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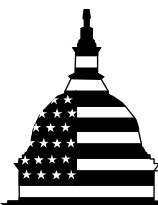
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AVIATION SAFETY

FAA Efforts Have Improved Safety, but Challenges Remain in Key Areas

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Highlights of [GAO-13-442T](#), a report to Committee on Commerce, Science, and Transportation, U.S. Senate

Why GAO Did This Study

Even with nearly 80,000 flights each day within the national airspace system, there has not been a fatal commercial aviation accident in more than 4 years. The U.S. airspace system is arguably one of the safest in the world, with key aviation stakeholders—the FAA, airlines, airports, aircraft manufacturers, and the National Transportation Safety Board (NTSB)—working together to ensure these results.

As the federal agency responsible for regulating the safety of civil aviation in the United States, FAA is responsible for, among other things: setting aircraft certification standards, collecting fleet and flight activity data, conducting safety oversight of pilot training and general aviation operations, and safely integrating aircraft into the national airspace. As the aviation industry evolves, FAA must remain diligent in its efforts to ensure the continued safety of aviation. In 2010, Congress passed the Airline Safety and Federal Aviation Administration Extension Act, which, in part, called for FAA to better manage safety risks.

This testimony focuses on (1) FAA's aircraft certification process and (2) FAA's use of data to enhance safety and improve aviation oversight. The testimony is based on GAO's previous work and updated with industry reports and information provided by FAA officials.

GAO has previously recommended that FAA address several data quality weaknesses. FAA concurred with most of these recommendations and has taken steps toward addressing some.

View [GAO-13-442T](#). For more information, contact Gerald L. Dillingham, Ph.D. at (202) 512-2834 or dillinghamg@gao.gov.

April 16, 2013

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What GAO Found

The Federal Aviation Administration (FAA) is responsible for approving the design and airworthiness of new aircraft and equipment before they are introduced into service. FAA approves changes to aircraft and equipment based on evaluation of industry submissions against standards set forth in federal aviation regulations and related guidance documents. In September 2011, we reported that, overall, FAA did a good job following its certification processes in assessing the composite fuselage and wings of Boeing's 787 against its airworthiness standards. However, the approval process—referred to as certification—presents challenges for FAA in terms of resources and maintaining up-to-date knowledge of industry practices, two issues that may hinder FAA's efforts to conduct certifications in an efficient and timely manner. FAA is currently assessing its certification process and identifying opportunities to streamline it.

FAA plans to continue analyzing data reactively to understand the causes of accidents and incidents, and to augment this approach through implementation of a safety management system (SMS). SMS is a proactive approach that includes continually monitoring all aspects of aviation operations and collecting and analyzing appropriate data to identify emerging safety problems before they result in death, injury, or significant property damage. FAA has put in place various quality controls for its data; however, GAO has identified a number of areas where FAA does not have comprehensive risk-based data or methods of reporting that capture all incidents. The following are among the key areas GAO identified as needing improved data collection and analysis.

- **Runway and ramp safety.** Additional information about surface incidents could help improve safety in the airport terminal area, as data collection is currently limited to certain types of incidents, notably runway incursions, which involve the incorrect presence of an aircraft, vehicle, or person on a runway and certain airborne incidents, and does not include runway overruns, which occur when an aircraft veers off a runway or incidents in ramp areas, which can involve aircraft and airport vehicles.
- **Airborne operational errors.** FAA's metric for airborne losses of separation—a type of operational error—is too narrow to account for all potential risk.
- **General aviation.** FAA estimates of annual flight hours for the general aviation sector, which includes all forms of aviation except commercial and military, may not be reliable.
- **Pilot training.** FAA does not have a comprehensive system in place to measure its performance in meeting its annual pilot school inspection requirements.

FAA has taken steps to address safety oversight issues and data challenges in many of these areas. For example, FAA is planning to develop a program to collect and analyze data on runway overruns, but it will be several years before FAA has obtained enough information about these incidents to assess risks. Sustained attention to these data collection and analysis issues will be necessary to ensure that FAA can more comprehensively and accurately assess and manage risk.

Chairman Rockefeller, Ranking Member Thune, and Members of the Committee:

I appreciate the opportunity to testify today on the Federal Aviation Administration's (FAA) efforts to oversee aviation safety. Even with nearly 80,000 flights each day within the national airspace system (NAS), there has not been a fatal commercial aviation accident in more than 4 years, and although hundreds of fatalities continue to occur each year in general aviation,¹ the number of overall general aviation accidents has trended downward. The U.S. airspace system is arguably one of the safest in the world, with key aviation stakeholders—FAA, the airlines and other aircraft operators, airports, aircraft manufacturers, and the National Transportation Safety Board (NTSB)—working together to achieve these results. Nevertheless, we must not become complacent because of the extraordinary safety record that has been achieved to date. Congress, FAA, and other stakeholders must remain diligent in their oversight of aviation safety.

As the federal agency responsible for regulating the safety of civil aviation in the United States, FAA is responsible for, among other things, setting aircraft certification standards and ensuring that manufacturers and suppliers meet those standards, collecting fleet and flight activity data, conducting safety oversight of pilot training and general aviation operations, and safely integrating aircraft and equipment into the national airspace. With air travel projected to increase over the next 20 years and agencies governmentwide experiencing budget reductions as part of the 2013 sequestration, it will be critical for FAA to apply its limited resources in a manner that will allow it to maintain and enhance the safety of the NAS. In 2010, Congress passed the Airline Safety and Federal Aviation Administration Extension Act (Airline Safety Act),² which, in part, called for FAA to better manage safety risks. While FAA and other stakeholders continue to address safety concerns in a reactive fashion by analyzing and investigating accidents and incidents, they have also begun to address safety issues in a more proactive fashion—before accidents or incidents occur. This proactive approach involves identifying, analyzing, and managing safety risks that are inherent throughout the system, and is being undertaken by FAA as part of its implementation of safety

¹General aviation includes all forms of aviation except scheduled air carriers and military.

²Pub. L. No. 111-216, 124 Stat. 2348 (2010).

management systems (SMS). This risk-based oversight approach is becoming the standard throughout the global aviation industry and is recognized by aviation leaders, such as the International Civil Aviation Organization (ICAO), as the next step in the evolution of safety. In addition to SMS, FAA's certification process attempts to ensure that safety is built into the aircraft and equipment used in the NAS.³ While the agency has taken steps to improve its oversight approach, challenges remain in key areas.

My statement today highlights two areas that are important to FAA's safety efforts: the certification process and the collection and analysis of risk-based data as part of SMS. This statement is drawn from a body of work that we have completed from June 2009 to October 2012 regarding FAA's safety oversight efforts. We have updated this information through a review of FAA documents and interviews with FAA officials. A list of related GAO products is included at the end of this statement, along with footnoted references to these products throughout the statement. The reports and testimonies cited in this statement contain more detailed explanations of the methods used to conduct our work. This body of work was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Certification is a Key Component of FAA's Aviation Safety Oversight

Among its responsibilities for aviation safety, FAA issues certificates that approve the design and production of new aircraft and equipment before they are introduced into service; these certificates demonstrate that the aircraft and equipment meet FAA's airworthiness requirements. FAA also grants approvals for such things as changes to air operations and equipment. Certificates indicate that the aircraft, equipment, and new air operators are safe for use or flight in the NAS. While industry stakeholders have expressed concerns about variation in FAA's interpretation of standards for certification and approval decisions,

³FAA issues certificates for new air operators, new aircraft, and aircraft parts and equipment, and approvals, based on the evaluation of aviation industry submissions against standards set forth in federal aviation regulations and related FAA guidance documents.

stakeholders and experts that we interviewed for our 2010 report indicated that serious problems occur infrequently.⁴ In addition, in September 2011 we reported that FAA did a good job following its certification processes in assessing the composite fuselage and wings of Boeing's 787 against its airworthiness standards.⁵

The certification process also provides an example of how FAA is attempting to use a more proactive approach in finding solutions to a potential problem. In the case of flammability regulations that govern transport type aircraft, FAA has primarily developed its regulations on a reactive basis. That is, as accidents and incidents have occurred, their causes have been investigated, and the findings used to develop regulations designed to prevent the future occurrence of similar incidents or accidents. To supplement this oversight method, FAA has proposed a new, threat-based approach for flammability regulations that will base the flammability performance for different parts of the aircraft upon realistic threats that could occur in-flight or in a post-crash environment.

FAA recognizes the value of certification as a safety tool, however the agency faces some significant challenges, including resources and maintaining up-to-date knowledge of industry changes. According to a report from the Aircraft Certification Process Review and Reform Aviation Rulemaking Committee,⁶ these certification challenges will become increasingly difficult to overcome, as industry activity is expected to continue growing and government spending for certification resources remains relatively flat. As one means of responding to its certification workload, FAA relies on designees,⁷ however, our prior work has shown that there are concerns that designee oversight is lacking, particularly with the new organizational designation authorities in which companies

⁴See GAO, *Aviation Safety: Certification and Approval Processes Are Generally Viewed as Working Well, but Better Evaluative Information Needed to Improve Efficiency*, [GAO-11-14](#) (Washington, D.C.: October 7, 2010).

⁵See GAO, *Aviation Safety: Status of Action to Oversee the Safety of Composite Airplanes*, [GAO-11-849](#) (Washington, D.C.: September 21, 2011).

⁶"A Report from the Aircraft Certification Process Review and Reform Aviation Rulemaking Committee to the Federal Aviation Administration: Recommendations on the Assessment of the Certification and Approval Process," May 22, 2012.

⁷FAA delegates many certification activities to FAA-approved individuals and organizations (called designees) to better leverage its resources. FAA's designees perform more than 90 percent of FAA's certification activities.

rather than individuals are granted designee status. There are also concerns that, when faced with certification of new aircraft or equipment, FAA staff have not been able to keep pace with industry changes and, thus, may struggle to understand the aircraft or equipment they are tasked with certifying.⁸ SMS implementation within FAA should reduce certification delays and increase available resources to facilitate the introduction of advanced technologies. In response to a provision in the 2012 FAA Reauthorization, FAA is assessing the certification process and identifying opportunities to streamline the process.

Better Quality and More Complete Data Could Help FAA Further Improve Safety Oversight

As we stated above, FAA plans to continue using data reactively to understand the causes of accidents and incidents, and is implementing a proactive approach—called an SMS approach—in which it analyzes data to identify and mitigate risks before they result in accidents. FAA is also overseeing SMS implementation throughout the aviation industry.⁹ Safety management systems are intended to continually monitor all aspects of aviation operations and collect appropriate data to identify emerging safety problems before they result in death, injury, or significant property damage. Under SMS, which FAA began implementing in 2005, the agency will analyze the aviation safety data it collects to identify conditions that could lead to aviation accidents or incidents and to address such conditions through changes to FAA’s organization, processes, management, and culture. As we reported in September 2012, according to FAA, the overarching goal of SMS is to improve safety by helping ensure that the outcomes of any management or system activity incorporate informed, risk-based decision making. FAA’s business lines, such as the Air Traffic Organization and the Aviation Safety Organization, are currently at different stages of SMS implementation and it is likely that full SMS implementation will take many more years.¹⁰

⁸[GAO-11-849](#).

⁹FAA is undertaking the transition to SMS in coordination with the international aviation community, working with the ICAO, an agency of the United Nations that promotes the safe and orderly development of international civil aviation worldwide, to adopt applicable global standards for safety management. ICAO requires SMS for the management of safety risk in air operations, maintenance organization, air traffic services, and airports as well as certain flight training operations and for organizations that design or manufacture aircraft within its member states.

¹⁰See GAO, *Aviation Safety: Additional FAA Efforts Could Enhance Safety Risk Management*, [GAO-12-898](#) (Washington D.C.: September 21, 2012).

SMS relies heavily on data analysis and, while FAA has put in place various data quality controls, it continues to experience data challenges including limitations with some of its analyses and limitations to or the absence of data in some areas.¹¹ Data limitations and the lack of data may inhibit FAA's ability to manage safety risks. For example, we found that some FAA data used in risk assessments may not be complete, meaningful, or available to decision makers. We have also reported that the agency currently does not have comprehensive risk-based data, sophisticated databases to perform queries and model data, methods of reporting that capture all incidents, or a level of coordination that facilitates the comparison of incidents across data systems. Furthermore, technologies aimed at improving reporting have not been fully implemented.¹² As a result, aviation officials managing risk using SMS have limited access to robust FAA incident data. Implementing systems and processes that capture accurate and complete data are critical for FAA to determine the magnitude of safety issues, assess their potential impacts, identify their root causes, and effectively address and mitigate them.

Our recent work on aviation safety and FAA oversight issues has identified a number of specific areas where FAA's risk-based oversight could be improved through improved data collection and analysis, including: runway and ramp safety, airborne operational errors, general aviation, pilot training, unmanned aircraft systems, and commercial space. FAA has taken steps to address safety oversight issues in many of these areas, including making changes to or committing to make changes to its data collection practices in response to our recommendations in most of these areas. Nonetheless, sustained FAA attention will be necessary to ensure that the agency's ability to comprehensively and accurately assess and manage risk is not impaired.

- *Runway and ramp safety.* Takeoffs, landings, and movement around the surface areas of airports (the terminal area) are critical to the safe and efficient movement of air traffic. In a June 2011 incident at John F. Kennedy International Airport in New York, for example, a jumbo jet

¹¹On November 8, 2012, FAA signed a memorandum of agreement with NTSB that will allow for greater sharing of safety data between the two organizations.

¹²See GAO, *Aviation Safety: Enhanced Oversight and Improved Availability of Risk-Based Data Could Further Improve Safety*, [GAO-12-24](#) (Washington, D.C.: Oct 5, 2011).

carrying 286 passengers and crew almost collided with another jumbo jet, which reportedly missed a turn and failed to stop where it should have to avoid the occupied runway. Safety in the terminal area could be improved by additional information about surface incidents, which is currently limited to certain types of incidents, notably runway incursions and certain airborne incidents, but does not include runway overruns or incidents in ramp areas. Without a process to track and assess these overruns or ramp area incidents, FAA cannot assess trends in those areas and the risks posed to aircraft or passengers in the terminal area. FAA is planning to develop a program to collect and analyze data on runway overruns, something we recommended in 2011, but it will be several years before FAA has obtained sufficient information about these incidents to be able to assess risks.¹³ FAA still collects no comprehensive data on ramp area incidents and NTSB does not routinely collect data on ramp accidents unless they result in serious injury or substantial aircraft damage. In 2011, we recommended that FAA extend its oversight to ramp safety and FAA concurred.

- *Airborne operational errors.* Operational errors –also referred to as losses of separation—occur when two aircraft fly closer together than safety standards permit due to an air traffic controller error. We reported that FAA’s risk-based process for assessing airborne losses of separation is too narrow to account for all potential risk and changes in how errors are reported affect FAA’s ability to identify trends. For example, FAA’s current process for analyzing losses of separation assesses only those incidents that occur between two or more radar-tracked aircraft. By excluding incidents such as those that occur between aircraft and terrain or aircraft and protected airspace, FAA is not considering the systemic risks that may be associated with many other airborne incidents. FAA has stated that it is planning to include these incidents in its risk assessment process before the end of 2013, something we recommended in 2011.¹⁴ In addition, FAA’s changes to reporting policies affect its ability to accurately determine safety trends. For instance, we reported in October 2011 that the rate and number of reported airborne operational errors in the terminal

¹³GAO-12-24.

¹⁴GAO-12-24.

area increased considerably since 2007.¹⁵ However, multiple changes to reporting policies and processes in 2009 and 2010 make it difficult to know the extent to which the recent increases in reported operational errors are due to more accurate data, an actual increase in the occurrence of incidents, or both.

- *General aviation.* General aviation is characterized by a diverse fleet of aircraft flown for a variety of purposes. In 2010, FAA estimated that there were more than 220,000 aircraft in the active general aviation fleet, comprising more than 90 percent of the U.S. civil aircraft fleet. The number of nonfatal and fatal general aviation accidents decreased from 1999 through 2011; however, more than 200 fatal accidents occurred in each of those years. In October 2012, we reported that general aviation flight activity data limitations impede FAA's ability to assess general aviation safety and thereby target risk mitigation efforts.¹⁶ For example, FAA estimates of annual general aviation flight hours may not be reliable because of methodological and conceptual limitations with the survey upon which flight activity estimates are based. These limitations include survey response rates below 50 percent. Without more comprehensive reporting of general aviation flight activity, such as requiring the reporting of flight hours at certain intervals, FAA lacks assurance that it is basing its policy decisions on an accurate measure of general aviation trends, and NTSB lacks assurance that its calculations of accident and fatality rates accurately represent the state of general aviation safety.

Lack of comprehensive flight hour data is an issue we have also identified in other segments of the aviation industry, including helicopter emergency medical services (HEMS) and air cargo transportation. We recommended in 2007 and 2009 respectively that FAA take action to collect comprehensive and accurate data for HEMS and general aviation operations.¹⁷ In 2011, we confirmed that

¹⁵The terminal area is the area around an airport extending from the airfield or surface to about 10,000 feet vertically and out to about 40 miles in any direction.

¹⁶See GAO, *General Aviation Safety: Additional FAA Efforts Could Help Identify and Mitigate Safety Risks*, [GAO-13-36](#) (Washington, D.C.: October 4, 2012).

¹⁷See GAO, *Aviation Safety: Better Data and Targeted FAA Efforts Needed to Identify and Address Safety Issues of Small Air Cargo Carriers*, [GAO-09-614](#) (Washington, D.C.: June 24, 2009); GAO, *Aviation Safety: Improved Data Collection Needed for Effective Oversight of Air Ambulance Industry*, [GAO-07-353](#) (Washington, D.C.: February 21, 2007); and [GAO-13-36](#).

FAA now annually surveys all helicopter operators and requests, among other things, information on the total flying hours and the percentage of hours that were flown in air ambulance operations. Our recommendations to FAA for air cargo and general aviation data remain unaddressed.

FAA's ability to further reduce the number of fatal general aviation accidents is hindered by a lack of key data on pilots. For instance, we reported in October 2012 that FAA does not maintain certain key information about general aviation pilots, including how many are actively flying each year and whether they participate in recurrent training in addition to FAA's voluntary training program. Without this information, FAA cannot determine the potential effect of the various sources and types of training on pilot behavior, competence, and link this to the likelihood of an accident. The lack of pilot data also makes it difficult to identify the root causes of accidents attributed to pilot error and determine how to mitigate risks. We recommended in 2012 that FAA expand the data available for root cause analyses of general aviation accidents by collecting and maintaining data on each certificated pilot's recurrent training and also that FAA should require the collection of general aviation flight hours.¹⁸ FAA partially concurred with both of these recommendations and stated that it anticipates addressing these and other data collection concerns by September 30, 2014.

- *Pilot training.* There are about 3,400 pilot training organizations in the United States. For the most part, all pilot schools must provide training that includes both classroom and flight training. FAA has an annual inspection program that includes the oversight of pilot schools, pilot examiners, and flight instructors—gatekeepers for the initial pilot training process. Our 2011 analysis of FAA data indicated that FAA completed the large majority of the required inspections for the pilot schools that are certified by FAA, which generally supply most of the pilots that fly for scheduled commercial airlines.¹⁹ However, the extent to which FAA undertakes required inspections for the thousands of remaining pilot training organizations, which may provide training to recreational pilots, is unclear. Our 2011 analysis of FAA inspection

¹⁸GAO-13-36.

¹⁹See GAO, *Initial Pilot Training: Better Management Controls Are Needed to Improve FAA Oversight*, GAO-12-117 (Washington, D.C.: November 4, 2011).

data found that, while FAA requires its inspectors to conduct on-site inspections of each of these schools and their pilot examiners at least once per year, the agency does not have a comprehensive system in place to adequately measure its performance in meeting its annual inspection requirements. Without complete data on active pilot schools and pilot examiners, it is difficult to ensure that regulatory compliance and safety standards are being met. In addition, it is unclear whether required inspections for pilot examiners were completed because FAA's data system lacks historical information. One potential implication is the quality of training that recreational pilot candidates receive, which could contribute to the many general aviation accidents in which pilot error is cited as a contributing factor.²⁰ In 2011, we recommended that FAA develop a comprehensive system to measure performance of pilot school inspections and noted that this recommendation may require modifying or improving existing data systems. In responding to our recommendation, FAA officials said they agreed that improvements in oversight data were needed and indicated that they believe efforts already in existence or under way address our recommendations.

- *Unmanned aircraft systems (UAS)*. FAA and the National Aeronautics and Space Administration (NASA) are taking steps to ensure the reliability of both small and large UAS by working on certification standards specific to UAS and undertaking research and development efforts to mitigate obstacles to the safe and routine integration of UAS into the national airspace. Some of these obstacles include vulnerabilities in UAS operation that will require technical solutions.²¹ However, we found that these research and development efforts related to overcoming these obstacles cannot be completed and validated without safety, reliability, and performance standards for UAS operations, which FAA has not developed due to data limitations.²² Standards for UAS operations are a key step in the

²⁰According to our 2012 analysis of NTSB data, the pilot was a cause in more than 60 percent of the general aviation accidents from 2008 through 2010.

²¹These obstacles include the inability for UAS to sense and avoid other aircraft and airborne objects in a manner similar to manned aircraft and vulnerabilities in the command and control of UAS operations.

²²See GAO, *Unmanned Aircraft Systems: Measuring Progress and Addressing Potential Privacy Concerns Would Facilitate Integration Into the National Airspace System*, [GAO-12-891](#) (Washington, D.C.: September 14, 2012).

process of safely integrating regular UAS operations into the national airspace.²³ Once standards are developed, FAA has indicated that it will begin to use them in UAS regulations; until then, UAS will continue to operate as exceptions to the regulatory framework rather than being governed by it.

- *Commercial space.* FAA also oversees the safety of commercial space launches that can carry cargo and eventually humans into space. FAA is responsible for licensing and monitoring the safety of such launches and of spaceports (sites for launching spacecraft).²⁴ However, FAA is prohibited by statute from regulating commercial space crew and passenger safety before 2015 except in response to a serious injury or fatality or an event that poses a high risk of causing a serious injury or fatality.²⁵ FAA has interpreted this limited authority as allowing it to regulate crew safety in certain circumstances and has been proactive in issuing a regulation concerning emergency training for crews and passengers. However, FAA has not identified data that would allow it to monitor the safety of the developing space tourism sector and determine when to regulate human space flight. To allow the agency to be proactive about safety, rather than responding only after a fatality or serious incident occurs, we recommended in 2006 that FAA identify and continually monitor indicators of space tourism industry safety that might trigger the need to regulate crew and passenger safety before 2015 and use it to determine if the regulations should be revised.²⁶ According to agency officials, FAA is working with its industry advisory group, the Commercial Space Transportation Advisory Committee, to develop guidelines for human spaceflight.

²³FAA is required to issue a final rule for small UAS by August of 2014 at the latest under the FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, § 332(b) (2012).

²⁴The National Aeronautics and Space Administration expects to procure from private launch companies two manned launches per year to the International Space Station from 2017 to 2020. To date, FAA has not licensed any commercial space launches carrying humans.

²⁵Sec. 827, Pub. L. No. 112-95.

²⁶See GAO, *Commercial Space Launches: FAA Needs Continued Planning and Monitoring to Oversee the Safety of the Emerging Space Tourism Industry*, [GAO-07-16](#) (Washington, D.C.: October 2006).

Chairman Rockefeller, Ranking Member Thune, and Members of the Committee, this concludes my written statement. I would be pleased to answer any questions that you may have at this time.

GAO Contact and Acknowledgments

For further information on this statement, please contact Gerald L. Dillingham, Ph.D., at (202) 512-2834 or by email at dillinghamg@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony include Heather MacLeod, Assistant Director; Brooke Leary; Paul Aussendorf; Russell Burnett; Vashun Cole; Laura Erion; Brandon Haller; Dave Hooper; Dan Hoy; Delwen Jones; Maureen Luna-Long; Teresa Spisak; Pam Vines; and Jessica Wintfeld.

Related GAO Products

Unmanned Aircraft Systems: Continued Coordination, Operational Data, and Performance Standards Needed to Guide Research and Development. [GAO-13-346T](#). Washington, D.C.: February 15, 2013.

General Aviation Safety: Additional FAA Efforts Could Help Identify and Mitigate Safety Risks [GAO-13-36](#). Washington, D.C.: Oct 4, 2012.

Unmanned Aircraft Systems: Measuring Progress and Addressing Potential Privacy Concerns Would Facilitate Integration into the National Airspace System. [GAO-12-981](#). Washington, D.C.: September 14, 2012.

Aviation Safety: Additional FAA Efforts Could Enhance Safety Risk Management. [GAO-12-898](#). Washington, D.C.: Sep 12, 2012.

Aviation Safety: FAA Is Taking Steps to Improve Data, but Challenges for Managing Safety Risks Remain. [GAO-12-660T](#). Washington, D.C.: Apr 25, 2012.

Aviation Safety: FAA Has An Opportunity to Enhance Safety and Improve Oversight of Initial Pilot Training. [GAO-12-537T](#). Washington, D.C.: Mar 20, 2012.

Initial Pilot Training: Better Management Controls Are Needed to Improve FAA Oversight. [GAO-12-117](#). Washington, D.C.: November 4, 2011.

Aviation Safety: Enhanced Oversight and Improved Availability of Risk-Based Data Could Further Improve Safety. [GAO-12-24](#). Washington, D.C.: Oct 5, 2011.

Aviation Safety: Status of FAA's Actions to Oversee the Safety of Composite Airplanes. [GAO-11-849](#). Washington, D.C.: Sep 21, 2011.

Aviation Safety: Certification and Approval Processes Are Generally Viewed as Working Well, but Better Evaluative Information Needed to Improve Efficiency. [GAO-11-14](#). Washington, D.C.: October 7, 2010.

Air Ambulance: Effects of Industry Changes on Services Are Unclear. [GAO-10-907](#). Washington, D.C. September 30, 2010.

Aviation Safety: Improved Data Quality and Analysis Capabilities Are Needed as FAA Plans a Risk-Based Approach to Safety Oversight. [GAO-10-414](#). Washington, D.C.: May 6, 2010.

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Aviation Safety: Potential Strategies to Address Air Ambulance Safety Concerns. [GAO-09-627T](#). Washington, D.C.: April 22, 2009.

Aviation Safety: Improved Data Collection Needed for Effective Oversight of Air Ambulance Industry. [GAO-07-353](#). Washington, D.C.: February 21, 2007.

Commercial Space Launches: FAA Needs Continued Planning and Monitoring to Oversee the Safety of the Emerging Space Tourism Industry. [GAO-07-16](#). Washington, D.C.: October 2006.

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