FAA
Air Traffic Organization

Air Traffic Organization 2013 Safety Report

Table of Contents

A Note from the Chief Operating Officer 1

Executive Summary 2

Key Safety Indicators: Airborne 6

Scorecard: System Risk Event Rate 9

Voluntary Safety Reporting Programs 10

Safety Support Tools 14

Scorecard: Commercial Air Carrier Fatality Rate 15

Scorecard: General Aviation Fatal Accident Rate 16

Key Safety Indicators: Surface 18

Runway Safety Initiatives 22

Scorecard: Runway Incursions 25

Maximizing Safety Performance 26

Additional Scorecards 31

The Future of Air Traffic Safety 32

Conclusion 36

The Federal Aviation Administration Air Traffic Organization's (ATO) first priority is safety. Thanks in large part to our commitment to this priority, the United States boasts the safest and most efficient airspace system in the world, consistently meeting, and often exceeding, our own increasingly demanding performance targets.

This year, with more than 53.8 million arrivals and departures carrying more than 735.5 million passengers and 37 billion cargo revenue ton miles of freight, the ATO conducted 99.995 percent of all air traffic operations in full compliance with FAA safety standards. Not only that, but, over the course of fiscal year (FY) 2013, we limited serious runway incursions to a rate of 0.220 per million operations (exceeding our target of 0.395 per million), fully implemented 18 of our 19 annual top-priority risk mitigation strategies (exceeding our target by 15 percent), and, addressed 68 percent more safety concerns as a result of our voluntary safety reporting programs.

Our success is not by chance. It is built on a proactive Safety Management System (SMS) that begins with our employees, is supported by a comprehensive safety culture, and helps focus resources on understanding and fixing potential problems. The ATO's SMS is crucial to our ability to manage risk in the National Airspace System (NAS) and will become even more so as we move toward attaining the Next Level of Safety, an FAA-wide strategic objective described as the safety state in which no accident-related fatalities occur in the United States on commercial-service aircraft, at certified airports, or during commercial space launches; risk is reduced through all phases of flight (gate-to-gate); and the general aviation fatal-accident rate is appreciably improved.

ATO Safety Components

Encourage input from frontline employees

Deploy technology to gather data and enhance education

Improve analysis to assess performance

Embrace correction through education, training and implementation

Because significant portions of this objective fall to the ATO, we establish strategic performance goals that support achieving the Next Level of Safety end state. For FY 2013, these goals included:

- Assessing and harmonizing ATO metrics in the four key areas of safety, efficiency, cost effectiveness, and community, and ensuring that management strategies are responsive to these metrics.
- Demonstrating international leadership by developing initiatives that enhance worldwide aviation safety, security, and efficiency.
- Supporting the completion of Runway Safety Area (RSA) improvements.
- Developing a risk-based audit capability for Operations and Training.
- Advancing the multi-phase revision of the Air Traffic Control handbook, FAA Order 7110.65.

Our FY 2014 Strategic Goals and Milestones, below, continue the ATO's systematic approach to continuous safety improvement.

FAA Administrator Michael P. Huerta recently outlined the agency's four major priorities for the next five years: making aviation safer and smarter; delivering benefits through technology and infrastructure; enhancing global leadership; and empowering the FAA's people. As the metrics and program highlights collected in this report show, the ATO is already committed to Administrator Huerta's priorities and, in fact, is beginning to reap their benefits. By employing SMS principles to enhance the tools and processes at our disposal, we have measurably improved the safety of the NAS. At the same time, we continue to actively prepare for the challenges that will inevitably attend the busier, more technologically complex airspace of tomorrow.

Teri L. Bristol

Chief Operating Officer
Air Traffic Organization, Federal Aviation Administration

Executive Summary

2014 ATO STRATEGIC SAFETY GOALS				
Develop criteria to determine the effectiveness of safety mitigations and enhancements	Transition to evidence based training standards	Improve safety risk analytical capabilities	Advance safety initiatives to enable NextGen capabilities	Provide airspace services while gaining cost efficiencies through identification and implementation of increased savings and cost avoidance

2014 ATO SAFETY MILESTONES
1. Develop a process to measure and report on the effectiveness of the Top 5 Interventions.
2. Develop a process to measure and report on the progress and effectiveness of Safety Risk Management (SRM) corrective action activities.
3. Continue to improve Air Traffic Control (ATC) Recurrent Training.
4. Implement Common Principles course for Technical Operations personnel.
5. Catalog FAA course inventory and publish maintenance policy.
6. Improve Air Traffic Control Optimum Training Solution (ATCOTS) field training effectiveness.
7. Complete objective grading modification for Initial Tower and Terminal Radar course.
8. Continue to invest in Operational Analysis Reporting System (OARS), a web-based safety portal designed to consolidate, automate, and analyze safety data.
9. Revise FAA Order 7110.65, Air Traffic Control: Reconcile remaining issues from FY 2013 and develop FY 2014 Top 15 recommendations for Executive Sponsors' approval; implement strategies for corrective actions developed for the Top 15 recommendations; implement 50 percent of those corrective actions.
10. Supplement FAA Integrated Risk Assessment by developing new Event Sequence Diagrams for the NAS Integrated Risk Picture to connect NAS systems and sub-systems and to provide quantitative risk definition.
11. Establish and conduct a Safety Roundtable to coordinate and agree on safety strategies that enhance organizational performance, manage risk, and achieve prioritization of safety resources.
12. Develop New Training Initiatives to implement ATC recurrent training scenarios that provide NextGen procedural knowledge requirements.
13. Implement Phase 1 of Joint Procedures Automation and Management System (JPAMS) FY 2014 activities to automate processes for developing, accessing, and providing electronic delivery of Directives, Directives Changes, Notices, Waivers, Interpretations, processing, and other publications.

The Air Traffic Organization's (ATO) mission is to safely and efficiently move air traffic: every commercial, private, and military aircraft in the U.S. National Airspace System (NAS). Our employees—over 35,000 air traffic controllers, technicians, engineers, safety analysts, and support personnel—provide this service, and we are proud of our record.

The foundation for our success in fiscal year (FY) 2013 was laid last year, when, relying on our Safety Management System (SMS), we developed and deployed a variety of new safety tools, data collection methodologies, and metrics. By the end of FY 2012, we were already collecting 10 times more data than at any time in the past, convening panels of experts in every service area to analyze that data, and collaborating with Air Traffic and Technical Operations bargaining units to improve the quantity of the data that we collect and the quality of our analysis processes. This continuous cycle of data collection and analysis allowed us to begin identifying important safety trends and new opportunities for improvement.

Building on these accomplishments, FY 2013 was a year of full implementation and refinement within the ATO. We took a hard look at our programs, and wherever expedient opportunities presented themselves, set about revising, reinforcing, or expanding those programs accordingly. For example, in FY 2013:

- The Federal Aviation Administration (FAA) updated its SMS Order (8000.36A), and the ATO completed work on its revised SMS Order (1000.37A), Manual, and Safety Guidance. SMS forms the backbone of our safety management activities, providing safety managers and implementers with the rigorous, comprehensive concepts, processes, and tools that they need to ensure that risks can be proactively identified, mitigated, and monitored.
- Our Voluntary Safety Reporting Programs continued to grow. For example, compared with last year, positive resolutions of issues identified through the Air Traffic Safety Action Program increased 68 percent, and membership in the Confidential Information Share Program, by which the ATO and the aviation industry share safety reports, grew by 55 percent.
- Our Risk Analysis Process, which was formerly devoted exclusively to airborne losses of separation, was adapted to also assess airfield surface incidents.
- The ATO conducted its first ATO Safety Roundtable, which brought together senior safety experts from the operational service units and the National Air Traffic Controllers Association (NATCA), the union representing controllers, to oversee an ATO enterprise-level safety diagnostic system for developing risk assessments, approving identification of the Top 5 hazards in the NAS, and assigning prioritized mitigation strategies that enhance organizational performance, manage risk, and achieve positive safety results.
- We signed a Partnership for Safety Memorandum of Agreement between the FAA and NATCA in March 2013 and trained local safety councils at 47 Terminal facilities and 18 En Route facilities. Complete implementation is scheduled for the second quarter of FY 2014.
- We formed the Surface Safety Initiatives Team, a multidisciplinary group tasked with developing a process to improve the coordination, selection, and prioritization of surface safety initiatives across the NAS.
- The Civil Air Navigation Services Organisation (CANSO) and the ATO launched a major new initiative devoted to improving runway safety, featuring a variety of pilot- and air traffic control-targeted educational and informational materials, a runway safety maturity checklist for airports and air navigation service providers, and an ATO-developed smartphone/tablet application for quick and easy access to materials.
- We identified and completed all planned Runway Safety Area improvement projects.

- We developed a process for risk-based audit criteria, coordinated the operational concept with the service units, developed and published a national order, developed audit training, and established an operational audit cadre.
- We revised the Air Traffic Control handbook, FAA Order 7110.65, and identified the FY 2013 top 15 recommendations; developed implementation strategies for corrective actions for the top 15 recommendations, and implemented 50 percent of those corrective actions.

And these represent only a small sample of the strides that the ATO has made over the last year. To continue making progress toward the Next Level of Safety, the ATO must remain committed to developing and adhering to our strategy of proactive safety management, to providing effective oversight of the development and introduction of new aviation products, and to transforming the way that we assure safety (by expanding our safety culture, for example). Technical challenges—including those associated with the sheer quantity of data that we now collect—abound. However, the ATO's strategic safety initiatives, safety targets, annual work plan activities, monitoring and review processes, and proven ability to meet our safety goals demonstrate the leadership and commitment required to overcome these challenges.

Drawing on information gathered from the ATO's numerous data collection and analysis tools, reporting programs, and audits and assessments, this report details the current state of air traffic control safety in the NAS and indicates where we are headed in the years to come. When it comes to safety, there will always be room for improvement; but in FY 2013 we made significant strides toward honoring our commitments to the flying public and remaining the safest, most efficient air transportation system in the world.

UNITED
5

Key Safety Indicators: Airborne

Every airborne loss of standard separation (a violation of the procedurally required distance minima between aircraft in flight) in the National Airspace System (NAS) represents an opportunity for the Air Traffic Organization (ATO) to collect valuable safety data. In an effort to establish a rigorous methodology to analyze and act on such data, the ATO implemented the Risk Analysis Process (RAP) in 2009. RAP, which continues to evolve, has become a key means of realizing the ATO's Safety Management System (SMS), significantly improving our ability to identify and mitigate some of the most serious risks in the NAS.

Risk Analysis Process

When data generated by a loss-of-separation event indicate that less than two-thirds of the required separation was maintained, that loss is categorized as a Risk Analysis Event (RAE) and subjected to RAP, a post-investigative approach to risk-assessment designed for consistency and objectivity. RAP is conducted by a panel of experts, including pilots and controllers, who examine each RAE against a defined set of criteria—proximity, closure rate, controller/pilot actions, etc.—to determine the potential severity and likelihood of similar losses of separation to NAS users. Adopting RAP has allowed the ATO to:

- Increase the amount of safety data that we analyze
- Align our risk analysis approach with those of our international partners
- Integrate pilot and controller performance data related to air traffic incidents
- Evaluate loss-of-separation events caused by factors other than controller error (such as pilot actions)
- More effectively identify hazards that contribute to NAS-wide risk
- Avoid under-reporting and misclassification of incidents

Initially, RAP included fewer than 100 causal and contributory factors related to air traffic safety; today, it includes more than 500, enabling RAP panelists to explore incidents—their causes and risks—at a much finer level of detail. Moreover, because of new reporting requirements and automated loss-detection systems implemented over the last several years, the ATO is now able to report more accurately the number of RAE reports processed, the number of losses of separation that actually occurred during a given period, the number that required further analysis, and the number that were identified, through RAP, as high-risk events. With the better data and more subtle analysis provided by RAP, we have developed new metrics that indicate with greater clarity risk trends in the NAS and our own overall safety performance.

RAP, FY 2013	
Total Volume Air Traffic Operations	130,055,817
Processed Mandatory / Electronic Occurrences	234,938
Validated Losses of Separation	6,717
Non–Risk Analysis Events	4,358
Risk Analysis Events	2,359
High-risk Events	38
Percent Air Traffic Operations with No Loss of Separation	99.99484

The Risk Analysis Matrix

Likelihood \ Severity	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Frequent A	0	0	0	0	0
Probable B	0	8	10	6	2
Remote C	8	74	128	19	1
Extremely Remote D	320	968	716	88	0
Extremely Improbable E	8	3	0	0	0

The Risk Analysis Matrix, a RAP assessment tool, populated with data reflecting hazards assessed by RAP panels during FY 2013

High Risk	38
Medium Risk	224
Low Risk	2097
Total	2359

Adapting RAP

In FY 2013, the ATO adapted the airborne RAP parameters to accommodate surface operations. The Surface RAP, as the resulting process is known, is used to analyze any runway incident in which the distance between two aircraft, or between an aircraft and a vehicle or person, is less than 6,000 feet. A severity rating for each such event is determined by using a set of factors similar to those used in the airborne RAP (for example, closure rate and controllability) and other factors specific to the surface environment (such as weather and airport geometry). Once fully implemented (in the second quarter of FY 2014), the Surface RAP will enable the ATO to analyze surface incidents in a more objective, data-driven way than ever before possible, resulting in a better understanding of the causal and contributory factors involved in those incidents, the relationships between actions and their consequences, and how best to prioritize the available safety mitigation resources

Another adaptation of RAP, called the Service Integrity RAP (SIRAP), is under development. The goal of the SIRAP is to assess the risk of Service Integrity Events, i.e., maintenance or technical support incidents that compromise the safe provision of air traffic management (ATM) services.

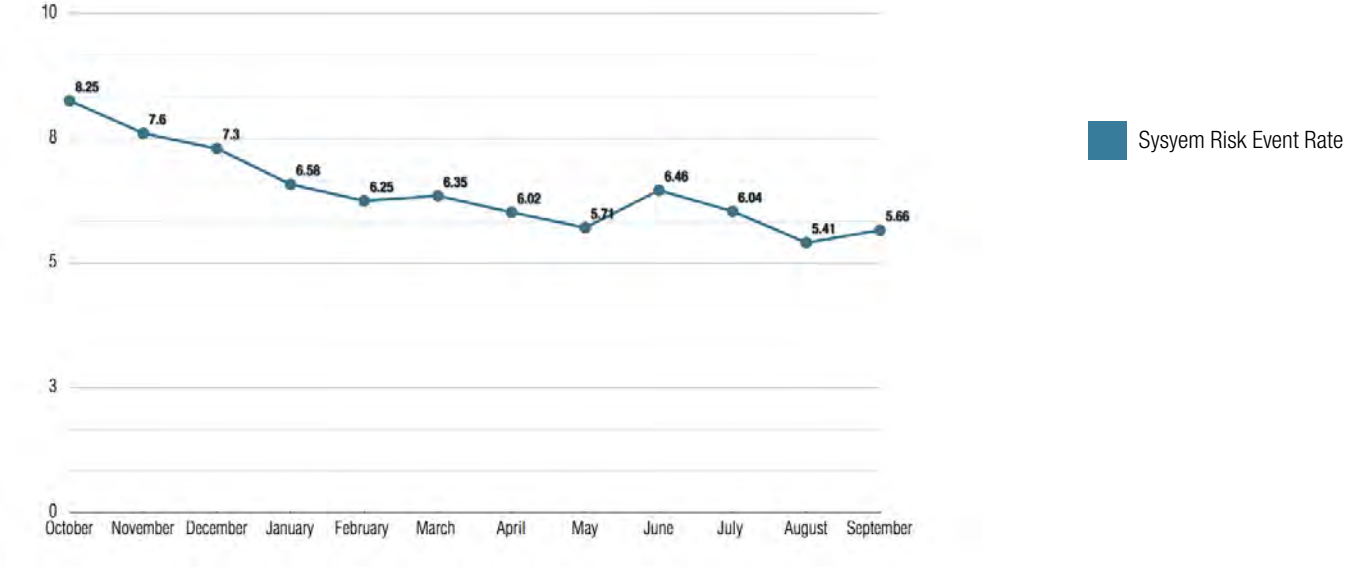
System Risk Event Rate

In 2011, in an effort to move beyond one-dimensional safety metrics (i.e., procedural noncompliance tallies), the ATO introduced the System Risk Event Rate (SRER), a 12-month rolling rate that compares the number of high-risk RAEs to the total number of validated losses of standard separation. The SRER shows, with far greater precision than legacy metrics, the rate of high-risk events across the NAS.

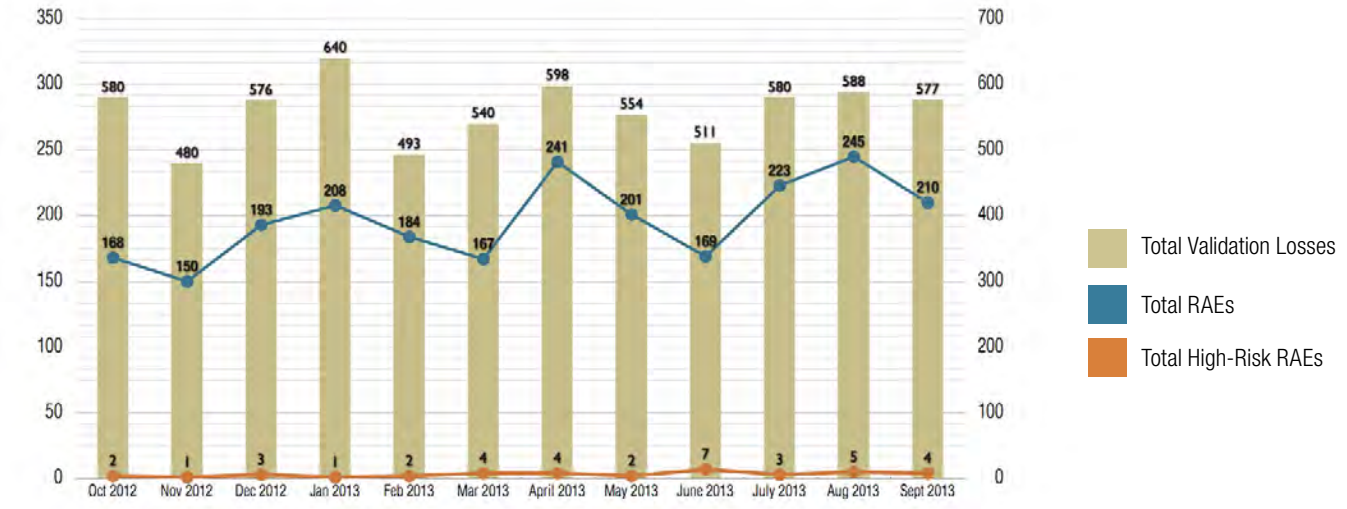
High-risk RAE

An event that is classified during RAP as being "Major" or higher in its severity classification and "Probable" or higher in the likelihood classification matrix.

The ATO SRER, FY 2013



Total Validated Losses, RAEs and High-Risk RAEs, FY 2013



Scorecard: System Risk Event Rate

The FAA has established a strategic goal of limiting the most serious losses of standard separation to a rate of 20 or fewer for every thousand losses in the NAS. In FY 2013, we achieved a rate of 5.66 high-risk losses per thousand. The following scorecard represents some of the ATO's Business Plan activities that most helped us along the way.

ATO Business Plan Activity	Outcome
Research and define integrated risk-based assessment methodologies for new systems and operational concepts.	✔
Manage the development of new safety performance targets, tools, and metrics; collect and analyze data related thereto.	✔
Conduct audits and assessments to ensure requirements compliance and the integrity of technical training curriculum.	✔
Conduct independent reviews and assessments of NAS systems, processes, and procedures.	✔
Coordinate and integrate investigative responses critical to the safety of the NAS and the welfare of the public.	✔
Conduct analysis and disseminate findings of Risk Analysis Events, causal factors, and high-risk hazard trends; develop Corrective Action Requests when appropriate.	✔
Analyze NAS performance against the SRER and recommend mitigation strategies.	✔
Establish automated loss of separation reporting platforms.	✔
Promote enhancements to safety culture and crew resource management within the ATO through resource materials, consistent safety messaging, and sponsored training.	✔
Manage existing VSRPs, including ATSAP, and encourage/sponsor additional programs. Identified issues will be used for safety communications and to create training materials, and will be escalated for resolution as needed.	✔
Identify and mitigate current or potential hazards throughout the NAS and the aviation work environment through the Partnership for Safety Program. Collaborate with NATCA, PASS, and other FAA lines of business to create and support local safety councils.	✔
Maintain and support T-SAP throughout 2013 and continue rollout in Western Service Area and Eastern Service Area facilities.	✔
Develop a national order governing audits and assessments and the resolution of their findings.	✔
Rewrite FAA Order JO 7110.65, Air Traffic Control (which prescribes ATC procedures and phraseology).	✔
Identify and mitigate operational fatigue risk through the use of a Fatigue Risk Management System.	✔
Ensure that all service units meet SMS requirements, including competency and training requirements, and SRM responsibilities.	✔

Voluntary Safety Reporting Programs

RAP and Surface RAP are supported by voluntary and automated safety reporting programs. The ATO's Voluntary Safety Reporting Programs (VSRP)—which provide employees a means of submitting safety information confidentially—continued to mature throughout FY 2013, improving significantly the quantity and quality of safety data collected and analyzed by the ATO and allowing the development of more targeted, more effective risk mitigation strategies. These programs have also contributed to an appreciable positive change in the ATO's safety culture: by actively encouraging employee participation and by removing the fear of reprisal, our VSRPs have helped to change employee attitudes about sharing incidents and issues, increased accountability at the individual level, and, in general, promoted a proactive approach to safety.

Air Traffic Safety Action Program

This cultural shift can be attributed largely to the Air Traffic Safety Action Program (ATSAP), currently the largest aviation VSRP in the world. ATSAP allows air traffic controllers and managers to identify and report risks confidentially. As of September 30, 2013, a total of 72,278 reports have been filed, and 202 safety risks have been identified and mitigated. Approximately 80 percent of the reports describe specific events; the rest provide insight into policy, procedural, and equipment issues. Nearly 90 percent of eligible submitters have registered for the program, and during the last fiscal year, 7,968 employees filed at least one report. And ATSAP continues to grow: 350 ATSAP reports are now filed each week, and, from FY2012 to FY2013, there was a 9 percent increase in the total number of reports filed.

This wealth of safety data has proved extremely valuable in a number of ways. First, in FY 2013, three Event Review Committees issued 19 Corrective Action Requests to ATO organizations to initiate the mitigation of ATSAP-identified hazards. To date, the program has issued over 100 Corrective Action Requests. Second, ATSAP provides specific data upon request to workgroups and offices engaged in ongoing operational mitigations; over 70 comprehensive data analysis reports were fulfilled last year alone. ATSAP also disseminated 20 briefing sheets in print, electronic, and video formats, reflecting current safety events drawn from actual ATSAP reports. Finally, the Partnership for Safety program has integrated ATSAP and other operations data into an innovative portal that is available to local safety councils at field facilities, giving those facilities the information they need to develop comprehensive solutions to local challenges.

The ATO's VSRPs document success through "Positives," meaning positive resolutions to safety issues reported by employees. In FY 2013, 42 ATSAP Positives were recorded, including the following:

- ATO Terminal Operations, working with Flight Standards (AFS), drafted a Notice revising and emphasizing current procedures to determine airman certification applicants' English language skills. AFS also assigned an English language proficiency liaison to represent the United States at the International Civil Aviation Organization (ICAO).

- A lack of uniform procedures between Potomac Terminal Radar Approach Control and Dulles Tower (IAD) for pipeline patrol aircraft that transition in IAD airspace led to discussions that alleviated a longstanding issue of map change coordination. Changes were also made to the Letter of Agreement (LOA) and pipeline routes on maps at both facilities.
- Conflicting handoff procedures and sector identifications in LOAs between adjacent facilities near the Los Angeles Air Route Traffic Control Center were collaboratively resolved by the affected facilities.

Confidential Information Share Program

An adjunct program to ATSAP, the Confidential Information Share Program (CISP), was created to allow ATSAP and participating airline Aviation Safety Action Programs (ASAP) to share data and foster mutual understanding of aviation safety issues from Air Traffic and flight crew perspectives. In FY 2013, CISP served as a conduit for a total of 7,213 reports (5,100 ASAP reports submitted by airlines to the ATO, and 2,113 redacted ATSAP reports submitted by the ATO to participating airlines).

CISP reported the following Positives:

- In response to increased glider activity in the vicinity of Albuquerque International Sunport, the ATO assembled and shared with all airline partners an informational video about sailplane activity near the Albuquerque approach. An advisory flier was also disseminated to sailplane pilots at local airports.
- Airline partners reported crew task saturation issues experienced during aircraft touchdown, sometimes resulting in missed instructions. A briefing sheet focusing on the issue was created and disseminated throughout the NAS.

ATSAP by the Numbers, FY 2013	
18,023	ATSAP reports filed (9% increase from FY2012)
24	ATSAP Information Requests issued
18	Corrective Action Requests issued
13	Corrective Action Requests closed
42	ATSAP Positives (positive resolutions from ATSAP reporting)
350	Reports filed per week

Since ATSAP's Inception (as of September 2013)	
72,278	ATSAP reports filed
202	ATSAP Positives
80%	Eligible employees who have filed at least one ATSAP report

CISP by the Numbers, FY 2013	
7,213	CISP reports exchanged (128% increase from 2012)
5,100	Reports submitted by participating airlines to FAA
2,113	Reports submitted by FAA to participating airlines
14	Participating airlines (up from 4 in 2012)

T SAP by the Numbers, FY 2013	
70	T-SAP reports filed (35% decrease from FY 2012)
71	T-SAP Information Requests issues
18	Corrective Action Requests issued
21	Corrective Action Requests closed
10	T-SAP Positives

Technical Operations Safety Action Program

Another VSRP, the Technical Operations Safety Action Program (T-SAP), provides Technical Operations personnel in the Central Service Area an avenue to report safety issues related to the infrastructure of the NAS. The 70 reports received in FY 2013 generated 18 Corrective Action Requests, for a program total of over 40 Corrective Action Requests since inception.

In FY 2013, 10 T-SAP Positives were recorded, including the following:

- In response to an electrical safety hazard associated with a glide slope upgrade project, Engineering Services, Technical Operations Services, and the affected district engaged in a post-event analysis of lessons learned. With direction from Technical Operations Services, Planning and Requirements developed a project flowchart to help guide project planning efforts and the associated hazard identification and mitigation strategies.
- Among many corrective actions directed at improving communications between Air Traffic and Technical Operations personnel, Technical Operations Services developed an air traffic control (ATC) phraseology guide and created a practical training environment in which vehicle operators could practice communicating with air traffic controllers and air traffic controllers could familiarize themselves with the work practices of Technical Operations personnel.

In the coming year, the ATO plans to implement a VSRP for Federal Contract Towers (FCT). Known as SAFER-FCT, this program will extend the benefits of voluntary safety reporting to non-federal frontline personnel across the country and further expand the ATO's voluntary safety information network.

The ATO Top 5 Safety Hazards

Drawing on RAP and ATSAP data, the ATO annually prioritizes the most serious safety hazards in the NAS to determine the Top 5 safety hazards. For each Top 5 hazard, workgroups are tasked with developing plans to reassess and, where necessary, improve the policy, procedures, training, and systems associated with occurrences of that hazard. Resources are then prioritized to implement the necessary interventions. All Top 5 mitigations are monitored for two years to ensure that they have the intended effect.

The Top 5 shows the full scope of the ATO's SMS at work: the SMS prescribes the gathering of data and guides concrete changes to improve safety in the NAS; RAP facilitates the identification of the causes and risks of hazards from gathered data; and the Top 5 helps to focus efforts and resources on fixing key safety issues. Each step in the process feeds the next, ensuring that available resources are deployed when and where they will most effectively improve the safety of the NAS.

In FY 2013, the ATO fully implemented 18 of the 19 approved Top 5 mitigation strategies, far exceeding our goal of 80 percent.

FY 2013 Top 5 Hazards

Hazard	Description	Completed Mitigation Examples
Recovery	In some cases, separation requirements are not efficiently re-established after a loss of standard separation.	• The FAA's Air Traffic Technical Training order was changed to include requirements for recovery training. • Recovery training is now required during Controller On-the-Job Training. • Recovery training was added to the Terminal and En Route Instructional Program Guides.
Traffic Advisories Safety Alerts	Safety alerts and/or traffic advisories are not being issued, removing a safety barrier and increasing risk.	• A safety awareness video was created. • Training course material on traffic advisories/safety alerts was developed.
Failure to Monitor Initial Departure Headings	Communications are being transferred prior to ensuring initial departure headings, resulting in aircraft being off-frequency while controllers attempt to mitigate losses of separation.	• The FAA's Facility Operation and Administration order was altered to include a section titled Transfer of Communications for Departures or Initial Departure Headings.
Similar Sounding Call Signs	Aircraft are operating with similar sounding call signs, resulting in increased opportunities for confusion and incorrect aircraft receiving or reading back clearances.	• A Decision Support Tool designed to "de-conflict" similar call signs to airlines representatives was introduced. • An interactive portal that will help participating airlines identify call-sign conflicts in their schedules is currently under development. • A tool that will help facility managers identify call-sign conflicts in their sectors is under development.
Conflicting Procedures	Facility Letters of Agreement (LOAs) and Standard Operating Procedures conflict with published arrival and departure procedures, increasing the likelihood of incorrect pilot readback and actions.	• Safety Guidance clarifying the responsibility of the Air Traffic Manager to review LOAs annually and update as necessary was issued.

Safety Support Tools

Over the last several years, the ATO has developed and deployed a number of tools designed to support RAP and other important safety risk management activities. Some are responsible for collecting the data necessary for thorough analysis, some for aggregating and making accessible that data, and some for representing, for the purposes of trend analysis and education, the incidents to which the data pertain. All, however, are critical to maintaining the safety of the NAS and preparing us for the full implementation of Next Generation Air Transportation System (NextGen) technologies.

Traffic Analysis and Review Program

Among the most important sources of RAP data are Mandatory Occurrence Reports (MOR), which, following any loss of separation, must be filed by the involved frontline personnel, and Electronic Occurrence Reports (EOR), which are alerts automatically generated by the ATO's Traffic Analysis and Review Program (TARP). Fully implemented in FY 2013, TARP has eliminated the need to manually process EORs (reducing employee workload) and significantly improving the sensitivity with which ATO automation systems detect losses of separation.

The Comprehensive Electronic Data Analysis and Reporting Tool

To access and analyze the large quantities of data generated by MORs and EORs, ATO Quality Assurance safety analysis personnel, who are responsible for validating reported losses of separation, rely on the Comprehensive Electronic Data Analysis and Reporting (CEDAR) tool. CEDAR aggregates, organizes, and permits instant access to safety data gathered from facilities across the NAS, enhancing our ability to identify and understand the causal factors of safety incidents. Recently, the ATO has improved CEDAR's event replay tools and implemented a digital voice recording playback function, both critical to improving the accuracy of Quality Assurance evaluations. CEDAR and another data aggregation tool, known as FALCON, also provide valuable information to our recurrent training efforts (see "Maximizing Safety Performance") and national simulation scenarios.

Forensic Animation/Graphic Replay Tools

These replay tools—which are designed to represent loss-of-separation events, even under conditions of limited radar coverage—serve three primary purposes. First, because some of the smaller facilities in the NAS lack access to other replay tools, they are used by the facility or facilities involved in a loss event when conducting lessons learned briefings. Second, they are used at national-level meetings to facilitate discussion of specific loss events between Quality Assurance and Quality Control personnel and involved facilities. Third, they aggregate and organize a library of replays easily accessible by facilities across the NAS.

Search and Rescue

The ATO uses radar forensic tools to assist in locating aircraft that are the object of an active search and rescue (SAR) mission. In FY 2013, the ATO developed a first-of-its-kind tool that allows field personnel to locate lost or downed aircraft more quickly than other tools. Hosted in CEDAR, the tool provides a comprehensive database of information on the target aircraft, including radar track data, additional tracks within a 40-mile radius or 10-minute window of the target track's last radar return, and more detailed information, such as speed, altitude, call sign, and beacon code.

Scorecard: Commercial Air Carrier Fatality Rate

The FAA has established a strategic goal of reducing commercial air carrier fatalities per 100 million persons on board by 24 percent over a nine-year period (2010-2018), to a rate of no more than 6.2 in 2018. In FY 2013, we achieved a rate of 1.1 per 100 million persons, far surpassing our target for reduction. The following scorecard represents some of the ATO Business Plan activities that helped us along the way.

ATO Business Plan Activity	Outcome
Complete all practicable Runway Safety Area Navigational Aid improvements at certificated airports by the end of fiscal year 2015.	✔
Implement strategies to modernize the US Notices to Airmen (NOTAMs) system, improving the efficiency, timeliness, safety, and value of NOTAMs to all NOTAM customers.	✔
Provide services to support Aeronautical Information System Replacement (AISR) pre-flight, in-flight, and post-flight activities for pilots, air traffic control, and other NAS customers and systems.	✔
Conduct research and development investigating new methods, processes, and materials that can increase safety.	✔
Coordinate reliable and consistent data sharing of airway transportation system specialist safety information and Aviation Safety Information Analysis and Sharing (ASIAS) data throughout FY 2013.	✔
Enable safe and efficient integration of security operations and initiatives into the NAS.	✔
Analyze impacts to the NAS from threats related to national defense, homeland security, and natural disasters involving the Air Domain and develop traffic management initiatives; mitigate the impact of these threats and associated response measures on the safety and efficiency of the NAS.	✔
Develop and implement national traffic management responses during crisis response emergency operations.	✔
Manage the FAA's fixed infrastructure resources for operation and maintenance of aeronautical elements.	✔
Provide high-quality airport survey and geographic data to NAS airports.	✔
Increase the capabilities of the Airport Survey Program through the application of geographic information system and digital data to improve the data quality for FAA and external customers.	✔
Integrate aeronautical data management and aeronautical products production.	✔
Support all (approximately 180) approach control facilities with radar and all Air Route Traffic Control Centers for Minimum Vectoring Altitude and Minimum Instrument Flight Rules Altitude.	✔
Maintain a Digital Obstacle File (DOF) that includes records of all as-built, manmade obstructions and manmade obstructions reported by other sources.	✔
Support the completion of NAV Lean with FY 2013 activities to achieve workflow and system enhancements to improve data management.	✔
Provide comprehensive engineering services to establish management, operational, and technical security controls, configuration management, and safety management.	✔
Provide for the required infrastructure and information systems for Aeronautical Information Management.	✔
Provide program management for capital acquisitions aimed at increasing safety, including the TDWR Service Life Extension Program (SLEP).	✔
Develop, reproduce, and distribute IFR and VFR charts, Minimum Safe Altitude Warning (MSAW) and Radar Video Maps (RVM), Digital Aeronautical Products.	✔
Conduct Instrument Flight Procedure Obstacle Evaluations.	✔

Scorecard: General Aviation Fatal Accident Rate

The FAA has established a strategic goal of reducing the general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018. In FY 2013, the rate was 1.08 fatal accidents per 100,000 flight hours. The following scorecard represents some of the ATO Business Plan activities that helped us along the way.

ATO Business Plan Activity	Outcome
Manage the Automated Flight Service Station contract to provide quality flight services to the contiguous United States, Puerto Rico, and Hawaii.	✔
Continue to optimize weather camera benefits and explore alternative technologies.	✔
Support the procurement, installation, and commissioning of Precision Approach Path Indicator (PAPI) systems and Runway End Identification Light (REIL) systems.	✔
Manage the Approach Lighting System Improvement Program (ALSIP), which improves approach lighting systems built before 1975.	✔
Develop Localizer Performance with Vertical Guidance (LPV) and Localizer Performance (LP) procedures, enabling more efficient aircraft trajectories and the redesign of airspace to establish RNAV T and Q routes.	✔
Ensure Ground Based and Lighting Systems are available for the NAS.	✔
Provide program management oversight and technical guidance to Future Flight Service Program acquisition activities.	✔
Conduct site inspections and collect performance data through a variety of methods to evaluate service providers' achievement of acceptable performance levels.	✔
Lead the agency's effort to provide aeronautical information and customized preflight and inflight service to domestic and international general aviation communities, including military operations and federal local law enforcement, throughout the United States and Puerto Rico.	✔
Replace and/or upgrade Alaskan Satellite Telecommunications Infrastructure components to raise system availability to required levels (0.9999), reduce the frequency of system alarms and outages, and reduce the level of FAA maintenance.	✔
Reduce aviation accidents in Alaska through educational and outreach programs.	✔
Maintain a qualified Alaska workforce through effective training programs; identify and develop employees to effectively meet mission needs.	✔

Key Safety Indicators: Surface

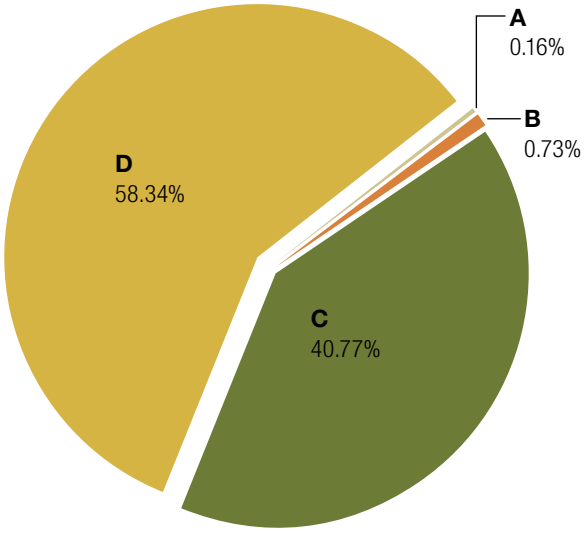
The dynamics of the airfield environment—the complex mix of aircraft, other vehicles, and pedestrians that, moving at very different speeds, must share available taxiways and runways—present a variety of unique safety challenges to ATO personnel and stakeholders. To help meet those challenges, in 1999, the FAA created the Runway Safety Program, charging it to develop activities that foster the continuous examination and correction of airfield safety issues. The Runway Safety Program contributed significantly to the improvements made in runway safety last year.

Metrics

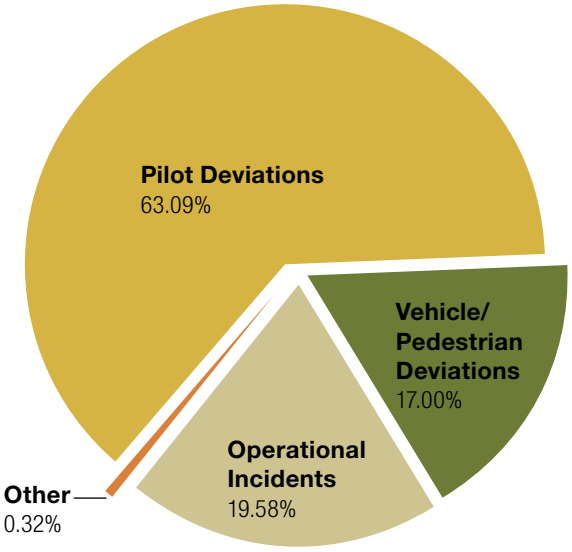
The ATO currently measures runway safety by counting and in various ways classifying the number of runway incursions reported each year by controllers (who are required to report any incident that occurs on a runway movement area). Each incursion falls into one of four categories (from most to least severe: A, B, C, or D) based on defined criteria.

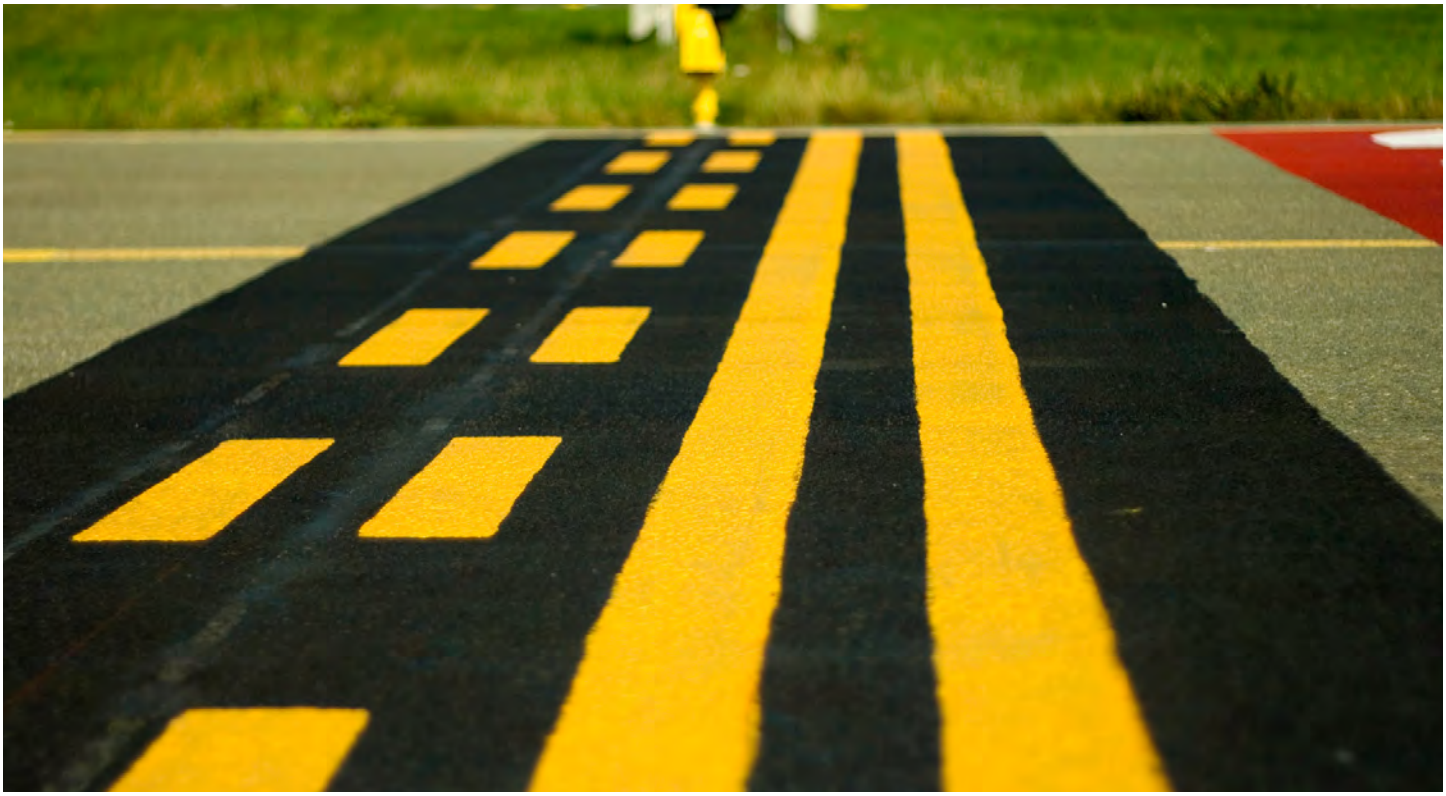
Category	Description
A	A serious incident in which a collision is narrowly avoided
B	An incident in which separation decreases and there is a significant potential for collision, which may result in a time-critical corrective/evasive response to avoid a collision
C	An incident characterized by ample time and/or distance to avoid a collision
D	An incident that meets the definition of Runway Incursion, such as incorrect presence of a single aircraft/vehicle/ person on the protected area of a surface designated for the landing and takeoff of aircraft, but with no immediate safety consequences

Runway Incursions by Category, FY2013



Runway Incursions by Type, FY 2013





Factors such as speed and the type and extent of any evasive action taken by pilots or controllers are considered when categorizing surface safety events. Category A and B events are considered to have elevated risk, while Category C and D events are not.

To target risk mitigation activities, runway incursions are also classified by type, typically falling into one of three general areas: 1) pilot actions, measured as Pilot Deviations; 2) controller actions, measured as Operational Incidents; and 3) actions by individuals driving or working in the vicinity of taxiways and runways, measured as Vehicle/Pedestrian Deviations.

Runway Incursion

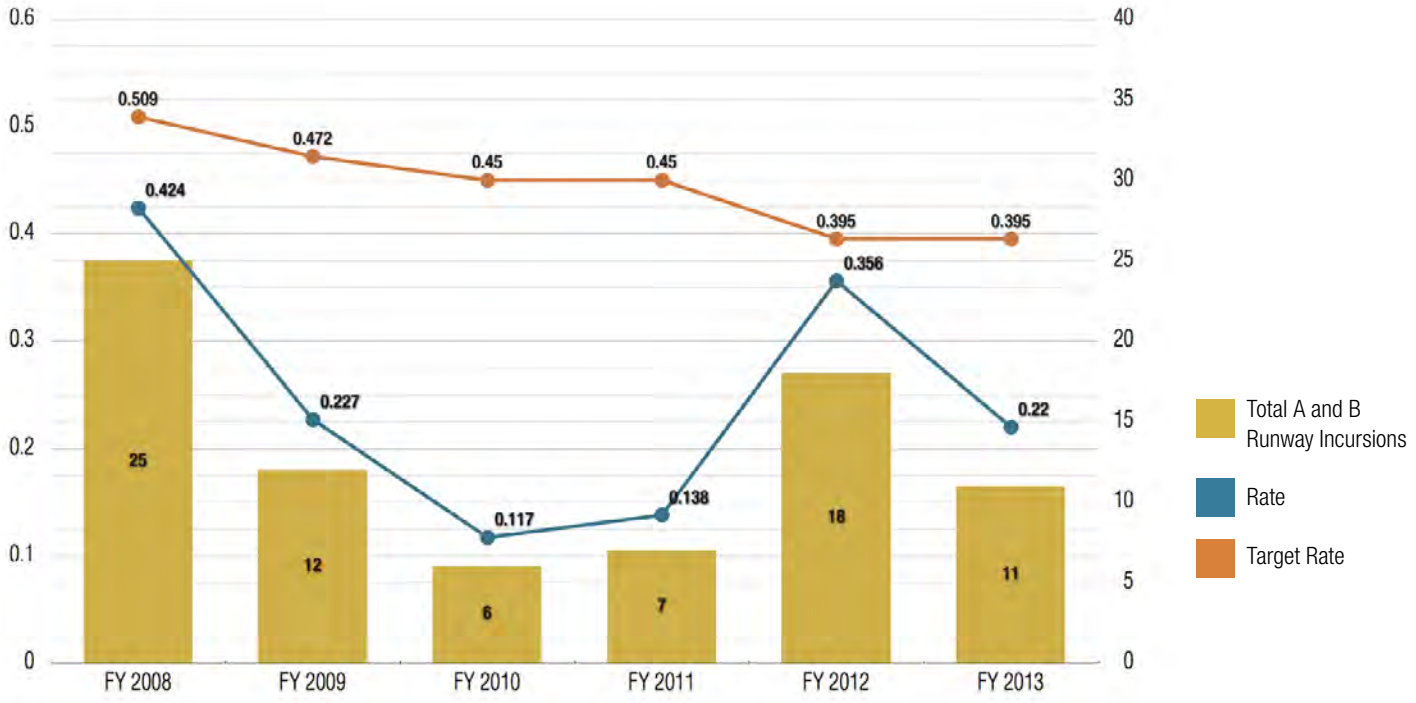
Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft.

Over the last 10 years, the total number and rate of Category A and B runway incursions has improved dramatically. The total number of Category A and B incursions has fallen from a high of 67 in FY 2000 to 10 in FY 2013. During that same period, the rate of Category of A and B incursions has decreased by 77 percent. Today, with fewer than 0.395 incursions per million operations, the ATO continues to outperform its increasingly stringent safety targets.

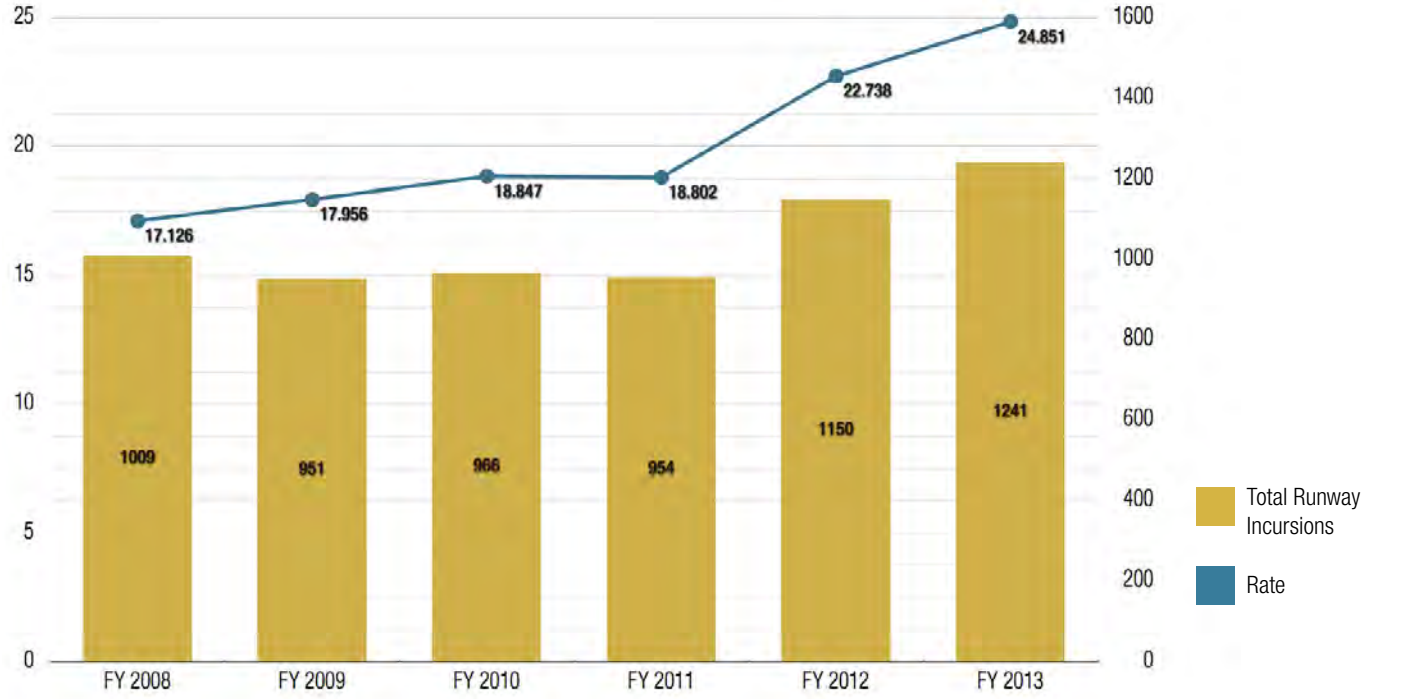
Runway Incursions, by Classification and Type, Over the Last Five Fiscal Years
(increase in total runway incursions from FY 2012 to FY 2013 due to revised MOR guidance issued on January 30, 2012)

Category	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
A	9	4	5	7	2
B	3	2	2	11	9
C	343	386	361	491	506
D	595	574	586	640	724
E	1	0	0	1	0
RI Total	951	966	954	1150	1241
RI – Operational Deviation	39	29	27	15	0
RI – Operational Incident	114	127	151	211	243
RI – Other	0	0	0	2	4
RI – Pilot Deviation	599	629	593	722	783
RI – Vehicle / Pedestrian	199	181	183	200	211

Number and Rate of Category A and B Runway Incursions Overthe Last Six Fiscal Years



Number and Rate of Runway Incursions Over the Last Six Fiscal Years



Runway Safety Initiatives

Despite the small number of Category A and B incursions recorded in recent years, the FAA has continued to invest in Runway Safety Program initiatives. For example, we have enhanced the airfield markings, signs, and lights at more than 500 airports; implemented Airport Surface Detection Equipment, Model X, at 35 of the nation's busiest airports; and, working collaboratively with airlines, funded the development of in-cockpit surface positioning systems. Other improvements in surface safety have resulted from focused initiatives, such as those discussed below.

National Runway Safety Governance Council

Chaired by the Vice President of Safety and Technical Training, the National Runway Safety Governance Council conducts quarterly program reviews with FAA Regional Administrators, ATO Regional Runway Safety, Terminal District and Technical Operations managers, and Regional Airports and Flight Standards managers to collaboratively provide regional oversight for runway incursions, ensure that regional actions are completed, and provide a forum for elevating issues for national review.

Runway Safety Council

The Runway Safety Council (RSC) is a government-industry team co-chaired by the ATO's Runway Safety Group manager and one representative from industry. With representatives from FAA operational and safety organizations, employee bargaining units, and a number of industry groups, the RSC collaboratively charters and oversees the Root Cause Analysis Team (RCAT), which analyzes key runway safety events, conducts integrated causal and human performance analyses from a systems perspective, and recommends intervention strategies. The RSC collaboratively reviews RCAT recommendations, agrees on intervention strategies, and monitors and adjusts implemented actions based on their effectiveness.

Surface Safety Initiatives Team

In fall 2013, the ATO formed the Surface Safety Initiatives Team (SSIT), a multidisciplinary group tasked with developing a process to improve the coordination, selection, and prioritization of surface safety initiatives across the NAS. Finalized in December 2013, the SSIT process provides guidance for teams at each of 10 identified airports to conduct Comprehensive Airport Reviews and Assessments, which identify hazards and the root causes of risks associated with surface incidents, runway incursions, and runway excursions. The SSIT ensures that corrective actions (such as technology investment, procedural changes, training, or organizational changes) to identified hazards are implemented, and validates through long-term, post-implementation data collection and monitoring that the corrections improve NAS safety.

Airport Construction Advisory Council

In 2010, the ATO created the Airport Construction Advisory Council (ACAC), a group of air traffic managers and industry stakeholders, drawn from ATO facilities and stakeholder companies across the United States, to help identify and mitigate the dangers of airport construction projects. The ACAC is currently in the process of testing the efficacy of orange construction-status signs posted near the beginnings of runways and along taxiways. The signs—an idea that originated in the FAA's Airports office—have been deployed in prototype at four airports: T. F. Green in Providence, Rhode Island; Portland International, Oregon; Chicago O'Hare, Illinois; and Long Island MacArthur, New York. Among other airports, Sanford Executive Airport in North Carolina will be added to this list in FY 2014.

In FY 2013, the international aviation community embraced the ACAC's efforts: ACAC Best Practices and Construction Checklists are now featured in the European Organisation for the Safety of Air Navigation's (EUROCONTROL) Skybrary, an online reference library for aviation safety knowledge; and the ACAC also rewrote most of chapter 8 of the ICAO Air Services Manual, titled, "Control of Work In Progress on the Movement Area and Precautions to be Taken."

Construction Safety Summits

With increased focus on the hazards attending airfield construction, many airports have initiated Construction Safety Summits before their largest projects begin. Airports with multi-year projects (e.g., Chicago O'Hare, Baltimore/Washington, Los Angeles, Denver, Salt Lake City, and San Francisco International Airports, among others) are meeting throughout the lifecycle of their projects to find proactive approaches to the challenges of airport construction.

Runway Safety Action Teams

The ATO continues to sponsor focused Runway Safety Action Team (RSAT) meetings at specific locations in response to runway safety events. In FY 2013, RSAT meetings were held at the David Wayne Hooks, Texas; Lafayette, Louisiana; Moline, Illinois; and Sarasota, Florida, airports. These meetings involved multiple lines of business and external stakeholders, and were effective in reversing the rising number of runway incursions at these airports.

Converging Runway Operations Collaboration Tools

In FY 2013, the ATO identified approximately 140 facilities with converging runway operations that will be required to conduct Safety Risk Management (SRM) panels on those operations. To assist those facilities, a Converging Runway Operations Collaboration Knowledge Services Network site was developed, incorporating the tools needed to conduct the panels and submit the required safety documentation.

Runway Excursions

Although runway incursions serve as the ATO's current runway safety performance metric, the Runway Safety Program is also investigating safety improvements related to runway excursions. According to the National Transportation Safety Board (NTSB) 2007–2009 Review of United States Civil Aviation Accidents, runway excursions are one of the top six defining events for commercial air transport accidents, accounting for seven of 91 accidents. Runway excursions also accounted for seven of 109 fixed-wing air taxi accidents and 205 of 4,653 general aviation accidents.

The ATO and the FAA's Office of Aviation Safety (AVS) continue to sponsor studies and compile data that will lead to a better understanding of the factors that contribute to runway excursions, such as aircraft energy states on approach, runway overshoots, rejected takeoffs, risk of runway overrun, and arrival winds. Many of the metrics developed thus far are available to local facilities in near-real time via the Partnership for Safety's online Safety Data Portal (see "Maximizing Safety Performance"). Additional metrics are available to industry, government, and aviation stakeholders through the AVS Aviation Safety Information Analysis and Sharing (ASIAS) portal.

Runway Excursion Joint Safety Analysis and Implementation Team

The ATO participates on the Commercial Aviation Safety Team's Runway Excursion Joint Safety Analysis and Implementation Team (RE JSAIT), a collaboration of government and industry experts, co-led by FAA's Office of Aviation Safety. RE JSAIT was established in 2012 to address an increase in the rate of commercial aviation accidents associated with runway excursions. In FY 2013, the RE JSAIT analyzed numerous domestic and international safety reports and began developing safety enhancement plans to mitigate runway excursions. These plans include, but are not limited to, the incorporation of technological awareness tools and revisions to training and procedures.

Runway Safety Areas and Engineered Materials Arresting System

Two highly effective FAA programs, Runway Safety Areas (RSA) and the Engineered Materials Arresting System (EMAS), are designed to reduce the risk of human injury and minimize or eliminate aircraft damage in the event of a runway undershoot, overrun, or excursion.

Runway Safety Area

A defined surface surrounding a runway that is suitable for or has been prepared to reduce the risk to aircraft and passengers in the event of a runway undershoot, overrun, or excursion.

Engineered Materials Arresting System

A bed, composed of energy absorbing materials and built at the end of a runway, designed to provide a safety zone where there is not enough level, cleared land for a standard RSA.

In FY 2013, the FAA completed Airport Improvement Program (AIP) improvements at 26 RSAs, and Facilities and Equipment (F&E) improvements at 102 RSAs. This brings the total number of AIP improvements to 554 and F&E improvements to 208. By the end of FY 2013, 67 percent of the RSAs on commercial runways at Part 139 airports had been improved to the extent practicable. Currently, 46 commercial airports have installed an EMAS at the end of at least one runway (a total of 70 runways in the United States have EMASs); an additional 24 EMAS beds are scheduled to be installed at 16 certificated airports by the end of 2015. To date, EMAS has had a 100 percent success rate.

International Runway Safety Leadership

The ATO's commitment to runway safety extends beyond the NAS, lending leadership, expertise, and active support to collaborate on initiatives sponsored by international partners such as the Civil Air Navigation Services Organisation (CANSO) and ICAO. Our efforts are intended to harmonize and improve runway safety across the globe.

In FY 2013, CANSO and the ATO launched a major new initiative devoted to improving runway safety. The focus of this initiative is unstable approaches, which, according to the International Air Transport Association, were identified as a contributing factor for 17 percent of accidents between 2008 and 2012. The initiative features an educational booklet titled "Unstable Approaches—ATC Considerations," a variety of pilot- and ATC-targeted informational sheets covering unstable approaches and runway excursions, and a runway safety maturity checklist for airports and air navigation service providers. Quick and easy access to the unstable approaches material is provided by a smartphone/tablet application developed and released by the ATO at www.cansosafety.com; the runway safety maturity checklist can be accessed and downloaded via the CANSO Safety Web page at http://www.canso.org/safety.

As an active partner in the ICAO Runway Safety Partnership Team, the ATO helps to develop and conduct Regional Runway Safety Seminars (RRSS), which provide a forum for discussing regional-level runway safety issues, as well as tools, guidance, and methodologies to address those issues. Among other responsibilities, the team determines which topics will be covered in the seminars, develops materials, and coordinates meeting logistics. In FY 2013, three ICAO RRSSs were held; four are scheduled for FY 2014.

The ATO also participated in the development of the ICAO Runway Safety Handbook, which provides guidance for airports that wish to establish local runway safety teams.

Scorecard: Runway Incursions

The FAA has established a strategic goal of reducing the most serious runway incursions (category A and B) to a rate of no more than 0.395 per million operations. In FY 2013, we achieved a rate of 0.200. The following scorecard represents some of the ATO Business Plan activities that helped us along the way.

ATO Business Plan Activity	Outcome
Improve training, procedures, evaluation, analysis, testing, and certification requirements to reduce the risk of runway incursions resulting from errors by pilots, air traffic controllers, pedestrians, vehicle operators, tug operators, and individuals conducting aircraft taxi operations.	✔
Continue to evaluate and deploy runway status lights at airports with Airport Surface Detection Equipment, Model X (ASDE-X).	✔[1]
Design, develop, and implement an improved runway incursion analysis capability by leveraging the expertise of the Runway Safety Council and Root Causal Analysis Team.	✔
Complete the ASDE-X Tech Refresh.	✔
Develop and mature technology solutions designed to reduce the likelihood of runway incidents and accidents.	✔
Develop initial guidance for incorporating runway excursions into the ATO Safety and Technical Training Program.	✔
Provide guidance to terminal facilities in support of current and future operations pertaining to runway incursions, including weather, procedures, requirements, airspace, contingency planning, and tactical support.	✔
Coordinate reliable and consistent runway incursion and excursion data collection; ensure that data collection efforts are designed to facilitate accurate hazard identification and risk mitigation.	✔
Provide training, educational materials, communication discussion workshops, flight school and planning basics instruction, curriculum building guidance, and collaborative operations planning on using runway safety technology effectively.	✔
Manage efforts of the Headquarters' Runway Safety Program staff, field offices, and Regional Administrators to continue improving and providing educational training and awareness tools to commercial and General Aviation pilots, airport vehicle operators, and air traffic controllers.	✔
Publish and ensure the currency of the National Runway Safety Plan.	✔
Develop ATO and Airports (ARP) policy modifications needed to improve safety during runway and taxiway construction projects; support the timely implementation thereof.	✔
Work with the Aviation Community to ensure widespread comprehension of the risks associated with airport construction and the mitigations developed to address them.	✔
Develop process changes to improve training available to facilities prior to and during runway and taxiway construction projects; support the timely implementation thereof.	✔
Develop process changes to improve construction graphics available to pilots and vehicle operators during runway and taxiway construction projects; support the timely implementation thereof.	✔

[1]Although one of two planned sites achieved initial operating capability (IOC) in August 2013, sequestration impacted the program's ability to achieve the additional scheduled IOC.

Maximizing Safety Performance

The quality of the ATO's safety programs is measured by our success in fixing identified risks and improving safety performance. The programs discussed in this section—highlights among many such ATO initiatives—are driven by two safety management tools, known as Corrective Action Requests and Corrective Action Plans. These tools are designed to initiate, manage, and monitor the success of the mitigation activities that target issues identified through RAP, VSRPs, facility evaluations, and other SRM activities. For the purposes of risk mitigation, actionable program feedback and findings are provided to the ATO personnel best suited to interpret that information and develop effective mitigation strategies (i.e., system developers, local facilities, regional safety councils, and national-level executives).

Safety Promotion

One of the ways in which the ATO promotes proactive safety management is by disseminating educational information designed to help our employees identify, understand, and communicate hazards in the NAS. The All Points Safety campaign, a multimedia communications effort intended to increase awareness of and participation in the ATO's SMS, is one example of our commitment to promoting a positive, proactive safety culture. A key component of this program is recognizing outstanding contributions to safety performance. Another is Safety Matters, a quarterly digest launched in FY 2013, which combined multiple safety newsletters into one ATO-wide electronic technical safety publication.

Recurrent ATC Training

As part of the ATO's evidence-based training approach, Recurrent Training for air traffic controllers is a mandatory training program that uses data drawn from RAP reports, ATSAP reports, MORs, and the Top 5 safety hazards to bring the latest lessons learned to the frontline personnel responsible for conducting ATC operations. A dynamic, always up-to-date system, Recurrent Training is designed to increase controller proficiency, enhance awareness of the human factors affecting aviation, and promote behaviors essential to the identification and mitigation of risks.

One of the FY 2013 Top 5 safety hazards, Recovery, is an example of the kind of issue that can be effectively addressed through Recurrent Training. Recovery describes how quickly a procedurally defined margin of safety is re-established after a loss of separation. Data show that 73 percent of all high-risk events that occur in the NAS are associated with inefficient or inadequate recovery. One of the six corrective actions required by the Top 5 Recovery Corrective Action Plan was a first-ever requirement for on-the-job recovery training.

Partnership for Safety

The ATO launched the Partnership for Safety (PFS) in 2011 as part of the organization's broader effort to identify and mitigate operational safety issues. The PFS enables local management and labor teams to establish safety councils to collaboratively identify and mitigate local safety issues, encouraging all frontline employees to participate in the safety culture. Toward these ends, in FY 2013, the PFS stood up and trained local safety councils at 47 Terminal facilities and 18 En Route facilities (complete implementation is scheduled for the second quarter of FY 2014) and fully deployed the Safety Data Portal, an online tool that provides safety data for each facility and analysis tools to the local safety councils. The portal provides data on such topics as:

- Missed approaches
- Traffic Alert and Collision Avoidance System resolution advisories
- Mandatory reporting trends
- ATSAP trends
- High-energy approaches
- Sector traffic
- Runway overshoots
- Arrival winds
- Facility weather conditions
- Similar sounding call signs

The work of the local safety councils, their lessons learned, and user feedback are documented on and disseminated via ATC Infohub, another portal available on the PFS website.

Significant PFS accomplishments in FY 2013 include:

- An initiative, carried out in collaboration with ATSAP, to share de-identified ATSAP narratives with local safety councils via the Safety Data Portal, with the submitter's permission
- Risk analysis and mitigation advances made possible by providing operational safety metrics directly to air traffic facilities and executive leadership
- The launch of Local Safety Council Corner, a new safety publication, shared electronically with established local safety councils

Fatigue Risk Management

The ATO Fatigue Risk Management (FRM) Team was established in September 2009 to provide fatigue risk expertise, guidance, and support to the ATO controllers and technicians; to develop fatigue reduction strategies for the mitigation and management of operational fatigue risk in the NAS; and to enhance the safety and well-being of FAA employees through fatigue safety awareness. The ATO FRM System—fully implemented in FY 2013—is led by the Fatigue Safety Steering Committee, which is responsible for collaborating with facility management and union representatives to resolve fatigue-related issues across the FAA. In FY 2013, the FRM Team:

- Completed the Controller Alertness and Fatigue Monitoring Study
- Completed the Technical Operations Fatigue Baseline Study
- Delivered FRM educational materials to the field via ATSAP and T-SAP communications channels

Senior Safety Briefing

Senior Safety Briefings provide information directly to the vice presidents and other leaders of the operational service units on high-risk issues identified through RAP, Surface RAP, facility evaluations, and Operational Skills Assessments. In addition to depicting the high-risk issues and trends specific to each program, the Senior Safety Briefings correlate issues and trends between programs.

Safety Management

Monitoring the effects of any changes to the NAS, including hazard mitigations, is among the most important functions of the ATO. During FY 2013, the ATO monitored the FY 2012 Top 5 mitigations (of which 95 percent were implemented by the end of FY 2013); approved 38 Acquisition Safety Assessments; and led nine Safety Risk Management panels, addressing such topics as:

- Federal Contract Tower Withdrawal of Funds
- Failure to Monitor Initial Departure Headings
- Marine Corps Use of Ground-Based Sense and Avoid
- 50NM Longitudinal, 30NM Lateral/ Longitudinal Separation Minima in New York Oceanic Control Area

Also in FY 2013, the FAA updated Order 8000.369A, Safety Management System, providing guiding principles so that FAA lines of business can use a common framework to structure their SMSs, thus facilitating the coordination of safety management activities. The revised order was published in May 2013 and is scheduled for full implementation in 2014.

Audits and Assessments

Audits and assessments, an integral part of the ATO's SMS, are conducted on-site and remotely to evaluate new NAS systems, suspected risk trends, and the effectiveness of risk mitigation efforts already under way. These assessments ensure that new technologies and procedures are safe for national deployment; identify any existing or new safety hazards attending those technologies and procedures; and ensure that safety management processes and procedures align with policy. The ATO conducted 35 assessment activities during FY 2013, including:

- Four Independent Operational Assessment activities, three of which evaluated the integration of Automatic Dependent Surveillance–Broadcast technologies (a critical component of NextGen) with existing radar and automation systems
- Three Operational Peer Assessments at Terminal facilities, helping to determine management's involvement in and oversight of each facility's operations, procedures, training, and Quality Control efforts
- One Non-Federal Facility Program Assessment, which, by evaluating the effectiveness of Technical Operations maintenance programs, policies, and processes, helped to ensure that stakeholder needs are met consistently throughout the NAS

Also in FY 2013, the ATO's policy on the evaluation of operational services, solutions, safety programs, initiatives, and technical training was officially defined in FAA Order JO 7010.14, Air Traffic Organization Audits and Assessments Program. The order was signed by the Vice President of Safety and Technical Training and became effective on September 30, 2013.

Compliance Reporting

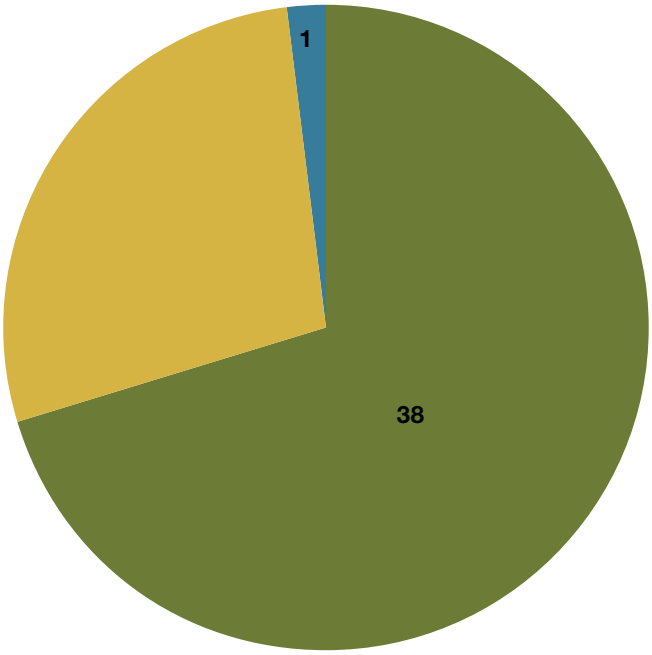
The ATO uses Quality Assurance and Quality Control programs to ensure that our personnel, facilities, and programs comply with both internally and externally imposed safety requirements. Internally, the ATO investigates air traffic incidents and accidents; ensures the timely dissemination of accurate, unbiased information pertinent to those events; and looks for safety trends, which, when identified, are communicated to executive leadership for action. The ATO also conducts operational audits at air traffic facilities throughout the NAS. The audits measure air traffic system compliance with established policies, procedures, and orders. The orders focus on new processes that identify measurable safety factors with the potential to increase the risk of an incident or accident. The Air Traffic Quality Assurance database, the primary repository for the data related to the ATO's accident and incident investigations and facility compliance audits, now receives data from RAP, significantly expanding its usefulness in the analysis of causal factors, identification of risk trends, and development of risk mitigation strategy.

Externally, the ATO is answerable to three sources of safety requirements and recommendations. The first of these is the FAA's Air Traffic Safety Oversight Service (AOV), which is responsible for oversight of the ATO, conducting independent safety audits of ATO facilities, and monitoring the ATO's compliance with the results of those audits. The ATO is required to develop and implement Corrective Action Plans for any safety risks identified through the AOV audit process.

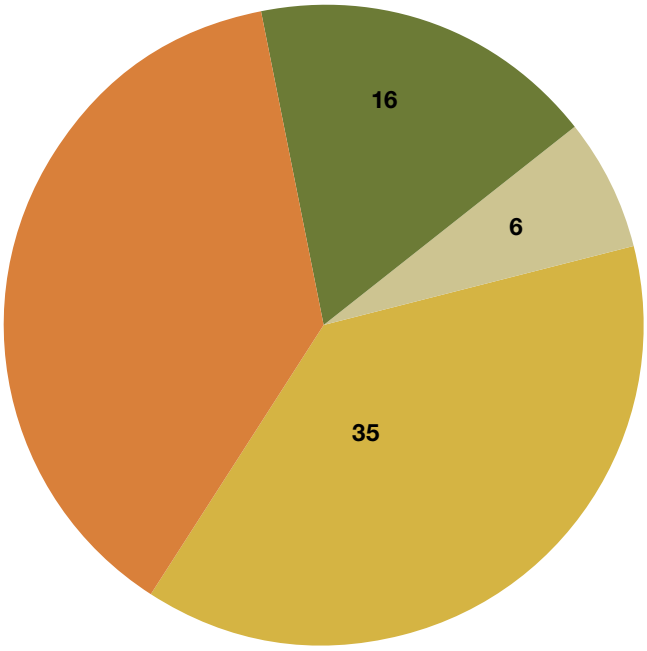
The second is the FAA's Office of Accident Investigation and Prevention (AVP), which is the principal organization within the FAA with respect to aircraft accident investigation and all activities related to the NTSB. AVP collaborates with the ATO and the aviation community to develop FAA Safety Recommendations, which focus on preventing accidents by identifying hazards, evaluating risks, and monitoring the effectiveness of risk mitigations.

The third is the NTSB, an independent federal agency charged to investigate every civil aviation accident in the United States. The ATO is required to track, analyze, and develop appropriate responses to all NTSB recommendations pertaining to air traffic services.

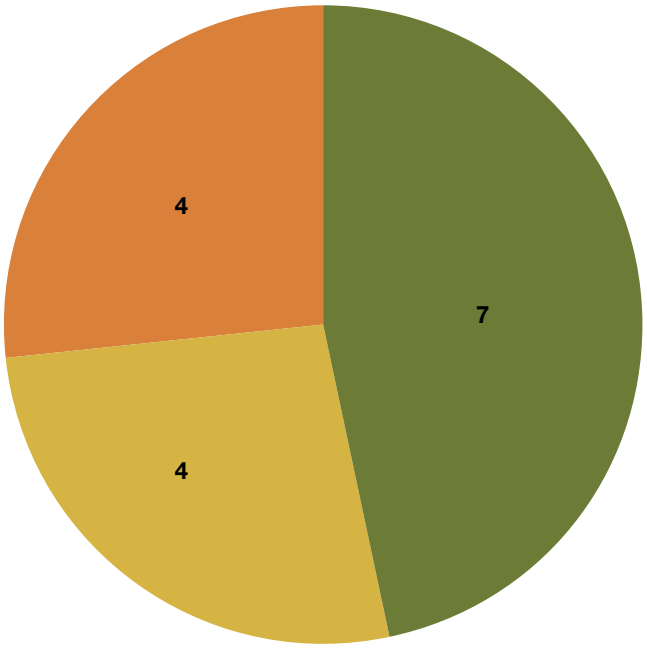
AOV Compliance, FY2013



NTSB Recommendations, FY2013



FAA Safety Recommendations, FY2013



- Closed (FY2013)
- Open (FY2013)
- Open (issued prior to FY2013)
- Open (awaiting approval)
- Open (past due)

International Leadership

The ATO provides international leadership in air traffic management safety by working closely with international stakeholders, such as ICAO, CANSO, and EUROCONTROL. Our focus is ensuring global harmonization of safety management in the provision of air navigation services. In FY 2013, ATO personnel supported the CANSO Safety Standing Committee, served as the CANSO Safety Program Manager, and actively participated in the ICAO Runway Safety Partnership Team, the ICAO Fatigue Risk Management System Task Force, and the FAA/EUROCONTROL Action Plan 15 Workgroup. Key international accomplishments for FY 2013 included:

- Completing the second annual CANSO Safety Report, which includes member Air Navigation Service Provider (ANSP) safety metrics for: SMS Maturity; Instrument Flight Rules (IFR)-to-IFR Loss of Separation (including top five causal factors), and Runway Incursions
- Completing development of a runway safety analysis model runway excursion thread that includes an "unstable approaches leading to runway excursion" threat line, as well as the Runway Safety Maturity Index (derived from the model)
- Completing development of the Commercial Aviation Safety Team (CAST)–ICAO Common Taxonomy Team (CICTT) ATM Common Taxonomy
- Conducting the annual CANSO Global ATM Safety Conference in Cape Town, South Africa, and completing CANSO's first Africa Conference and Regional Safety Seminar, which focused on strategies to increase membership and align SMS processes
- Completing the first joint CANSO/ICAO Regional Runway Safety Seminar in the African Region
- Supporting three ICAO Regional Runway Safety Seminars
- Completing CANSO Regional Safety Seminars, which included safety management workshops, in the Latin America-Caribbean and Asia-Pacific regions
- Measuring safety culture survey implementation in non-EUROCONTROL CANSO Member States

Scorecard: Commercial Space Launch Accidents

The FAA has established a strategic goal of sustaining no fatalities, serious injuries, or significant property damage to the uninvolved public during licensed or permitted space launch and reentry activities. In FY 2013, we achieved that goal.

ATO Business Plan Activity	Outcome
Partner with National Aeronautics and Space Administration and Department of Defense to manage the integration of space transportation operations and develop tools to estimate operational impacts of commercial space launches on the NAS.	✔

Scorecard: Airport Safety

The FAA has established a strategic goal of implementing 40 percent of mitigating strategies for the top five airport risk areas. In FY 2013, the mitigation plans were completed.

ATO Business Plan Activity	Outcome
Support the development of a single FAA source of digital geographic airport data that reduces costs, increases accuracy, and enhances safety and capacity. Implement the survey data collection and quality control portion of the Airport Geographic Information System project and provide survey data for NAS airports.	✔

Scorecard: IT Risk Management and Information Systems Security

The FAA has established a strategic goal of ensuring that no cyber security event significantly degrades or disables a mission-critical FAA system. In FY 2013, there were no such events.

ATO Business Plan Activity	Outcome
For all applicable systems, support the implementation of effective Information Security System protocols and controls and ensure compliance with Federal Information System Management Authorization requirements.	✔

The Future of Air Traffic Safety

NextGen is becoming a more interdependent, cohesive system, in which the various air traffic system domains (e.g., communications, navigation, automation, weather, surveillance) are closely coupled. As a result, the performance of one domain can and will affect the safety performance of other domains. The SMS and its infrastructure (programs, tools, initiatives) must keep pace with this evolution by providing the capabilities necessary to assess and manage risk in an efficient and integrated fashion across implementation time frames and organizations. At the same time, we must continue to mature and validate our safety analysis techniques and metrics, ensuing their objectivity and predictive value (i.e., their ability to reveal the causal factors and chains of events that could lead to or prevent safety incidents).

Common Taxonomy

The ATO views a common taxonomy as a foundational element of its safety data analysis and risk prediction capabilities; to obtain actionable risk data, we must be able to correctly identify and classify safety hazards, as well as the causal and contributory factors underlying those hazards.

In FY 2013, the ATO continued development of its common taxonomy, incorporating the ATM Common Taxonomy (ACT) version 2 into the RAP tool, mapping ACT v.2 to NavCanada causal factors, and completing development of ACT v.3 (which, as a syntactical taxonomy, differs significantly from ACT v.2). The ATO is currently developing testing scenarios to support validation of ACT v.3 against historical SRM, RAP, ATSAP, and runway incursion data, as well as to assess the usability of ACT from both data-submitter and analyst perspectives.

Progress has also continued in international common taxonomy efforts. At the 2013 CICTT meeting, representatives from ANSPs, regulators, commercial operators, and manufacturers agreed to continue supporting the development of an overarching super-taxonomy structure and to adopt the rules of construction necessary to ensure the consistency of that taxonomy.

Leading Indicators

Analyzing accident and precursor incident data for safety trends, causal factors, and barrier effectiveness informs much of the ATO's research in improved safety metrics, tools, and protocols. One area of particular interest involves adapting leading econometric methodologies for use as aviation Safety Leading Indicators. Preliminary work on runway incursions suggests that these methodologies have the potential to detect safety anomalies earlier than current techniques. The work also suggests the possibility of detectable safety cycles, analogous to economic cycles.

Another promising area of research in new safety metrics is the assessment of Key Performance Indicators (KPI). KPIs are measurements of the frequency of particular events that are believed to be associated with increased accident risk, even when no separation minima were violated. Based upon a preliminary study, the ATO selected three KPIs for modeling and further assessment:

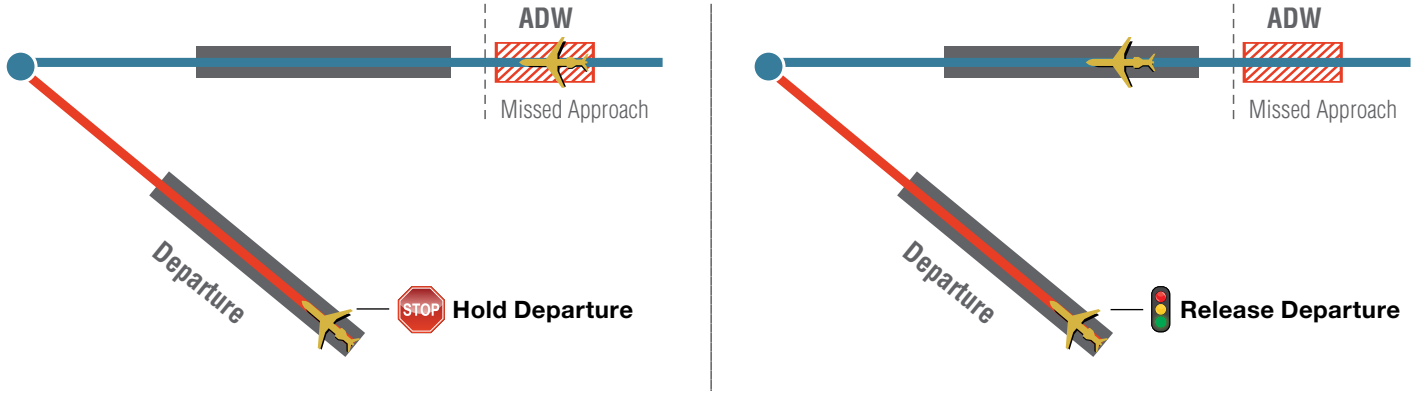
1) Turn To Final, Parallel Approach, Same Altitude: identifies situations when two aircraft conduct parallel approaches with less than standard separation, with trajectories that could lead to increased risk of collision

2) Departure Procedure Compliance: identifies aircraft that execute a different departure procedure than was expected, which could lead to a greater risk of collision with other aircraft in the vicinity

3) Intersecting Operations at Intersecting and Converging Runways (IOICR): identifies possible conflicts that occur when runways or flight paths intersect during arrival or departure

The IOICR simulation model Arrival Departure Window (ADW), depicted in the figure below, is a good example of how data-driven safety analyses that quantify risk may be used to develop safety tools or protocols. Although air traffic rules and procedures are defined for converging runway operations, intersecting flight paths create a risk for airborne collision where an arriving aircraft executes a missed approach at the same time a departure takes off from a converging runway. The ADW defines a window along the arrival approach, such that a departure may be released only if no arrival occupies this window.

A Graphic Depiction of the Arrival Departure Window Model:



On the left, an arriving aircraft is within the ADW boundaries, so the departure is held. On the right, no arriving aircraft is within the ADW, so the departure may be released.

Operational Analysis Reporting System

Air traffic analysis tools and techniques must be developed in parallel with improved safety performance measurement methodology and increased safety data collection capabilities. To date, analysis of safety data has been challenging because there is no efficient means for analysts to process the vast amounts of data now being collected by systems and programs such as TARP and ATSAP. The FAA is therefore developing the Operational Analysis Reporting System (OARS) to integrate numerous sources of safety data, including automation data, VSRP reports, and audit/compliance information, with analysis programs. This integrated system will expedite access to a much broader range of accurate, safety-related data while ultimately providing analysts with the ability to achieve more robust, comprehensive, predictive and proactive analyses of risk.

In FY 2013, the ATO took two important steps toward realizing the OARS. First, we developed a Safety Analysis Tools prototype to explore approaches to integrating, accessing, analyzing, and visualizing safety data. Second, we began a major overhaul of the Safety Management Tracking System (SMTS), the organization's central means of tracking the outcomes of all SRM assessments of changes to NAS systems, equipment, and facilities. Both of these systems will support the development of robust concepts and requirements for the end-state OARS.

Integrated Safety Assessment Model

One of the safety analysis methodologies that the FAA is developing in parallel with NextGen is the Integrated Safety Assessment Model (ISAM). The ISAM has two goals: first, to provide the risk baseline of the current NAS, against which the risk of future system changes can be measured; second, to forecast the risks and safety impacts of implementing changes to the NAS (i.e., NextGen). The ISAM is an application and an extension of two models of safety in air transportation systems: Delft University's Causal Model for Air Transportation Safety, and EUROCONTROL's Integrated Risk Picture.

Currently, the ISAM is an integrated pilot and controller model, representing safety in the form of traditional safety modeling techniques: Event Sequence Diagrams (ESD) and fault trees. ESDs describe the sequence of events that led to an accident (or positive outcome) and fault trees represent causalities underlying that sequence. To date, the ISAM includes 30 accident scenarios (ESDs), 13 of which have been quantified, using objective data from the ASIAS program, Flight Operations Quality Assurance data, NTSB accident reports, and surveillance data. The 13 quantified ESDs (including, for example, scenarios describing runway incursion accidents and wake vortex encounters) were identified as priority ESDs. Efforts are under way to establish the baseline statistics for the remainder of the ESDs and the fault trees.

U·S AIRWAYS
U·S AIRWAYS

Conclusion

By focusing on identifying, understanding and correcting the most pressing risks in the NAS, the ATO continues to build on its stellar safety record. Our proactive safety process has been recognized with the Department of Transportation's 2013 Transportation Safety Award.

The ATO's commitment to overhauling our approach to safety led us to transition to a new safety culture and proactive SMS that includes new tools, risk assessment processes, and policies, all of which maximize and leverage our increased safety knowledge and improve our overall safety performance. In FY 2014, we will baseline our performance within this new system and culture. The new issues that we discover and address, and the experience we acquire, will inspire and inform our continuous improvement.

The ATO remains the platinum standard in air traffic control, and we are committed to making our safe system even safer.

U.S. Department of Transportation
Federal Aviation Administration

800 Independence Avenue, SW
Washington, DC 20591

Published by Safety & Technical Training on April 30, 2014

Produced by FAA Communications • 2014-AJI-193