skills for takeoff and landing in gusty winds. It is likely that many certificate holders already train and evaluate crosswind takeoffs and landings with gusty winds included as a variable of the training. However, the agency recognizes that not all FFSs are capable of replicating gusts and is reviewing simulator capabilities as part of a separate rulemaking. Moreover, since crosswind takeoff and landing are already required and gusty winds are merely one variable of this current requirement, the agency does not believe any additional time is necessary to train and evaluate crosswind takeoffs and landings with gusts.

#### **Q. Miscellaneous**

The final rule includes a number of miscellaneous editorial and clarifying changes. These changes remedy typographical errors, redundancies and provisions that are no longer applicable within the regulatory text.

In those instances in which the agency must provide approval or authorization, for consistency, the final rule refers only to the Administrator. The Administrator's delegation of authority for specific functions is appropriately addressed in guidance material.

Finally, the agency has removed flight navigator training requirements from subpart N. Flight navigators are no longer required on aircraft used in part 121 operations. Also, consistent with the SNPRM, the agency replaced the terms proficiency check and competency check in § 121.413(a)(2) with checks and supervision of operating experience, to more accurately reflect check airman functions in part 121 operations.

## **R. SNPRM Economic Comments**

In March 2010, the FAA conducted a preliminary regulatory evaluation to estimate the costs and benefits of the provisions proposed in the SNPRM. The agency received several comments on the SNPRM regulatory evaluation from air carriers, labor organizations and trade associations. This section provides a summary of issues raised by commenters on the SNPRM regulatory evaluation and the FAA's response.

### **1. Benefit Analysis**

ATA, Continental, and United noted the benefit methodology developed for the SNPRM regulatory evaluation differs significantly from the original methodology used in the NPRM regulatory evaluation.

The FAA refined the SNRPM regulatory evaluation benefit analysis based on public comments to the NPRM analysis. For example, in the SNPRM benefit analysis, the FAA limited historical accidents to those associated with airlines that did not have an existing AQP for pilot training. The agency made this change based on comments stating it was inconsistent for the FAA to determine that the provisions in the NPRM would have minimal cost impact on AQP

operators while claiming monetary benefits for preventing or mitigating accidents that involved carriers using AQP for training. Further, consistent with NPRM comments, the FAA discounted the benefits in the same way costs were discounted.

The agency has determined it is necessary to move forward at this time with a final rule to address certain provisions proposed in the SNPRM that enhance pilot training for rare but high risk scenarios and provide the greatest safety benefit. Therefore, the methodology used in the regulatory evaluation for the final rule differs somewhat from the SNPRM.

The final rule regulatory evaluation benefits analysis uses the same methodology as that used in the SNPRM analysis in terms of using the Commercial Aviation Safety Team (CAST) approach to select and score each accident, and discounting benefits and costs. However, after further review of the proposal and existing AQPs, the FAA has determined that the training standards required in the final rule will result in new training for all pilots who complete training under subparts N and O as well as those who complete training under AQP.

Thus, the agency has estimated the benefits and costs of the final rule requirements on all part 121 operators, including those training pilots under an AQP. In addition, the final rule benefit analysis adds benefits from accidents involving air carriers that trained pilots under an AQP at the time of the accident if the accident could have been prevented or mitigated by the requirements in the final rule. The cost analysis for the final rule also calculates costs for carriers that use AQP to train pilots based on new training requirements for all pilots and not just traditionally trained pilots.

Several commenters raised concerns about the accident avoidance safety benefit analysis in which the FAA estimated the potential benefits of the SNPRM by attempting to calculate the number and cost of future accidents that would be prevented if this proposal were adopted.



Continental and Southwest assert the methodology the FAA used assumed that past accident history from the chosen time period would be an accurate reflection of future accidents. The commenters contend that the accident rate per departure has been decreasing over the past 60 years and therefore the FAA methodology is flawed.

First, although part 121 accidents have generally decreased over the past 20 years, major and serious accidents still occur. The NTSB's records on Accidents and Accident Rates show that from 2001 to 2010, 26 major accidents, 19 serious accidents, 160 accidents with injuries, and 209 accidents with aircraft damage occurred.<sup>22</sup>

Second, OMB guidance directs the FAA to monetize quantitative estimates by using sound and defensible procedures to monetize benefits and costs. The FAA used the willingness-to-pay approach to assume that past accident history would be an accurate reflection of reducing the risk of future airplane accident fatalities. This approach is transparent, reproducible and follows OMB guidance. OMB states the willingness-to-pay approach is the best methodology to use if reduction in fatality risk is monetized, and the monetized value of small changes in fatality risk can be measured by the "value of statistical life" (VSL).<sup>23</sup>

The FAA estimated total damages for the accidents identified in the SNPRM regulatory evaluation based on assumptions identified in the benefits analysis. ATA commented that accident investigation costs were assigned based on the agency conducting the investigation and that it is unclear how the FAA identified which type of cost applied to each accident.

The FAA calculated investigation costs based on the results of a study completed in 2003 and 2004 to provide the FAA with critical values the agency uses in costs analyses. The results

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<sup>22</sup> NTSB Aviation Statistical Reports, Table 2. Accidents and Accident Rates by NTSB Classification, 1992 through 2011, for U.S. Air Carriers Operating Under 14 CFR 121, [http://www.nts.gov/data/table2\\_2012.html](http://www.nts.gov/data/table2_2012.html), (visited March 14, 2013).

<sup>23</sup> [http://www.whitehouse.gov/omb/circulars\\_a004\\_a-4](http://www.whitehouse.gov/omb/circulars_a004_a-4), March 4, 2013.

of the study can be found in a report “*Economic Values for FAA Investment and Regulatory Decisions, A Guide*” at

[http://www.faa.gov/regulations\\_policies/policy\\_guidance/benefit\\_cost/media/050404%20Critical%20Values%20Dec%2031%20Report%2007Jan05.pdf](http://www.faa.gov/regulations_policies/policy_guidance/benefit_cost/media/050404%20Critical%20Values%20Dec%2031%20Report%2007Jan05.pdf). The benefit analysis added the weighted averages of investigation costs (in 2002 dollars) for an NTSB investigation, an FAA investigation and a private investigation from Table 8-2 of the study to estimate the total per accident investigation cost savings. Since Table 8-2 was in 2002 dollars, using a GDP deflator, we escalated the results of Table 8-2 to 2012 dollars. In addition, the FAA used Department of Transportation guidance to estimate accident costs found at <http://www.dot.gov/policy/transportation-policy/treatment-economic-value-statistical-life>. The SNPRM regulatory evaluation documented this report as a data source for accident costs.

ATA, Continental, and Delta commented that the SNPRM regulatory evaluation contains no description of the criteria the FAA used to determine which accidents were relevant or how the criteria were applied.

The process the FAA used to determine which accidents were relevant to the proposal is described in Section II.B.2. Accident Population and Scoring on page 7 of the SNPRM regulatory evaluation. To determine which accidents were relevant to the accident avoidance benefit analysis, the FAA initially reviewed accident data for U.S. certificate holders required to train under parts 121 and 121/135 from 1988 through 2009. The agency considered accidents that occurred during this 22-year period because this period includes accidents with open NTSB recommendations. The agency then selected accidents in which the NTSB identified areas of inadequate training as either the probable cause or a contributing factor to the accident. The accidents included for consideration in the analysis were those for which the FAA developed a

regulatory change proposed in the SNPRM that could have mitigated each accident. Finally, the agency eliminated from consideration accidents that occurred by operators with an AQP training program and while the carrier was operating under part 135.

The importance of training varies for each of the accidents. Therefore, the FAA rated each accident by evaluating the effectiveness of the proposed rule against each accident using the scoring process in CAST. All of the accidents with published final NTSB reports were scored against the CAST safety enhancements. The agency used the NTSB recommendations along with narratives, probable cause, contributing factors and other pertinent data to score the accidents.

American, ATA, Continental, Southwest, and United believe the accident analysis should only include accidents from the past 10 years because of the dramatic decline in accident rates over the past 20 years. ATA and United contend the FAA should exclude pilot-related accidents from carriers who are now out of business, have merged with other carriers, or involve more than one airline.

For the benefits analysis, the FAA analyzed the causal factors, as determined by the NTSB, for past accidents that occurred in part 121 operations. As discussed earlier in this preamble, the first accident with pertinent accident causal factors was Delta flight 1141. Although the accident rate has declined in the last 10 years, accident causal factors identified by the NTSB during the 22-year historical benefit analysis period are still relevant and need to be addressed. Also, accidents by carriers who are out of business, have merged with other carriers, or involve more than one airline could have been mitigated if this proposal had been in effect when the accident occurred. Therefore these accidents were included in the benefits analysis because (1) the accident occurred while the pilot was training under a part 121 traditional

training program, and (2) new US certificated operators entering part 121 service and training under a traditional training program would benefit from the additional training requirement proposed in the SNPRM.

American, ASTAR, ATA, Continental, Delta, Southwest, and USAir contend the FAA has failed to give adequate credit for accident rate reduction resulting from existing training program enhancements and technological advancements that have been incorporated over the last 20 years, including the following: Terrain Avoidance Warning System (TAWS); Controlled Flight into Terrain (CFIT) standard operating procedures; CFIT avoidance, vertical angles; CFIT prevention training; Visual Glide Slope Indicators (VGSI) requirements implemented; Area Navigation (RNAV) 3D and Required Navigation Performance (RNP) approach procedures; Flight Operation Quality Assurance (FOQA) and Aviation Safety Action Program (ASAP); loss of control prevention, policies, systems and training; and runway incursion prevention policies, systems and training. Taking these enhancements into account, the commenters assert the FAA economic analysis overstates the potential benefit/cost savings purported to be achieved by implementation of the proposed rule.

Even with these existing programs, the NTSB shows that major and serious accidents still occur. The final rule requirements include higher training standards and specific tasks which improve pilot training program's content and application that will reduce human error among crewmembers, particularly in hazardous or emergency situations.

Southwest disagrees with the FAA's analysis of NTSB recommendations relevant to training and accidents that could have been mitigated if the proposed training requirements had been in effect at the time of the accident. The SNPRM cited 28 NTSB recommendations relevant to training programs that were issued as a result of 178 accidents, which occurred

between 1988 and 2009. Southwest reviewed the 28 NTSB recommendations and stated “the FAA speculates that no more than 4 accidents were associated with pilot inflight actions.” Additionally, Southwest noted the NTSB did not identify inadequate training as the probable cause of these four accidents. Therefore, Southwest disagrees with the FAA’s conclusion that these pilot inflight accidents could have been mitigated if the proposed training requirements had been in effect at the time of the accident.

As part of the decision to move forward with certain provisions proposed in the SNPRM that enhance pilot training for rare but high risk scenarios and other discrete provisions, the agency has conducted a new analysis and determined the final rule addresses the seven NTSB recommendations identified in the background section of this preamble.

Moreover, the FAA clarifies that relevant NTSB recommendations were used to establish the proposed training requirements. These recommendations served as one of the components of the analysis used to establish the mitigation effect on discrete accidents. The approach taken to establish an effectiveness ratio (mitigation for each accident) for the training requirements included an analysis of each accident in the context of the CAST scoring process.

## **2. Cost Analysis**

ATA, Continental, ASTAR, and United contend the SNPRM regulatory evaluation fails to provide documentation of the underlying assumptions of the cost estimates.

The FAA documented the sources for its information in the assumption sections, tables and footnotes of the SNPRM regulatory evaluation. The methodologies employed in the analysis were discussed in the sections preceding the tables showing total costs.

ATA and United stated the projected growth in affected crew population levels of initial/new hire training in the SNPRM regulatory evaluation was based on the net increase in

total crew population but ignores training necessary to replace retiring crew. United also stated that, retirements alone are expected to be 5 percent annually throughout the benefit period and thus the FAA underestimated the pilot attrition rate in the SNPRM regulatory evaluation. As a result of underestimating the attrition rate, United asserts that we have underestimated the training costs that will result from retirements. United contends one retirement would generate at least two initial courses.

The FAA crew population forecast accounts for the replacement of a retired crewmember in the turnover percentage. Although United projected a 5 percent retirement rate for their pilots, the FAA maintains its assumption that 5 percent of the total number of pilots would leave an operator through attrition (including loss of medical certificate, loss of airman certificate, career transfer, or retirement). This assumption is based on objective data presented in a University of North Dakota study.<sup>24</sup> The FAA disagrees with United's assertion that for every crewmember who retires, two courses of initial training would be required. The agency assumed that for each pilot lost through attrition, one pilot will complete initial training. For any additional training, the agency considered transition training and upgrade training and accounted for those training costs in the final rule regulatory evaluation.

Based on the FAA Aerospace Forecasts 2013-2033, we expect the total number of part 121 pilots to increase by 0.4 percent annually.<sup>25</sup> Applying BLS labor wage data, the FAA has determined that the training costs due to attrition and growth will range from \$51.6M to \$69.1M.

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<sup>24</sup>[http://www.faa.gov/news/conferences\\_events/aviation\\_forecast\\_2010/agenda/media/GAF%20Jim%20Higgins%20and%20Kent%20Love.pdf](http://www.faa.gov/news/conferences_events/aviation_forecast_2010/agenda/media/GAF%20Jim%20Higgins%20and%20Kent%20Love.pdf). The University of North Dakota estimates that 2.12% of pilots have retired annually along with forecasting 2.94% pilot attrition (loss of medical, loss of certificate, career transfer) from 2009 to 2024. We rounded to three digits.

<sup>25</sup> FAA Aerospace Forecasts 2013-2033. Table 30: Active Pilots by Type of Certificate, Airline Transport, 2012-2033. [http://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/aviation\\_forecasts/aerospace\\_forecasts/2013-2033/](http://www.faa.gov/about/office_org/headquarters_offices/apl/aviation_forecasts/aerospace_forecasts/2013-2033/) Accessed March 2013.

ATA stated the FAA's determination of the net impact on annual training hours appears to be based on the minimum programmed hour requirements rather than on the actual number of training hours necessary to complete the required training tasks.

In preparing the cost estimate for the SNPRM regulatory evaluation, the FAA identified the proposed programmed hour requirements and calculated the incremental costs that the proposed programmed hours would add over the current regulatory requirements. If operators voluntarily exceed the training standard proposed in the SNPRM, then there was no additional compliance cost estimated in the FAA cost analysis.

ALPA, American, Continental, JetBlue, Southwest, United, UPS, and USAir stated the FAA underestimated the time it takes to complete flight training tasks proposed in the SNPRM.

On October 26, 2009 the FAA conducted a simulator trial to determine the time required to complete the proposed recurrent proficiency check requirements. The agency collected data on the time it took to complete the recurrent proficiency check tasks proposed in the NPRM and then used this data to estimate the time required to complete the proficiency check requirements proposed in the SNPRM. See <http://www.regulations.gov/#!documentDetail;D=FAA-2008-0677-0177>. In preparing the cost estimate for the SNPRM regulatory evaluation, the FAA used the data from the simulator trial to determine the additional training hours required by the proposal and calculated the incremental costs, over the current regulations, the proposed requirements would add.

On June 19, 2012, the FAA conducted a second simulator trial to determine the time required to complete the additional final rule maneuvers and procedures in each curriculum. During the second simulator trial, the agency observed two FAA pilots perform the extended

envelope flight training requirements in an Airbus 330 Level D simulator.<sup>26</sup> The FAA pilots serving as the PIC and SIC both held ATP certificates and were current and qualified to operate the Airbus 330. All required checklists and procedures were completed in their entirety for each maneuver and procedure. In addition, all required Air Traffic Control (ATC) instructions and clearances were provided.

The data collected during this simulator trial provides the estimated simulator time required to meet the extended envelope flight training requirements in the final rule. The FAA has reviewed both simulator trials and revised the cost estimates for the training tasks required by the final rule.<sup>27</sup>

ATA, Continental, United, and USAIR noted the FAA calculates simulator costs at an hourly rate instead of the industry-standard 4-hour blocks for the purpose of keeping the cost of the proposed rule low. These commenters also stated the simulator hour projection for the SNPRM regulatory evaluation does not consider collective bargaining agreements that may further limit training hours per day.

The SNPRM regulatory evaluation calculated simulator costs at an hourly rate instead of 4-hour blocks. Industry is not tied to the 4-hour simulator training blocks. With the 5-year compliance date in the final rule for simulator training tasks, air carriers have the ability to revise their internal processes or re-negotiate contracts with simulator training providers. In addition, the FAA believes that bargaining agreements can be adjusted before the 5 year compliance date.

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<sup>26</sup> Recognition of, and recovery from, full stall and demonstration of stick pusher activation were not completed during the second simulator trial. Therefore, the agency considered the time for recognition of, and recovery from, approach to stall – clean configuration, collected during the first simulator trial. The agency expects the time for each of these two maneuvers to be similar to the time for recognition of, and recovery from, approach to stall because full stall and stick pusher are further developed stages of an approach to stall.

<sup>27</sup> The FAA has amended the Technical Report to add the 2012 simulator trial data in new appendix G. The agency has placed the revised Technical Report in the public docket for this rulemaking.



Therefore these costs are not attributed to the rule. The final rule includes extended envelope training that must be completed in an FFS. The agency estimates that the time required to complete this training ranges from 90 to 135 minutes for initial training, 60 to 90 minutes for transition training, 45 to 60 minutes for upgrade training, and 30 to 45 minutes for recurrent training.

Continental contends the associated costs for legacy mainframe computer programming related to the proposed requirement for evaluating and recording line check performance in proposed § 121.1233(d) were not accounted for in the SNPRM regulatory evaluation.

Continental also states the requirements proposed in the SNPRM would add significantly to the recordkeeping system requirement.

The agency notes programmers in major companies, such as Continental, are typically on staff. Staff programmers typically cover software updates and maintenance. The FAA has reviewed the paperwork requirements for the new final rule provisions and has revised the regulatory evaluation accordingly. Upon further review of the SNPRM regulatory evaluation, the agency identified paperwork costs that were inadvertently omitted. For the final rule regulatory evaluation, the FAA has further reviewed the potential costs of implementing the final rule requirements and captured additional detail. For example, the paperwork costs now fully address the review and development of training programs, courseware and manuals.

ATA, Continental, JetBlue, and USAir assert the SNPRM regulatory evaluation did not include non-paperwork costs for program development, and maintenance including high capital and management costs necessary to modify or replace training equipment, reconfigure training facilities, or re-program and maintain software systems.

The agency included costs in the SNPRM regulatory evaluation for maintenance, including high capital and management costs, necessary to modify or replace training equipment, reconfigure training facilities, or re-program and maintain software systems with a simulator or ground cost hourly rental expense.

For the final rule, the FAA determined that the average simulator rental fee is \$500 per hour plus the cost of an instructor for consistency with the FAA's "Pilot Certification and Qualification Requirements for Air Carrier Operations" final rule. The FAA believes the hourly rental price accurately reflects the cost of capital and includes costs for maintenance, capital, management, reconfiguring training facilities, and reprogramming.

The FAA received several comments from air carriers stating the agency underestimated the cost of a number of SNPRM provisions, including: operating manual changes; the continuous analysis process; crewmember and aircraft dispatcher requalification; flightcrew member recurrent training; relief pilot recent experience; PIC line checks; training with a complete flightcrew; flight attendant operating experience; check flight attendant requirements; aircraft dispatcher qualification and recurrent training; and, check dispatcher training.

At this time, the agency is proceeding with a final rule to address certain provisions proposed in the SNPRM that enhance pilot training for rare but high risk scenarios, provide the greatest safety benefit, and require time to implement, as well as certain other discrete proposals. This final rule does not include the provisions identified by commenters as having underestimated costs. If a subsequent final rule includes the provisions cited by commenters, the agency will review the costs identified in the SNPRM and determine whether reassessment of these costs is necessary.

### **3. General Cost-Benefit Analysis**

ATA asserted that the FAA failed to correctly match the timing of the benefits and costs in the SNPRM regulatory evaluation and asserted that the incurrence of implementation costs would necessarily precede any benefits that might occur by at least two years.

The FAA initiated the benefits and costs of the analysis at the compliance date of the final rule. The compliance date proposed in the SNPRM was 2016, or 5 years after the proposed effective date of the final rule. In the SNPRM regulatory evaluation, the agency determined the timing of both the benefits and costs would start in 2016 and end in 2025.

In the SNPRM, the agency proposed an effective date for the final rule of 120 days after publication in the Federal Register. The agency further proposed to require compliance with certain amendments to part 121 on the effective date and to delay compliance with other amendments requiring time to implement, to 5 years after the effective date. However, in the SNPRM regulatory evaluation, the agency assumed the timing of both the benefits and costs for all provisions would start in 2016 to account for a compliance date of 5 years after the proposed effective date of the final rule, and end in 2025.

The agency agrees that some implementation costs may be incurred prior to when the full benefits of the final rule are realized. For the final rule, safety benefits are realized beginning in 2019, when compliance is required with the new pilot training maneuvers and procedures. However, the agency assumes paperwork costs associated with the training provisions for instructors and check airmen who serve in FSTDs will begin the year before the compliance date in preparation to meet the final rule requirements. For the paperwork costs associated with the remaining final rule provisions, the agency assumes new paperwork costs start to accrue on the date that compliance is required. These timelines are reflected in the table that appears in the Paperwork Reduction Act discussion in the Regulatory Notices and Analyses section of this

preamble (Section IV). Greater detail regarding the paperwork burden can be found in the Summary of Estimated Paperwork Costs by Objective Grouping section of the final rule regulatory evaluation.

#### **4. Economic Impact to Operators Training under AQP**

The FAA received several comments from air carriers concerned that the agency failed to include costs to air carriers with pilots who train under an AQP in its economic analysis of the SNPRM.

In the economic analysis of the SNPRM, the agency determined the proposals in the SNPRM would have a minimal impact on carriers that train pilots using an AQP. Therefore, the SNPRM regulatory evaluation included only certain paperwork costs for these carriers.

Following further review of existing AQP curriculums and the final rule pilot training requirements, the agency has determined that the majority of new pilot training maneuvers and procedures are not incorporated into existing AQPs used to train pilots. Therefore, the FAA has estimated the cost of the new requirements on all part 121 operators, including those who train under AQP.

### **IV. Regulatory Notices and Analyses**

#### **Regulatory Evaluation**

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Public Law 96-354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade

Agreements Act (Public Law 96-39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Public Law 104-4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of \$100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this final rule. We suggest readers seeking greater detail read the full regulatory evaluation, a copy of which we have placed in the docket for this rulemaking.

In conducting these analyses, FAA has determined that this final rule: (1) has benefits that justify its costs, (2) is not an economically "significant regulatory action" as defined in section 3(f) of Executive Order 12866, (3) is "significant" as defined in the U.S. Department of Transportation's (DOT) Regulatory Policies and Procedures; (4) will have a significant economic impact on a substantial number of small entities; (5) will not create unnecessary obstacles to the foreign commerce of the United States; and (6) will not impose an unfunded mandate on state, local, or tribal governments, or on the private sector by exceeding the threshold identified above. These analyses are summarized below.

### **Total Benefits and Costs of this Rule**

The following table shows the FAA's estimate for the base case costs, including the low and high cost range, in 2012 dollars. This table also shows our estimated potential quantified safety benefits using a 22-year historical accident analysis period.

**Total Benefits and Costs (2012 \$ Millions) From 2019 to 2028**

Range		2012 \$	Present Value	
			7%	3%
Low	Cost	\$274.1	\$130.8	\$197.5
High	Cost	\$353.7	\$168.8	\$254.8
<b>Base Case</b>	<b>Cost</b>	<b>\$313.9</b>	<b>\$149.8</b>	<b>\$226.1</b>
	<b>Benefit</b>	<b>\$689.2</b>	<b>\$317.1</b>	<b>\$488.7</b>

For the benefits analysis, the FAA analyzed the causal factors, as determined by the NTSB, for past accidents that occurred in part 121 operations. The objective of the analysis was to determine if an accident could have been prevented or mitigated by the training provisions in the final rule. In 1988, Delta flight 1141 crashed shortly after lifting off from the runway at the Dallas-Fort Worth International Airport (DCA88MA072). In its final report, the NTSB determined that one causal factor for the accident was “The captain and first officer’s inadequate cockpit discipline which resulted in the flightcrew’s attempt to take off without wing flaps and slats properly configured.”

As a result of the accident investigation, the NTSB made recommendations to the FAA that emphasized the importance of training and manual procedures regarding “the roles of each flight crewmember in visually confirming the accomplishment of all operating checklist items,” as well as the “verification of flap position during stall recognition and recovery procedures.”

The FAA determined that the pilot monitoring training and operational provisions may have prevented or mitigated this accident. The pilot monitoring training will provide pilots an opportunity to practice monitoring skills in an environment that closely simulates real line operations. The operational requirements will require flightcrew members to follow air carrier procedures regarding pilot monitoring. Together, these provisions establish an active requirement for the pilot not flying the aircraft to remain engaged throughout the flight by

monitoring the pilot flying, as well as the position of the aircraft, the flight instruments, the configuration of the aircraft, etc. The provisions will ensure that the pilot monitoring is prepared to notify the pilot flying of any anomalies or to assume the flying responsibilities if necessary. If these requirements had been in place at the time of this accident, the pilot monitoring may have identified the incorrect configuration and notified the pilot flying prior to takeoff.

Therefore, the FAA initiated the historical accident interval for the benefits analysis with this accident in 1988. The FAA concluded the accident interval in 2009 with the Colgan accident because, at this time, the NTSB still has not finalized its reports on the major accidents (that may be pertinent to this training rule) that occurred in 2010 and 2011. This is why the FAA uses the same 22 year accident interval (1988-2009) for the benefits analysis in the final rule as in the SNPRM.

The FAA identified 10 additional major accidents with casual factors identified by the NTSB that are addressed by the provisions in the final rule that occurred during this 22 year accident interval. The FAA cited these accidents in the benefits analysis based on pertinent accident causal factors, regardless of whether or not there were open NTSB recommendations associated with those accidents.

The FAA notes, however, that it conducted a sensitivity analysis to explore the effect of reducing the historical accident analysis period from the 22 years to 10 years in response to comments disputing the use of a 22-year time frame. Appendix 14 of the regulatory evaluation shows that using a shorter historical accident analysis period increases the estimated benefits of the final rule by approximately 17 percent.

### **Who is Potentially Affected by this Rule?**

This final rulemaking will increase costs to operators of transport category airplanes operating under 14 CFR part 121 by requiring improved pilot training, as well as by requiring accompanying revisions to their training manuals and related training materials.

**Assumptions:**

The benefit and cost analysis for the regulatory evaluation is based on the following factors/assumptions:

- The analysis is conducted in constant dollars with 2012 as the base year.
- The estimates of costs and benefits reported in this evaluation include both 2012 dollar values and present values. Benefits and costs are calculated in present values using both 3 percent and 7 percent discount rates as prescribed by OMB in Circular A-4.
- This final rule will be published in late 2013.
- This final rule will become effective in 2014, 120 days after its publication. Compliance is required on the effective date (120 days) for a few of the provisions, including for example all technical amendments, §§ 121.9 (falsification), 121.392 (identification of personnel as flight attendants), and 121.711 (communication records). Compliance with the remaining substantive provisions is required within 5 years after the effective date.
- Although some incidental costs are expected to occur prior to 2019, the primary analysis period for costs and benefits extends for 10 years, from 2019 through 2028. This period was selected because annual costs and benefits will have reached a steady state by 2019.
- Safety benefits will be realized beginning in 2019, when compliance is required with the new training provisions in the final rule.
- Past accident history from 1988 to 2009 (22 years) is an appropriate basis on which to forecast the likely future occurrence of the types of accidents that the training and other



provisions of this rule will help to prevent. The full regulatory evaluation provides a detailed justification for the selection of the 22 year analysis period, as well as a sensitivity analysis that explores the effect of reducing the historical analysis period from the 22 year period to 10 years. The Accident Population and Scoring section in the full final rule regulatory evaluation gives more details on the use of accident history in this analysis.

### **Changes from the SNPRM to the Final Rule Regulatory Evaluation**

Based on public comments and further agency review of the proposal, the FAA made the following changes to the regulatory evaluation for the final rule:

- Re-estimated costs and benefits to correspond directly to the provisions of this final rule. The final rule focuses on enhancements to pilot training for rare, but high-risk scenarios.
- Assumed that the final rule will affect all Advanced Qualification Program (AQP) and non-AQP trained pilots in command, second in command, check pilots, and flight instructors by adding simulator and ground school time to their current training curriculum.
- Accounted for paperwork costs documenting the required revisions to operators listed in Appendix 9 of the regulatory evaluation.
- Updated the value of averted fatalities, injuries, accident investigation and medical costs based on current DOT guidance.<sup>28</sup>
- Updated the hourly wages and benefits for aircraft crew members with current hourly wages from the Bureau of Labor Statistics (BLS).

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<sup>28</sup> “Revised Departmental Guidance 2013: Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analysis.” available at <http://www.dot.gov/regulations/economic-values-used-in-analysis>

- Removed airfare, hotel, and per diem travel costs from the cost estimates because the FAA believes operators will be able to complete the new final rule training requirements within their current initial, upgrade, transition, or recurrent simulator and ground school training days. The FAA conducted a sensitivity analysis on the costs of the final rule adding an additional day of travel. The results of the sensitivity analysis are shown in Appendix 10 of the regulatory evaluation. Even with the cost of an extra day of travel, the benefits of the final rule still exceed the costs.
- Conducted a new accident analysis that took into account the mitigations of other rulemakings for the same accidents in determining the probability of effectiveness for this final rule.
- Assumed that the “Flight Simulation Training Devices Qualification Standards For Extended Envelope and Adverse Weather Event Training Tasks” rulemaking (RIN 2120-AK08) is in place by the time compliance is required with the new pilot training requirements because amendments to FSTD qualification and evaluation standards in part 60 are needed to support the new full flight simulator training requirements in this final rule. In addition, the agency recognizes that the final rule on Pilot Certification and Qualification Requirements for Air Carrier Operations will be in place at the time that compliance is required with the pilot training requirements in this final rule.
- Included a table in Appendix 13 of the regulatory evaluation comparing the probability of effectiveness ratings of the overlapping accidents from the Flightcrew Member Duty and Rest Requirements final rule, the Pilot Certification and Qualification Requirements for Air Carrier Operations final rule and this final rule.

- Updated employment growth rates for pilots based on current FAA forecasts and actual February 2013 employment statistics for operators listed in Appendix 9 of the regulatory evaluation.
- Updated the hourly simulator costs from the \$550 estimate used in the SNPRM to \$500 for the final rule based on updated FAA Flight Standards Service (AFS) data. This revised cost maintains consistency with analysis from the Pilot Certification and Qualification Requirements for Air Carrier Operations final rule published on July 15, 2013 (78 FR 42324).
- Conducted a sensitivity analysis on the hourly simulator rental rate using the \$550 rate from the SNPRM. The agency estimated \$323.1 million for the total costs using the \$550 hourly rate. The total benefits, as shown in the table above, exceed the costs for the \$550 hourly simulator rental rate.
- Initiated the "Flight Simulation Training Device Qualification Standards for Extended Envelope and Adverse Weather Event Training Tasks" rulemaking to amend 14 CFR part 60 to require the additional programming and upgrades to simulators, which will be needed to comply with extended envelope training required by the final rule. The FAA estimates that the \$500 hourly simulator rental rate assumed in this analysis includes all upgrades expected to be required by the Flight Simulation Training Device rulemaking. As an alternative, the agency also conducted a sensitivity analysis using \$600 for an hourly simulator rental rate. The agency estimated \$332.4 million for the total costs with the \$600 hourly rate. The total benefits as shown in the table above also exceed the costs for the \$600 hourly simulator rental rate.

- Conducted a sensitivity analysis to explore the effect of reducing the historical analysis period from the 22 year period to 10 years in response to comments disputing the use of a 22-year time frame for accidents. Appendix 14 of the final rule regulatory evaluation shows that using the 10-year period, the estimated benefits of this final rule increase by approximately 17 percent. The full regulatory evaluation provides a detailed justification for the selection of the 22 year analysis period.
- Changed the pilot ground school distance learning<sup>29</sup> percentage from the 80 percent estimate used in the SNPRM to 100 percent, because the FAA allows 100 percent of ground training to be accomplished via distance learning.<sup>30</sup>

### **Benefits of this Rule**

Phased-in potential benefits will accrue from the additional training requirements, and these are estimated in the table above. As prescribed by OMB in Circular A-4, we discounted the 2012 \$ benefits to their present values using a seven and three percent annual rate.

The final rule will also generate qualitative benefits. The final rule addresses safety issues identified during two recent FAA “Call to Action” initiatives including improvement of runway safety by requiring training in critical runway safety issues, responds to seven National Transportation Safety Board (NTSB) safety recommendations, and addresses the requirements in the Airline Safety and Federal Aviation Administration Extension Act of 2010.

### **Costs of this Rule**

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<sup>29</sup> Distance learning allows pilots to train out of the classroom (such as at home).

<sup>30</sup> FAA Order 8900.1, Vol.3, Ch. 19, Sec. 5, Para. 3-1209 (July 15, 2013). The FAA notes that pilot ground school training requirements include hands-on emergency equipment training (current §121.417(c) requires that every 24 months, pilots must perform hands-on drills on aircraft emergency equipment) that may not be accomplished via distance learning. These costs are not included in this cost analysis because those hands-on drills are currently required.

The FAA estimates the range of costs to air carriers in the table above. As prescribed by OMB in Circular A-4, we discounted the 2012 \$ to their present values using a seven and three percent annual rate.

### **Alternatives Considered**

The FAA considered multiple alternatives to the final rule. Three of the alternatives that were considered would have provided relief from some of the rule's provisions to small entities, while one alternative considered accepting all of the provisions of the SNPRM. A discussion of these alternatives can be found in the final regulatory flexibility analysis.

### **Regulatory Flexibility Determination**

The Regulatory Flexibility Act of 1980 (Public Law 96-354) (RFA) establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration." The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

The FAA believes that this final rule will result in a significant economic impact on a substantial number of small entities. The purpose of this analysis is to provide the reasoning underlying the FAA determination.

Section 604 of the Act requires agencies to prepare and make available for public comment a final regulatory flexibility analysis (FRFA) describing the impact of final rules on small entities. Section 604(a) of the Act specifies the content of a FRFA.

Each FRFA must contain:

- A statement of the need for, and objectives of, the rule;
- A statement of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis, a statement of the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments;
- The response of the agency to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the proposed rule, and a detailed statement of any change made to the proposed rule in the final rule as a result of the comments;
- A description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available;
- A description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and
- A description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative

adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected.

#### **Statement of the need for, and objectives of, the rule**

The primary purpose and objectives of the final rule are to ensure that training and evaluation is provided for crewmembers by establishing new requirements for part 121 commercial air carrier training programs, as mandated by Public Law 111-216. The changes seek to make a significant contribution to the FAA's accident reduction goal by directly addressing the safety goals from two recent FAA "Call to Action" initiatives including improvement of runway safety by requiring training in critical runway safety issues. The requirements of the final rule also implement numerous safety recommendations from the NTSB.

#### **Statement of the significant issues raised by public comments**

There were no significant issues raised by the public comments in response to the initial regulatory flexibility analysis.

#### **Agency response to comments filed by the Chief Counsel for Advocacy**

There were no comments filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the proposed rule.

#### **Description of projected reporting, recordkeeping and other compliance requirements of the rule**

As described in the Paperwork Reduction Act summary in this preamble, the agency expects only minimal new training documentation, reporting and record-keeping compliance requirements to result from this final rule. Every operator (including small businesses and businesses with greater than 1500 employees) will incur a paperwork burden as described in Paperwork Reduction Act discussion in this preamble.

Costs for the labor entailed in meeting these documentation, reporting, and record-keeping requirements constitute a burden under the Paperwork Reduction Act, and these costs are accounted for in the final rule regulatory evaluation. The types of professional skills necessary for preparation of the report or record include both technical writers and flight instructors.

Under section 604 of the Act, the FAA must determine an estimate of the classes of small entities which will be subject to the requirement. This determination is typically based on small entity size and cost thresholds that determine whether an entity meets the definition of “small,” and these thresholds vary depending on the affected industry.

Using the size standards from the Small Business Administration for Air Transportation and Aircraft Manufacturing, the FAA defined companies as small entities if they have fewer than 1,500 employees.<sup>31</sup>

### **Small entities affected**

This final rule will be published in 2013 and become effective in 2014. Operators affected by this final rule will be required to comply with a majority of the final rule requirements 5 years after the effective date. The FAA does not know if an operator will still be in business or will still remain a small business entity by the 2019 compliance date applicable to the majority of the provisions. Therefore, the FAA will use current U.S. operator’s employment and annual revenue in order to determine the number of operators this final rule affect.

To determine the economic impact of this final rule on small-business operators the agency began by identifying the affected firms, gathering operational data, and establishing the compliance cost impact. The FAA obtained a list of U.S. operators, who are affected by the final

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<sup>31</sup> 13 CFR § 121.201, Size Standards Used to Define Small Business Concerns, Sector 48-49 Transportation, Subsector 481 Air Transportation.



rule, from the FAA Flight Standards Service National Vital Information Subsystem (NVIS) database.<sup>32</sup> Using information provided by the U.S. Department of Transportation Form 41 filings and the World Aviation Directory & Aerospace Database (WAD) the agency obtained company revenue and employment for many of the operators.

We determined that 83 operators would be affected by the final rule. Of these 83 operators, there are 49 that reported annual employment and operating revenue data. Of the 49 air carriers that reported annual employment data, 22 air carriers are below the SBA size standard of 1,500 employees for a small business. Due to the sparse amount of publicly available data on internal company financial and employment statistics for small entities, it is not feasible to identify how many of the remaining carriers that did not report employment data would also qualify as small businesses, so it is not possible to estimate the total population of small entities that are likely to be affected by this rulemaking. However, based on the publically available data, the FAA assumes that this rule will have an impact on a substantial number of small entities.

To assess the final rule's cost impact to small business operators, the FAA determined the amount of additional time this rulemaking will add to their current training activities.

The FAA uses the average hourly wage (including benefits) of flight-crew members as a basis to estimate costs for additional training time. The FAA does not expect that the additional training requirements will result in higher travel costs, because the final rule adds only a small amount of training time, which we believe can be absorbed within operators' current training schedules. In order to estimate the impact on small entities, we sum the incremental costs of this rulemaking, and use that estimate to calculate an average cost per flight crew member. We then

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<sup>32</sup> The National Vital Information Subsystem (NVIS) is a Flight Standard Service database that contains the general information about operators, including the number of pilots.

use that average to estimate the total cost burden on carriers that we identify as meeting the above definition of small entities.

Specifically, we estimate each operator's total compliance cost by multiplying our estimate of the average cost per flight crew member by the number of flight-crew members for each of the 22 air carriers that meet the SBA size standard for a small business of 1,500 employees. In estimating the average cost per flight-crew member, we use the high cost from the range of costs estimated in the final rule, in order to provide a conservative estimate. We then measure the economic impact on small entities by dividing the estimated compliance cost for each of the 22 small entities by its annual revenue, and expressing the result as a percentage.

The FAA estimates that costs for complying with this final rule will exceed one percent of annual revenue for 2 of the sample of 22 operators identified as small entities. On the basis of these estimates, we conclude that this final rule will have a significant economic impact on a substantial number of small entities.

#### **Agency steps taken to minimize the significant economic impact on small entities**

In the following Analysis of Alternatives section, the FAA considered three alternatives to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes. The Analysis of Alternatives section also includes statements of the factual, policy, and legal reasons for selecting the final rule and why each one of the alternatives to the rule, considered by the agency, which affect the impact on small entities, was rejected.

#### **Analysis of Alternatives**

The FAA proposed alternatives to the SNPRM for small carriers and considered the proposed alternatives as it developed the final rule. A discussion of the final rule alternatives follows.

#### Alternative 1 -12 month recurrent training cycle for small entities.

Currently, PICs (captains) train every 6 months and SICs (first officers) train every 12 months. The FAA considered extending the recurrent training cycle for PICs working for small entities to 12 months to coincide with existing SIC recurrent training cycles. This would result in cost savings for small entities. However, a reduction in the training frequency for PICs to a 12-month cycle would be contrary to the purpose of this rulemaking, which is to improve safety. As a consequence, FAA determined that this alternative was unacceptable.

#### Alternative 2 - Excluding certain small entities.

In the SNPRM, the FAA considered exempting certain operators from compliance with the rule simply because they are small entities; however, small entities had experienced past accidents that the agency believes could be mitigated or prevented by this rule. Thus exempting small entities entirely from the rule would be contrary to our policy of ensuring a single high level of safety in all part 121 operations. Thus, the FAA did not find this alternative to be acceptable.

#### Alternative 3 - Extending the final compliance date to 7 years for small entities

Extending the final compliance date from 5 years to 7 years for small entities reduces the costs to small entities over the analysis interval. Under this alternative, the FAA expects that the projected cost of the final rule would not be significant for some of the 22 operators studied.

In the final rule, the FAA requires improvements that would reduce human error among crewmembers, particularly in situations that present special hazards. Because these requirements would address problems that are faced by all part 121 air carriers, regardless of their size, excluding certain operators simply because they are small entities would again be contrary to FAA's policy of ensuring one high level of safety in all part 121 operations. Thus, the FAA also found this alternative to be unacceptable.

#### Alternative 4 – The SNPRM

This agency considered moving forward with a final rule including all of the provisions of the rule proposed in the SNPRM. Industry commented that the rule language was unclear and did not estimate all of the proposal's costs. Instead of modifying the SNPRM, the FAA elected to adopt a final rule that included those provisions that provide the greatest safety benefit. Thus, the FAA did not accept this alternative.

#### **International Trade Impact Assessment**

The Trade Agreements Act of 1979 (Public Law 96-39), as amended by the Uruguay Round Agreements Act (Public Law 103-465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such the protection of safety, and does not operate

in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this final rule and determined that the final rule ensures the safety of the American public and does not exclude foreign operators that meet this objective. As a result, this rule is not considered as creating an unnecessary obstacle to foreign commerce.

### **Unfunded Mandates Assessment**

Title II of the Unfunded Mandates Reform Act of 1995 (Public Law 104-4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of \$100 million or more (in 1995 dollars) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a "significant regulatory action." The FAA currently uses an inflation-adjusted value of \$143.1 million in lieu of \$100 million. This final rule does not contain such a mandate; therefore, the requirements of Title II of the Act do not apply.

### **Paperwork Reduction Act**

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. According to the 1995 amendments to the Paperwork Reduction Act (5 CFR 1320.8(b)(2)(vi)), an agency may not collect or sponsor the collection of information, nor may it impose an information collection requirement unless it displays a currently valid Office of Management and Budget (OMB) control number.

This final rule will impose the following information collection requirements. As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), the FAA has submitted these information collection amendments to OMB for its review. The Office of Management and Budget has assigned OMB Control Number 2120-0739 to this collection, and upon publication of this rule, the package will be available on [reginfo.gov](http://reginfo.gov).

Summary: This final rule revises the training requirements for pilots in air carrier operations. The regulations enhance air carrier pilot training programs by emphasizing the development of pilots' manual handling skills and adding safety-critical tasks such as recovery from stall and upset. The final rule also requires enhanced runway safety training, training on pilot monitoring to be incorporated into existing requirements for scenario-based flight training and requires air carriers to implement remedial training programs for pilots. The FAA expects these changes to contribute to a reduction in aviation accidents.

Public comments: The requirements in the final rule were proposed in a supplemental notice of proposed rulemaking, published in the Federal Register on January 12, 2009, vol. 74, no. 7, pages 1280-1453, and the public was encouraged to comment.

Commenters to the proposed rule noted that the provisions specifically addressing preparation, approval and contents of crewmember and dispatcher manuals would generally result in significant time and cost to revise current manuals. Commenters also noted that proposed requirements regarding collection and retention of crewmember and dispatcher records were excessive and unnecessary. Commenters further noted that paperwork required by the proposed requirements for approval and amendment of crewmember and dispatcher training programs were burdensome for both air carriers and FAA personnel. Commenters also identified programming costs related to SNPRM provisions (e.g. new training intervals, new evaluation

intervals and new designations for check personnel) and claimed that while these costs would be substantial, they were not included in the agency's cost analysis. The FAA has not adopted these proposed requirements in this final rule.

The final rule contains discrete additional training and evaluation requirements (e.g. prevention and recovery from stall, prevention and recovery of upset, recovery from bounced landing and training in manual handling skills). The FAA did not receive any comments regarding recording or recordkeeping requirements for these proposed provisions that are being adopted in the final rule.

Purpose: This project is in direct support of the Department of Transportation's Strategic Plan—Strategic Goal—SAFETY; *i.e.*, to promote the public health and safety by working toward the elimination of transportation-related deaths and injuries. This final rule also responds to Public Law 111-216, sections 208 and 209. Under Public Law 111-216, Congress directed the FAA to conduct rulemaking to ensure that all flightcrew members receive ground training and flight training in recognizing and avoiding stalls, recovering from stalls, and recognizing and avoiding upset of an aircraft, as well as the proper techniques to recover from upset. Public Law 111-216 also directed the FAA to ensure air carriers develop remedial training programs for flightcrew members who have demonstrated performance deficiencies or experienced failures in the training environment. The FAA will use the information it collects and reviews to ensure compliance and adherence to regulations and, where necessary, to take enforcement action on violators of the regulations.

Respondents (including number of): The FAA estimates there are 83 certificate holders who would be required to provide information in accordance with the final rule. The respondents

to this proposed information requirement are certificate holders using the training requirements in 14 CFR part 121.

Frequency: The FAA estimates certificate holders will have a one-time information collection, then may collect or report information occasionally thereafter.

Annual Burden Estimate:

The FAA estimates the total one time paperwork costs for the final rule will be about \$8.2 million.

Final Rule Requirement	FAA Assumed Costs Start To Accrue	Number of Pages			Number Of Hours	Paper Work Person	Number Of Operators
		Training Program	Training Courseware	Operating Manual			
Fraud and falsification (§ 121.9)	120 days	0	0	0	0.0	n/a	83
Personnel identified as flight attendants (§ 121.392)	120 days	0	0	1	2.0	Tech Writer	83
Proficiency checks for PICs (§ 121.441(a)(1)(ii))	5 years and 120 days	0	0	0	0.0	n/a	83
Related aircraft differences training (§§ 121.400, 121.418, 121.434, 121.439, 121.441)	120 Days	0	0	0	0.0	n/a	83
Training equipment other than FSTDs approved under part 60 (§§ 121.403(b)(2), 121.408)	5 years and 120 days	1	0	5	40.0	Tech Writer	83
Approval of FSTDs (§ 121.407)	5 years and 120 days	0	0	0	0.0	n/a	83
Pilot monitoring (§§121.409,121.544, Appendix H)	5 years and 120 days	0	20	0	40.0	Instructor	83
		1	0	0	20.0	Tech Writer	83
Remedial training (§§ 121.415(h) and § 121.415(i))	5 years and 120 days	0	20	0	48.0	Instructor	83
		1	0	0	20.0	Tech Writer	83
Communication records for domestic and flag operations (§ 121.711)	120 days	0	0	2	2.0	Tech Writer	83
Qualifications and Training for instructors and check airmen who serve in FSTDs (§§ 121.411, 121.412, 121.413, 121.414)	4 years	0	40	0	60.0	Instructor	83
		2	0	0	40.0	Tech Writer	83
Extended envelope flight training maneuvers and procedures (§§121.407(e),121.423, 121.424, 121.427(d)(1)(i), 121.433(e)), Extended envelope ground training subjects (§§ 121.419(a)(2), 121.427), Runway safety maneuvers and procedures (Appendices E and F) and Crosswind maneuvers including wind gusts (Appendices E and F).	5 years and 120 days	0	60	0	240.0	Instructor	83
		4	0	40	240.0	Tech Writer	83
Approval of Advanced Qualification Program (§ 121.909)	120 Days	0	0	0	9.6	Instructor	22
		5	0	0	40.0	Tech Writer	22
<b>Total</b>					<b>801.6</b>		

**International Compatibility and Cooperation**

1. In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these proposed regulations.

2. Executive Order 13609, Promoting International Regulatory Cooperation, promotes international regulatory cooperation to meet shared challenges involving health, safety, labor,



security, environmental, and other issues and to reduce, eliminate, or prevent unnecessary differences in regulatory requirements. The FAA has analyzed this action under the policies and agency responsibilities of Executive Order 13609, and has determined that this action would have no effect on international regulatory cooperation.

### **Environmental Analysis**

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 312f and involves no extraordinary circumstances.

### **V. Executive Order Determinations**

#### **A. Executive Order 12866 and 13563**

See the “Regulatory Evaluation” discussion in the “Regulatory Notices and Analyses” section elsewhere in this preamble.

#### **B. Executive Order 13132, Federalism**

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. The agency determined that this action will not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, does not have Federalism implications.

#### **C. Executive Order 13211, Regulations That Significantly Affect Energy Supply, Distribution, or Use**

The FAA analyzed this final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The

agency has determined that it is not a “significant energy action” under the executive order and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

## **VI. How to Obtain Additional Information**

### **A. Rulemaking Documents**

An electronic copy of a rulemaking document may be obtained by using the Internet —

1. Search the Federal eRulemaking Portal (<http://www.regulations.gov>);
2. Visit the FAA’s Regulations and Policies Web page at [http://www.faa.gov/regulations\\_policies/](http://www.faa.gov/regulations_policies/) or
3. Access the Government Printing Office’s Web page at <http://www.gpo.gov/fdsys/>.

Copies may also be obtained by sending a request (identified by notice, amendment, or docket number of this rulemaking) to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9680.

### **B. Comments Submitted to the Docket**

Comments received may be viewed by going to <http://www.regulations.gov> and following the online instructions to search the docket number for this action. Anyone is able to search the electronic form of all comments received into any of the FAA’s dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.).

### **C. Small Business Regulatory Enforcement Fairness Act**

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires FAA to comply with small entity requests for information or advice about compliance with

statutes and regulations within its jurisdiction. A small entity with questions regarding this document, may contact its local FAA official, or the person listed under the FOR FURTHER INFORMATION CONTACT heading at the beginning of the preamble. To find out more about SBREFA on the Internet, visit [http://www.faa.gov/regulations\\_policies/rulemaking/sbre\\_act/](http://www.faa.gov/regulations_policies/rulemaking/sbre_act/).

### **List of Subjects**

14 CFR Part 121

Air carriers, Aircraft, Aviation safety, Reporting and recordkeeping requirements, Safety, Transportation.

### **The Amendment**

For the reasons set forth in the preamble, amend part 121 of title 14 of the Code of Federal Regulations as follows:

### **PART 121—OPERATING REQUIREMENTS: DOMESTIC, FLAG, AND SUPPLEMENTAL OPERATIONS**

1. The authority for part 121 is revised to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 40119, 41706, 44101, 44701–44702, 44705, 44709–44711, 44713, 44716–44717, 44722, 46105; Pub. L. 111-216, 124 Stat. 2348 (49 U.S.C. 44701 note).

2. Add § 121.9 to read as follows:

#### § 121.9 Fraud and falsification.

(a) No person may make, or cause to be made, any of the following:

(1) A fraudulent or intentionally false statement in any application or any amendment thereto, or in any other record or test result required by this part.

(2) A fraudulent or intentionally false statement in, or a known omission from, any record or report that is kept, made, or used to show compliance with this part, or to exercise any privileges under this chapter.

(b) The commission by any person of any act prohibited under paragraph (a) of this section is a basis for any one or any combination of the following:

(1) A civil penalty.

(2) Suspension or revocation of any certificate held by that person that was issued under this chapter.

(3) The denial of an application for any approval under this part.

(4) The removal of any approval under this part.

3. Add § 121.392 to read as follows:

§ 121.392 Personnel identified as flight attendants.

(a) Any person identified by the certificate holder as a flight attendant on an aircraft in operations under this part must be trained and qualified in accordance with subparts N and O of this part. This includes:

(1) Flight attendants provided by the certificate holder in excess of the number required by § 121.391(a); and

(2) Flight attendants provided by the certificate holder when flight attendants are not required by § 121.391(a).

(b) A qualifying flight attendant who is receiving operating experience on an aircraft in operations under subpart O of this part must be identified to passengers as a qualifying flight attendant.

4. Amend § 121.400 by adding paragraphs (c)(9), (c)(10), and (c)(11) to read as follows:

§ 121.400 Applicability and terms used.

\* \* \* \* \*

(c) \* \* \*

(9) Related aircraft. Any two or more aircraft of the same make with either the same or different type certificates that have been demonstrated and determined by the Administrator to have commonality to the extent that credit between those aircraft may be applied for flightcrew member training, checking, recent experience, operating experience, operating cycles, and line operating flight time for consolidation of knowledge and skills.

(10) Related aircraft differences training. The flightcrew member training required for aircraft with different type certificates that have been designated as related by the Administrator.

(11) Base aircraft. An aircraft identified by a certificate holder for use as a reference to compare differences with another aircraft.

5. Amend § 121.403 by revising paragraph (b)(2) to read as follows:

§ 121.403 Training program: Curriculum.

\* \* \* \* \*

(b) \* \* \*

(2) A list of all the training device mockups, systems trainers, procedures trainers, or other training aids that the certificate holder will use. No later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], a list of all the training equipment approved under § 121.408 as well as other training aids that the certificate holder will use.

\* \* \* \* \*

6. Amend § 121.407 as follows:

A. Revise paragraph (a) introductory text;

- B. Revise paragraphs (a)(1), (a)(1)(i), (a)(1)(iii), (a)(2) and (a)(3); and
- C. Add paragraph (e).

The revisions and addition read as follows:

§ 121.407 Training program: Approval of airplane simulators and other training devices.

(a) Each airplane simulator and other training device used to satisfy a training requirement of this part in an approved training program, must meet all of the following requirements:

(1) Be specifically approved by the Administrator for--

(i) Use in the certificate holder's approved training program;

(ii) \* \* \*

(iii) The particular maneuver, procedure, or flightcrew member function involved.

(2) Maintain the performance, function, and other characteristics that are required for qualification in accordance with part 60 of this chapter or a previously qualified device, as permitted in accordance with § 60.17 of this chapter.

(3) Be modified in accordance with part 60 of this chapter to conform with any modification to the airplane being simulated that results in changes to performance, function, or other characteristics required for qualification.

\* \* \* \* \*

(e) An airplane simulator approved under this section must be used instead of the airplane to satisfy the pilot flight training requirements prescribed in the extended envelope training set forth in § 121.423 of this part. Compliance with this paragraph is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

7. Add § 121.408 to read as follows:

§ 121.408 Training equipment other than flight simulation training devices.

- (a) The Administrator must approve training equipment used in a training program approved under this part and that functionally replicates aircraft equipment for the certificate holder and the crewmember duty or procedure. Training equipment does not include FSTDs qualified under part 60 of this chapter.
- (b) The certificate holder must demonstrate that the training equipment described in paragraph (a) of this section, used to meet the training requirements of this subpart, meets all of the following:
  - (1) The form, fit, function, and weight, as appropriate, of the aircraft equipment.
  - (2) Replicates the normal operation (and abnormal and emergency operation, if appropriate) of the aircraft equipment including the following:
    - (i) The required force, actions and travel of the aircraft equipment.
    - (ii) Variations in aircraft equipment operated by the certificate holder, if applicable.
  - (3) Replicates the operation of the aircraft equipment under adverse conditions, if appropriate.
- (c) Training equipment must be modified to ensure that it maintains the performance and function of the aircraft type or aircraft equipment replicated.
- (d) All training equipment must have a record of discrepancies. The documenting system must be readily available for review by each instructor, check airman or supervisor, prior to conducting training or checking with that equipment.
  - (1) Each instructor, check airman or supervisor conducting training or checking, and each person conducting an inspection of the equipment who discovers a discrepancy,

including any missing, malfunctioning or inoperative components, must record a description of that discrepancy and the date that the discrepancy was identified.

(2) All corrections to discrepancies must be recorded when the corrections are made.

This record must include the date of the correction.

(3) A record of a discrepancy must be maintained for at least 60 days.

(e) No person may use, allow the use of, or offer the use of training equipment with a missing, malfunctioning, or inoperative component to meet the crewmember training or checking requirements of this chapter for tasks that require the use of the correctly operating component.

(f) Compliance with this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

8. Amend § 121.409 as follows:

A. Replace the semicolon at the end of paragraph (b)(1) with a period;

B. Revise paragraph (b)(2);

C. Remove paragraph (b)(3); and

D. Redesignate current paragraph (b)(4) as paragraph (b)(3).

The revisions read as follows:

§ 121.409 Training courses using airplane simulators and other training devices.

\* \* \* \* \*

(b) \* \* \*

(2) Provides training in at least the following:

(i) The procedures and maneuvers set forth in appendix F to this part; or



(ii) Line-oriented flight training (LOFT) that—

(A) Before [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER],

(1) Utilizes a complete flight crew;

(2) Includes at least the maneuvers and procedures (abnormal and emergency) that may be expected in line operations; and

(3) Is representative of the flight segment appropriate to the operations being conducted by the certificate holder.

(B) Beginning on [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER]--

(1) Utilizes a complete flight crew;

(2) Includes at least the maneuvers and procedures (abnormal and emergency) that may be expected in line operations;

(3) Includes scenario-based or maneuver-based stall prevention training before, during or after the LOFT scenario for each pilot;

(4) Is representative of two flight segments appropriate to the operations being conducted by the certificate holder; and

(5) Provides an opportunity to demonstrate workload management and pilot monitoring skills.

\* \* \* \* \*

9. Amend § 121.411 by revising paragraphs (b)(1), (b)(2), (b)(3), (b)(6), (c)(1), (c)(2), and (c)(3) to read as follows:

§ 121.411 Qualifications: Check airmen (airplane) and check airmen (simulator).

\* \* \* \* \*

(b) \* \* \*

(1) Holds the airman certificates and ratings required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

(2) Has satisfactorily completed the appropriate training phases for the airplane, including recurrent training, that are required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

(3) Has satisfactorily completed the appropriate proficiency or flight checks that are required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

\* \* \* \* \*

(6) Has satisfied the recency of experience requirements of § 121.439, as applicable; and

\* \* \* \* \*

(c) \* \* \*

(1) Holds the airman certificates and ratings, except medical certificate, required to serve as a pilot in command or a flight engineer, as applicable, in operations under this part;

(2) Has satisfactorily completed the appropriate training phases for the airplane, including recurrent training, that are required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

(3) Has satisfactorily completed the appropriate proficiency or flight checks that are required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

\* \* \* \* \*

10. Amend § 121.412 by revising paragraphs (b)(1), (b)(2), (b)(3), (b)(5), (b)(6), (c)(1), (c)(2), and (c)(3) to read as follows:

§ 121.412 Qualifications: Flight instructors (airplane) and flight instructors (simulator).

\* \* \* \* \*

(b) \* \* \*

(1) Holds the airman certificates and rating required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

(2) Has satisfactorily completed the appropriate training phases for the airplane, including recurrent training, that are required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

(3) Has satisfactorily completed the appropriate proficiency or flight checks that are required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

\* \* \* \* \*

(5) Holds at least a Class III medical certificate unless serving as a required crewmember, in which case holds a Class I or a Class II medical certificate as appropriate; and

(6) Has satisfied the recency of experience requirements of § 121.439, as applicable.

\* \* \* \* \*

(c) \* \* \*

(1) Holds the airman certificates and ratings, except medical certificate, required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

(2) Has satisfactorily completed the appropriate training phases for the airplane, including recurrent training, that are required to serve as a pilot in command or flight engineer, as applicable, in operations under this part;

(3) Has satisfactorily completed the appropriate proficiency or flight checks that are required to serve as a pilot in command or flight engineer, as applicable, in operations under this part; and

\* \* \* \* \*

11. Amend § 121.413 as follows:

A. Revise the section heading;

B. Revise paragraph (a)(2), paragraph (d) introductory text, paragraph (d)(1), paragraph (e) introductory text, paragraph (e)(4), and paragraph (g) introductory text; and

C. Add paragraphs (c)(7), (d)(2), (h) and (i).

The revisions and additions read as follows:

§ 121.413 Initial, transition and recurrent training and checking requirements: Check airmen (airplane), check airmen (simulator).

(a) \* \* \*

(2) Within the preceding 24 calendar months that person satisfactorily conducts a check or supervises operating experience under the observation of an FAA inspector or an aircrew designated examiner employed by the operator. The observation check may be accomplished in part or in full in an airplane, in a flight simulator, or in a flight training device.

\* \* \* \* \*

(c) \* \* \*

(7) For check airmen who conduct training or checking in a flight simulator or a flight training device, the following subjects specific to the device(s) for the airplane type:

- (i) Proper operation of the controls and systems;
- (ii) Proper operation of environmental and fault panels;
- (iii) Data and motion limitations of simulation; and
- (iv) The minimum airplane simulator equipment required by this part or part 60 of this chapter, for each maneuver and procedure completed in a flight simulator or a flight training device.

(d) The transition ground training for check airmen must include the following:

(1) The approved methods, procedures, and limitations for performing the required normal, abnormal, and emergency procedures applicable to the airplane to which the check airman is transitioning.

(2) For check airmen who conduct training or checking in a flight simulator or a flight training device, the following subjects specific to the device(s) for the airplane type to which the check airman is transitioning:

- (i) Proper operation of the controls and systems;
- (ii) Proper operation of environmental and fault panels;
- (iii) Data and motion limitations of simulation; and
- (iv) The minimum airplane simulator equipment required by this part or part 60 of this chapter, for each maneuver and procedure completed in a flight simulator or a flight training device.

(e) The initial and transition flight training for check airmen (airplane) must include the following:

(1) \* \* \*

(4) For flight engineer check airmen (airplane), training to ensure competence to perform assigned duties.

\* \* \* \* \*

(g) The initial and transition flight training for check airmen who conduct training or checking in a flight simulator or a flight training device must include the following:

\* \* \* \* \*

(h) Recurrent ground training for check airmen who conduct training or checking in a flight simulator or a flight training device must be completed every 12 calendar months and must include the subjects required in paragraph (c)(7) of this section.

(i) Compliance with paragraphs (c)(7), (d)(2), and (h) of this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

12. Amend § 121.414 as follows:

A. Revise the section heading;

B. Revise paragraph (a)(2), paragraph (d) introductory text, paragraph (d)(1), paragraph (e) introductory text, paragraph (e)(4), and paragraph (g) introductory text; and

C. Add paragraphs (c)(8), (d)(2), (h), and (i).

The revisions and additions read as follows:

§ 121.414 Initial, transition and recurrent training and checking requirements: flight instructors (airplane), flight instructors (simulator).

(a) \* \* \*

(2) Within the preceding 24 calendar months, that person satisfactorily conducts instruction under the observation of an FAA inspector, an operator check airman, or an aircrew designated examiner employed by the operator. The observation check may be accomplished in part or in full in an airplane, in a flight simulator, or in a flight training device.

\* \* \* \* \*

(c) \* \* \*

(8) For flight instructors who conduct training in a flight simulator or a flight training device, the following subjects specific to the device(s) for the airplane type:

- (i) Proper operation of the controls and systems;
- (ii) Proper operation of environmental and fault panels;
- (iii) Data and motion limitations of simulation; and
- (iv) The minimum airplane simulator equipment required by this part or part 60 of this chapter, for each maneuver and procedure completed in a flight simulator or a flight training device.

(d) The transition ground training for flight instructors must include the following:

(1) The approved methods, procedures, and limitations for performing the required normal, abnormal, and emergency procedures applicable to the airplane to which the flight instructor is transitioning.

(2) For flight instructors who conduct training in a flight simulator or a flight training device, the following subjects specific to the device(s) for the airplane type to which the flight instructor is transitioning:

- (i) Proper operation of the controls and systems;

- (ii) Proper operation of environmental and fault panels;
- (iii) Data and motion limitations of simulation; and
- (iv) The minimum airplane simulator equipment required by this part or part 60 of this chapter, for each maneuver and procedure completed in a flight simulator or a flight training device.

(e) The initial and transition flight training for flight instructors (airplane) must include the following:

(1) \* \* \*

(4) For flight engineer instructors (airplane), inflight training to ensure competence to perform assigned duties.

\* \* \* \* \*

(g) The initial and transition flight training for flight instructors who conduct training in a flight simulator or a flight training device must include the following:

\* \* \* \* \*

(h) Recurrent flight instructor ground training for flight instructors who conduct training in a flight simulator or a flight training device must be completed every 12 calendar months and must include the subjects required in paragraph (c)(8) of this section.

(i) Compliance with paragraphs (c)(8), (d)(2), and (h) of this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

13. Amend § 121.415 as follows:

A. Revise section heading;



- B. In paragraph (a)(2), replace reference to “§§ 121.419 through 121.422” with “§§ 121.419, 121.421 and 121.422”;
- C. In paragraph (b), replace reference to “121.426” with “121.425”;
- D. In paragraph (d), replace reference to “§ 121.418” with “§ 121.418(a)” and replace the word “his” with “their”;
- E. In paragraph (f), replace reference to “§§ 121.419 through 121.425” with “§§ 121.419, 121.421, 121.422, 121.424, and 121.425”; and
- F. Add paragraphs (h), (i) and (j).

The revision and additions read as follows:

§ 121.415 Crewmember and dispatcher training program requirements.

\* \* \* \* \*

(h) Each training program must include a process to provide for the regular analysis of individual pilot performance to identify pilots with performance deficiencies during training and checking and multiple failures during checking.

(i) Each training program must include methods for remedial training and tracking of pilots identified in the analysis performed in accordance with paragraph (h).

(j) Compliance with paragraphs (h) and (i) of this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

14. Amend § 121.418 as follows:

- A. Revise section heading;
- B. Redesignate paragraphs (a), (a)(1), (a)(2), (a)(3) and the undesignated paragraph, as paragraphs (a)(1), (a)(1)(i), (a)(1)(ii), (a)(1)(iii), and (a)(2) respectively;

- C. Add new heading in paragraph (a); and
- D. Add new paragraphs (b) and (c).

The revisions and additions read as follows:

§ 121.418 Differences training and related aircraft differences training.

(a) Differences training.

\* \* \* \* \*

(b) Related aircraft differences training.

(1) In order to seek approval of related aircraft differences training for flightcrew members, a certificate holder must submit a request for related aircraft designation to the Administrator, and obtain approval of that request.

(2) If the Administrator determines under paragraph (b)(1) of this section that a certificate holder is operating related aircraft, the certificate holder may submit to the Administrator a request for approval of a training program that includes related aircraft differences training.

(3) A request for approval of a training program that includes related aircraft differences training must include at least the following:

- (i) Each appropriate subject required for the ground training for the related aircraft.
- (ii) Each appropriate maneuver or procedure required for the flight training and crewmember emergency training for the related aircraft.
- (iii) The number of programmed hours of ground training, flight training and crewmember emergency training necessary based on review of the related aircraft and the duty position.

(c) Approved related aircraft differences training for flightcrew members may be included in initial, transition, upgrade and recurrent training for the base aircraft. If the certificate holder's approved training program includes related aircraft differences training in accordance with paragraph (b) of this section, the training required by §§ 121.419, 121.424, 121.425 and 121.427, as applicable to flightcrew members, may be modified for the related aircraft.

15. Amend § 121.419 as follows:

- A. Revise paragraph (a)(1)(ix);
- B. In paragraph (a)(2)(x), remove "and" following the semi-colon;
- C. Redesignate paragraph (a)(2)(xi) as (a)(2)(xiii); and
- D. Add new paragraphs (a)(2)(xi), (a)(2)(xii), and (e).

The revisions and additions read as follows:

§ 121.419 Pilots and flight engineers: Initial, transition, and upgrade ground training.

(a) \* \* \*

(1) \* \* \*

(ix) Other instructions as necessary to ensure pilot and flight engineer competence.

(2) \* \* \*

(xi) For pilots, stall prevention and recovery in clean configuration, takeoff and maneuvering configuration, and landing configuration.

(xii) For pilots, upset prevention and recovery; and

(xiii) The approved Airplane Flight Manual.

\* \* \* \* \*

(e) Compliance and pilot programmed hours.

(1) Compliance with the requirements identified in paragraphs (a)(2)(xi) and (a)(2)(xii) of this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

(2) Beginning [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], initial programmed hours applicable to pilots as specified in paragraphs (c) and (d) of this section must include 2 additional hours.

16. Remove and reserve § 121.420.

§ 121.420 [Reserved]

17. Add § 121.423 to read as follows:

§ 121.423 Pilot: Extended Envelope Training.

(a) Each certificate holder must include in its approved training program, the extended envelope training set forth in this section with respect to each airplane type for each pilot. The extended envelope training required by this section must be performed in a Level C or higher full flight simulator, approved by the Administrator in accordance with § 121.407.

(b) Extended envelope training must include the following maneuvers and procedures:

- (1) Manually controlled slow flight;
- (2) Manually controlled loss of reliable airspeed;
- (3) Manually controlled instrument departure and arrival;
- (4) Upset recovery maneuvers; and
- (5) Recovery from bounced landing.

- (c) Extended envelope training must include instructor-guided hands on experience of recovery from full stall and stick pusher activation, if equipped.
- (d) Recurrent training. Within 24 calendar months preceding service as a pilot, each person must satisfactorily complete the extended envelope training described in paragraphs (b)(1) – (b)(4) and (c) of this section. Within 36 calendar months preceding service as a pilot, each person must satisfactorily complete the extended envelope training described in paragraph (b)(5) of this section.
- (e) Deviation from use of Level C or higher full flight simulator.
- (1) A certificate holder may submit a request to the Administrator for approval of a deviation from the requirements of paragraph (a) of this section to conduct the extended envelope training using an alternative method to meet the learning objectives of this section.
- (2) A request for deviation from paragraph (a) of this section must include the following information:
- (i) A simulator availability assessment, including hours by specific simulator and location of the simulator, and a simulator shortfall analysis that includes the training that cannot be completed in a Level C or higher full flight simulator; and
- (ii) Alternative methods for achieving the learning objectives of this section.
- (3) A certificate holder may request an extension of a deviation issued under this section.
- (4) Deviations or extensions to deviations will be issued for a period not to exceed 12 months.
- (f) Compliance with this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL

REGISTER]. For the recurrent training required in paragraph (d) of this section, each pilot qualified to serve as second in command or pilot in command in operations under this part on [INSERT DATE 5 YEARS AND 120 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER] must complete the recurrent extended envelope training within 12 calendar months after [INSERT DATE 5 YEARS AND 120 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

18. Amend § 121.424 as follows:

- A. Revise paragraph (a);
- B. Revise paragraph (b) introductory text;
- C. In paragraph (b)(1), remove the word “and” following the semi-colon;
- D. Redesignate paragraph (b)(2) as (b)(3);
- E. Add new paragraph (b)(2);
- F. In paragraph (c), replace the reference to “paragraph (a)” with reference to “paragraph (a)(1);” and
- G. Add paragraph (e).

The revisions and addition read as follows:

§ 121.424 Pilots: Initial, transition, and upgrade flight training.

- (a) Initial, transition, and upgrade training for pilots must include the following:
  - (1) Flight training and practice in the maneuvers and procedures set forth in the certificate holder's approved low-altitude windshear flight training program and in appendix E to this part, as applicable; and
  - (2) Extended envelope training set forth in § 121.423.

(b) The training required by paragraph (a) of this section must be performed inflight except--

(1) \* \* \*

(2) That the extended envelope training required by § 121.423 must be performed in a Level C or higher full flight simulator unless the Administrator has issued to the certificate holder a deviation in accordance with § 121.423(e); and

\* \* \* \* \*

(e) Compliance with paragraphs (a)(2) and (b)(2) of this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

19. Remove and reserve § 121.426.

§ 121.426 [Reserved]

20. Amend § 121.427 as follows:

- A. Revise paragraph (b)(4);
- B. Remove paragraph (c)(2);
- C. Redesignate paragraphs (c)(3) and (c)(4) as paragraphs (c)(2) and (c)(3), respectively;
- D. Revise paragraph (d)(1);
- E. Remove paragraph (d)(3); and
- F. Add paragraph (e).

The revisions and addition read as follows:

§ 121.427 Recurrent training.

\* \* \* \* \*

(b) \* \* \*

(4) CRM and DRM training. For flightcrew members, CRM training or portions thereof may be accomplished during an approved simulator line operational flight training (LOFT) session. The recurrent CRM or DRM training requirements do not apply until a person has completed the applicable initial CRM or DRM training required by §§ 121.419, 121.421, or 121.422.

\* \* \* \* \*

(d) Recurrent flight training for flightcrew members must include at least the following:

(1) For pilots--

(i) Extended envelope training as required by § 121.423; and

(ii) Flight training in an approved simulator in maneuvers and procedures set forth in the certificate holder's approved low-altitude windshear flight training program and flight training in maneuvers and procedures set forth in appendix F to this part, or in a flight training program approved by the Administrator, except as follows--

(A) The number of programmed inflight hours is not specified; and

(B) Satisfactory completion of a proficiency check may be substituted for recurrent flight training as permitted in § 121.433(c) and (e).

\* \* \* \* \*

(e) Compliance and pilot programmed hours.

(1) Compliance with the requirements identified in paragraphs (d)(1)(i) of this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

(2) After [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], recurrent programmed hours applicable



to pilots as specified in paragraph (c)(1) of this section must include 30 additional minutes.

21. Amend § 121.432 as follows:

- A. Remove paragraphs (b)(2) and (b)(3);
- B. Redesignate paragraphs (b)(4) and (b)(5) as paragraphs (b)(2) and (b)(3) respectively;
- C. Remove paragraphs (c) and (d); and
- D. Designate the undesignated paragraph as paragraph (c).

22. Amend § 121.433 as follows:

- A. Remove “he” each time it appears in § 121.433 and replace it with “the person;” and
- B. Revise paragraphs (d) and (e).

The revisions read as follows:

§ 121.433 Training required.

\* \* \* \* \*

(d) For each airplane in which a pilot serves as pilot in command, the person must satisfactorily complete either recurrent flight training or a proficiency check within the preceding 12 calendar months. The requirement in this paragraph expires on [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER]. After that date, the requirement in § 121.441(a)(1)(ii) applies.

(e) Notwithstanding paragraphs (c)(2) and (d) of this section, a proficiency check as provided in § 121.441 of this part may not be substituted for the extended envelope training required by § 121.423 or training in those maneuvers and procedures set forth in a certificate holder's approved low-altitude windshear flight training program when that

program is included in a recurrent flight training course as required by § 121.409(d) of this part.

23. Amend § 121.434 as follows:

- A. Add paragraph (a)(4); and,
- B. In paragraph (b)(1), replace “he” with “the person;”
- C. Remove the last sentence of paragraph (f); and
- D. Revise paragraph (i).

The addition and revisions read as follows:

§ 121.434 Operating experience, operating cycles, and consolidation of knowledge and skills.

(a) \* \* \*

(4) Deviation based upon designation of related aircraft in accordance with § 121.418(b).

(i) The Administrator may authorize a deviation from the operating experience, operating cycles, and line operating flight time for consolidation of knowledge and skills required by this section based upon a designation of related aircraft in accordance with § 121.418(b) and a determination that the certificate holder can demonstrate an equivalent level of safety.

(ii) A request for deviation from the operating experience, operating cycles, and line operating flight time for consolidation of knowledge and skills required by this section based upon a designation of related aircraft must be submitted to the Administrator. The request must include the following:

(A) Identification of aircraft operated by the certificate holder designated as related aircraft.

(B) Hours of operating experience and number of operating cycles necessary based on review of the related aircraft, the operation, and the duty position.

(C) Consolidation hours necessary based on review of the related aircraft, the operation, and the duty position.

(iii) The administrator may, at any time, terminate a grant of deviation authority issued under paragraph (a)(4) of this section.

\* \* \* \* \*

(i) Notwithstanding the reductions in programmed hours permitted under §§ 121.405 and 121.409 of subpart N of this part, the hours of operating experience for crewmembers are not subject to reduction other than as provided in accordance with a deviation authorized under paragraph (a) or as provided in paragraphs (e) and (f) of this section.

24. Remove and reserve § 121.435.

§ 121.435 [Reserved]

25. Amend § 121.439 by adding paragraph (f) to read as follows:

§ 121.439 Pilot qualification: Recent experience.

\* \* \* \* \*

(f) Deviation authority based upon designation of related aircraft in accordance with § 121.418(b).

(1) The Administrator may authorize a deviation from the requirements of paragraph (a) of this section based upon a designation of related aircraft in accordance with § 121.418(b) and a determination that the certificate holder can demonstrate an equivalent level of safety.

(2) A request for deviation from paragraph (a) of this section must be submitted to the Administrator. The request must include the following:

(i) Identification of aircraft operated by the certificate holder designated as related aircraft.

(ii) The number of takeoffs, landings, maneuvers, and procedures necessary to maintain or reestablish recency based on review of the related aircraft, the operation, and the duty position.

(3) The administrator may, at any time, terminate a grant of deviation authority issued under paragraph (f) of this section.

26. Amend § 121.441 by revising paragraph (a)(1) and adding paragraph (f) to read as follows:

§ 121.441 Proficiency checks.

(a) \* \* \*

(1) For a pilot in command—

(i) Before [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER],

(A) A proficiency check within the preceding 12 calendar months and,

(B) In addition, within the preceding 6 calendar months, either a proficiency check or the approved simulator course of training.

(ii) Beginning on [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER],

(A) A proficiency check within the preceding 12 calendar months in the aircraft type in which the person is to serve and,

(B) In addition, within the preceding 6 calendar months, either a proficiency check or the approved simulator course of training.

\* \* \* \* \*

(f) Deviation authority based upon designation of related aircraft in accordance with § 121.418(b).

(1) The Administrator may authorize a deviation from the proficiency check requirements of paragraphs (a) and (b)(1) of this section based upon a designation of related aircraft in accordance with § 121.418(b) and a determination that the certificate holder can demonstrate an equivalent level of safety.

(2) A request for deviation from paragraphs (a) and (b)(1) of this section must be submitted to the Administrator. The request must include the following:

(i) Identification of aircraft operated by the certificate holder designated as related aircraft.

(ii) For recurrent proficiency checks, the frequency of the related aircraft proficiency check and the maneuvers and procedures to be included in the related aircraft proficiency check based on review of the related aircraft, the operation, and the duty position.

(iii) For qualification proficiency checks, the maneuvers and procedures to be included in the related aircraft proficiency check based on review of the related aircraft, the operation, and the duty position.

(3) The administrator may, at any time, terminate a grant of deviation authority issued under paragraph (f) of this section.

27. Add § 121.544 to read as follows:

§ 121.544 Pilot monitoring.

Each pilot who is seated at the pilot controls of the aircraft, while not flying the aircraft, must accomplish pilot monitoring duties as appropriate in accordance with the certificate holder's procedures contained in the manual required by § 121.133. Compliance with this section is required no later than [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER].

28. Amend § 121.711 by replacing the section to read as follows:

§ 121.711 Communication records: Domestic and flag operations.

- (a) Each certificate holder conducting domestic or flag operations must record each en route communication between the certificate holder and its pilots using a communication system as required by § 121.99.
- (b) For purposes of this section the term en route means from the time the aircraft pushes back from the departing gate until the time the aircraft reaches the arrival gate at its destination.
- (c) The record required in subsection (a) must contain at least the following information:
  - (1) The date and time of the contact;
  - (2) The flight number;
  - (3) Aircraft registration number;
  - (4) Approximate position of the aircraft during the contact;
  - (5) Call sign; and
  - (6) Narrative of the contact.
- (d) The record required in subsection (a) must be kept for at least 30 days.

29. Amend text of appendix E by revising the first paragraph to read as follows:

Appendix E to Part 121—Flight Training Requirements

The maneuvers and procedures required by §121.424 of this part for pilot initial, transition, and upgrade flight training are set forth in the certificate holder's approved low-altitude windshear flight training program, § 121.423 extended envelope training, and in this appendix. All required maneuvers and procedures must be performed inflight except that windshear and extended envelope training maneuvers and procedures must be performed in an airplane simulator in which the maneuvers and procedures are specifically authorized to be accomplished. Certain other maneuvers and procedures may be performed in an airplane simulator with a visual system (visual simulator), an airplane simulator without a visual system (nonvisual simulator), a training device, or a static airplane as indicated by the appropriate symbol in the respective column opposite the maneuver or procedure.

\* \* \* \* \*

30. In appendix E, amend the entries in the Table entitled “Flight Training Requirements” as follows:

- A. Redesignate entry I(c) as I(c)(1) and revise text of I(c)(1);
- B. Add new entry I(c)(2);
- C. Redesignate entry I(d) as I(d)(1) and revise text of I(d)(1);
- D. Add new entry I(d)(2);
- E. Redesignate entry II(c) as II(c)(1);
- F. Add new entry II(c)(2);
- G. In entry III(e) replace the word “runway” with “runaway”;
- H. Revise entry III(i);

- I. Redesignate entry IV(d) as IV(d)(1); and
- J. Add new entry IV(d)(2).

The revisions and additions read as follows:

\* \* \* \* \*

	Initial Training					Transition Training					Upgrade Training				
	Airplane		Simulator			Airplane		Simulator			Airplane		Simulator		
	Inflight	Static	Visual simulator	Non-visual simulator	Training device	Inflight	Static	Visual simulator	Non-visual simulator	Training device	Inflight	Static	Visual simulator	Non-visual simulator	Training device
* * * * *															
<b>I Preflight—</b>															
* * * * *															
(c)(1) Before [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], taxiing, sailing, and docking procedures in compliance with instructions issued by the appropriate Traffic Control Authority or by the person conducting the training.	B					AT					BU				



<p>(c)(2) Taxiing. Beginning on [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], this maneuver includes the following:</p> <ul style="list-style-type: none"> <li>(i) Taxiing, sailing, and docking procedures in compliance with instructions issued by the appropriate Traffic Control Authority or by the person conducting the training.</li> <li>(ii) Use of airport diagram (surface movement chart).</li> <li>(iii) Obtaining appropriate clearance before crossing or entering active runways.</li> <li>(iv) Observation of all surface movement guidance control markings and lighting.</li> </ul>	B				AT					BU					
<p>(d)(1) Before [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], pre-takeoff checks that include power-plant checks.</p>			B					AT					BU		
<p>(d)(2) Beginning [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], pre-takeoff procedures that include power-plant checks, receipt of takeoff clearance and confirmation of aircraft location, and FMS entry (if appropriate), for departure runway prior to crossing hold short line for takeoff.</p>			B				AT					BU			

<b>II Takeoffs—</b>																	
* * * * *																	
(c)(2) Beginning [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], crosswind takeoffs including crosswind takeoffs with gusts if practicable under the existing meteorological, airport, and traffic conditions.	B					AT					BU						
* * * * *																	
<b>III. Flight Maneuvers and Procedures</b>																	
* * * * *																	
(i) Stall Prevention. For the purpose of this training the approved recovery procedure must be initiated at the first indication of an impending stall (buffet, stick shaker, aural warning). Stall prevention training must be conducted in at least the following configurations: (1) Takeoff configuration (except where the airplane uses only a zero-flap takeoff configuration). (2) Clean configuration. (3) Landing configuration. * * *				B					AT					BU			

* * * * *															
<b>IV Landings and Approaches to Landings—</b>															
* * * * *															
(d)(2) Beginning [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], crosswind landing, including crosswind landings with gusts if practicable under the existing meteorological, airport, and traffic conditions.	B					AT					BU				
* * * * *															

31. In appendix F, amend the entries in the Table as follows:

- A. Revise the reference in entry I(b) to §121.424(d)(2) by replacing it with a reference to §121.424(d)(1)(ii);
- B. Redesignate entry I(c) as I(c)(1) and revise text of I(c)(1);
- C. Add new entry I(c)(2);
- D. Redesignate entry I(d) as I(d)(1) and hyphenate the words power-plant in I(d)(1);
- E. Add new entry I(d)(2);
- F. Redesignate entry II(c) as II(c)(1) and revise text of II(c)(1);
- G. Add new entry II(c)(2);
- H. Revise entry III(c)(4) by removing the second sentence;

- I. Revise entry IV(b) and the first floating paragraph that follows;
- J. Revise entry V introductory text by removing the last sentence in the first paragraph;
- K. Redesignate entry V(c) as V(c)(1); and
- L. Add new entry V(c)(2).

The revisions and additions read as follows:

	Required		Permitted			
	Simulated Instrument Conditions	Inflight	Visual Simulator	Nonvisual Simulator	Training Device	Waiver Provisions of §121.441(d)
<b>Maneuvers/Procedures</b>						
* * * * *						
<b>I Preflight—</b>						
* * * * *						
(c)(1) Taxiing. Before [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], this maneuver includes taxiing (in the case of a second in command proficiency check to the extent practical from the second in command crew position), sailing, or docking procedures in compliance with instructions issued by the appropriate traffic control authority or by the person conducting the checks.		B				

<p>(c)(2) Taxiing. Beginning [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], this maneuver includes the following:</p> <ul style="list-style-type: none"> <li>(i) Taxiing (in the case of a second in command proficiency check to the extent practical from the second in command crew position), sailing, or docking procedures in compliance with instructions issued by the appropriate traffic control authority or by the person conducting the checks.</li> <li>(ii) Use of airport diagram (surface movement chart).</li> <li>(iii) Obtaining appropriate clearance before crossing or entering active runways.</li> <li>(iv) Observation of all surface movement guidance control markings and lighting.</li> </ul>		B				
* * * * *						
<p>(d)(2) Beginning [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], pre-takeoff procedures that include power-plant checks, receipt of takeoff clearance and confirmation of aircraft location, and FMS entry (if appropriate), for departure runway prior to crossing hold short line for takeoff.</p>		B				
<p><b>II Takeoff—</b></p>						
* * * * *						

<p>(c)(1) Crosswind. Before [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], one crosswind takeoff, if practicable, under the existing meteorological, airport, and traffic conditions.</p>		B*				
<p>(c)(2) Beginning [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], one crosswind takeoff with gusts, if practicable, under the existing meteorological, airport, and traffic conditions.</p>		B*				
<p>* * * * *</p>						
<p><b>IV. Inflight Maneuvers</b></p>						
<p>* * * * *</p>						

<p>(b) Stall Prevention. For the purpose of this maneuver the approved recovery procedure must be initiated at the first indication of an impending stall (buffet, stick shaker, aural warning). Except as provided below there must be at least three stall prevention recoveries as follows:</p> <p>(1) One in the takeoff configuration (except where the airplane uses only a zero-flap takeoff configuration).</p> <p>(2) One in a clean configuration.</p> <p>(3) One in a landing configuration.</p> <p>At the discretion of the person conducting the check, one stall prevention recovery must be performed in one of the above configurations while in a turn with the bank angle between 15° and 30°. Two out of the three stall prevention recoveries required by this paragraph may be waived.</p> <p>* * *</p>	B			B		B*
* * * * *						

<p><b>V Landings and Approaches to Landings—</b></p> <p>Notwithstanding the authorizations for combining and waiving maneuvers and for the use of a simulator, at least two actual landings (one to a full stop) must be made for all pilot-in-command and initial second-in-command proficiency checks.</p> <p>Landings and approaches to landings must include the types listed below, but more than one type may be combined where appropriate.</p>						
<p>* * * * *</p>						
<p>(c)(2) Beginning [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], crosswind landing with gusts, if practical under existing meteorological, airport, and traffic conditions.</p>		<p>B*</p>				
<p>* * * * *</p>						

32. Amend appendix H by adding a new sentence to the end of paragraph (6) in the section titled Advanced Simulation Training Program; and add new paragraph (5) to the section titled Level C Training and Checking Permitted to read as follows:

Appendix H to Part 121—Advanced Simulation

\* \* \* \* \*

Advanced Simulation Training Program



\* \* \* \* \*

6. \* \* \* After [INSERT DATE 5 YEARS AND 120 DAYS AFTER PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER], the LOFT must provide an opportunity for the pilot to demonstrate workload management and pilot monitoring skills.

\* \* \* \* \*

Level C

Training and Checking Permitted

\* \* \* \* \*

5. For all pilots, the extended envelope training required by § 121.423 of this part.

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and Secs. 208 and 209 of Pub. L. 111-216, 124 Stat. 2348 (49 U.S.C. 44701 note), on **NOV 5 2013**



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Administrator