

Federal Aviation Administration



Session VII - Initiatives to Promote and Support Runway Safety Culture

Michael Watkins, Senior Air Traffic Representative – Asia Pacific U.S. Federal Aviation Administration 5 March 2019, Singapore Aviation Academy

Truths

- Aviation is risky
- No one intends to cause an aviation accident
- Identify and manage risk
- Collaborate to reduce risk
- Don't wait for an accident
- Learn from your mistakes
- Adapt best practices





Reducing Risk

- Regulation is needed
- Education and outreach more important
- Must identify hazards

 All participant perspectives
- This presentation focuses on
 - o Incursions
 - Resources
 - Hot Spots
 - o Excursions
 - Wrong Surface Initiative
 - Language Proficiency





Risk Management



S S

Safety Policy

SMS Orders | SRMGSA | Safety Guidance FAA/ATO Safety Orders | SMS Manual



Safety Promotion

SMS Training | Lessons Learned Workshops | Safety Communication

Safety Assurance

Identify Operating Hazards | Program Data Voluntary Safety Reporting | Investigations Safety Risk Monitoring | Data Analysis Partnership for Safety | Audits and Evaluations



Safety Risk Management

Analyze, Assess, Mitigate, and Accept Risk Develop Monitoring Plan Identify Hazards

https://www.faa.gov/airports/runway_safety/publications/media/2015_ATO_Safety_National_Runway_Safety_Plan.pdf





Incursion Rates

- Incursion rate less than 3/100,000 operations
- Very few accidents
- Promote reporting culture
- Use data to identify and reduce risk

FAA Home + Airports + Runway Safety + Statistics

Runway Incursion Totals for FY 2018

2018 Regional Runway Incursion Totals



Data valid through 05-Dec-2018



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Engineering, Design, & Construction	 FAA Order 7050.1 Runway Construction Related Reso 	Call to Action Summary Report 2015 (Phase 2) (PDF)				
Environmental Programs	Resources for Pilots	Animations & Videos				
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Planning & Capacity	Statistics					



Construction

- Best Practices
- Checklist
- "How to" guidance
- Samples
 Communication
 Advisories
- Additional Resources

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Environmental Programs	Best Practices (PDF)									
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Passenger Facility Charge (PFC) Program	Communication and Advisory How To Guides SaFo (PDF)									
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Runway Safety	Communication and Advisory Samples									
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Runway Construction										
News and Information										
Resources	Sample Notice (PDF)									
Pilots	Sample Notice #2 (PDF) Sample SaFo - ATL (PDF)									
Controllers	Additional Materials and Resources General Safety Information									
Vehicle Drivers										
Statistics	Air Traffic Orders and Notices Free Digital Products NOTAM Search Airport Project Advisory Circulars Airport Construction Advisory Council (ACAC) Fact Sheet (PDF)									
Regions										
Publications										

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Back to Runway Safety Page



Pilots

- Best Practices
- Phraseology Changes
- Runway Status Lights (RWSL) and other system familiarization
- Airport Diagrams
- Marking Flash Cards
- Additional FAA and External Resources

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Planning & Capacity	Foundation's Air Safety Institute, that can provide valuable commercial and general aviation plints. Plints should use	a information for these tools and review
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Controllers

- Best Practices
- Runway Status Lights and other system familiarization
- Communication and Advisory "How to" Guide Samples
- Additional FAA and External Resources

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	Reports					
	Contacts					
	Current Events					



Drivers

- FAA Drivers Guide
- Animation and Videos
- Best Practices
- Hot Spots
- Additional FAA and External Resources

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Engineering, Design, & Construction	improve safety on the runway. It includes best practices, educational tools and resources, airport diagrams and hot spots, training and instruction, and briefings or meetings specifically tailored for Vehicle Drivers.						FAA Response to 2015 Call to Action Report (PDF)		
Environmental Programs						Call to Action Summary Report 2015 (Phase 2) (PDE)			
Major Airport Development	FAA Guide to Ground Vehicle Operations (PDF) Animations and Videos					Animations & Videos			
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Hot Spots

- A Hot Spot is a location on an airport with a history of potential risk of collision or runway incursion
- Identified by observations or history
- Requires increased attention by ATC, pilots and drivers



HS 1 Rwy 07L and Rwy 07R departures sometimes misidentify Twy F for Rwy 07L or Rwy 07R.
HS 2 Pilots sometimes cross Rwy 07L/25R at Twy F8, Twy F9, or Twy F10 without authorization.
HS 3 Acft taxiing from southern ramps have turned onto Rwy 25L when given instructions to cross Rwy 25L at Twy H3.

https://www.faa.gov/airports/runway_safety/hotspots/hotspots_list/











Common Runway Excursion Factors

- Runway contamination
- Adverse weather
- Mechanical failure
- Pilot error
- Unstable approaches







Avoiding Excursions: Tips for Controllers

- Fly the Arrival/Approach procedure as published
- Avoid routine vectoring
- When vectoring aircraft, provide track miles to the airport
- Keep the pilot informed of ATC intentions
- Ensure the runway is appropriate for the wind
- Issue accurate and timely information
- Apply appropriate speed control restrictions
- Give preference to precision approaches
- Avoid combining a descent and a speed reduction
- Comply with operational flight requirements
- Avoid close-in runway changes, even to a parallel runway



Avoiding Excursions: Tips for Pilots

- Be predictable
- Maintain a mental picture of the descent profile
- Advise ATC if a descent or additional track miles are needed for a stable approach
- Understand published ATC procedures/airspace restrictions affecting the approach
- Requests deviations for operational requirements, not for convenience
- If you can't comply, let ATC know early
- Tell ATC if you need extra time on the runway, before accepting a clearance
- In an emergency situation, let ATC know as soon as practicable





Wrong Surface Initiative



A WRONG SURFACE? TAKE ACTION.

On the average, aircraft land on the wrong surface at airports across the NAS twice a week. This presents risks that can lead to catastrophic events.





San Francisco (SFO) Example

Four Wrong Surface events in 12 months







Language Proficiency

- Effective teamwork requires effective communication
- ICAO proficiency levels: Level 1 "Pre-Elementary" to Level 6 "Expert"
- Pilots and ATC require Level 4 "Operational" proficiency or better for international operations
- English no longer the dominant first language
- Not limited to pilot and controller communications
- Crew communication and flight training also affected
- Most safety and training literature assumes English proficiency
- Use standard phraseology
- Develop language training for uncommon situations



Additional Safety Programs

Education and Outreach

- Commercial Aviation Safety Team (CAST)
- Runway Safety Action Teams (RSAT)
- FAA Safety Team (FAAST)
- WINGS Pilot Proficiency Program
- Partnership for Safety
- Local Runway Safety Teams (LRST)
- Safety Management System (SMS)

Reporting

- Aviation Safety Action Program (ASAP)
- Air Traffic Safety Action Program (ATSAP)
- Technical Operations Safety Action Program (T-SAP)
- Airport Voluntary Reporting System (AVRS)
- Flight Operations Quality Assurance (FOQA)



Runway Safety Challenge Quiz

Welcome to the Runway Safety Challenge!

For the next few minutes, you will take a 10 question quiz. Each question consists of an image and four possible answers. Study the image and choose the best answer. All information you provide is anonymous.

Your answers will help the Office of Runway Safety make airport operations safer for everyone, by providing us with information regarding the types of safety-related material that pilots and vehicle drivers need the most.

Thanks from the Office of Runway Safety. Good Luck with the Runway Safety Challenge.

Take the Quiz







Federal Aviation Administration



Thank You Michael.W.Watkins@FAA.gov



Federal Aviation Administration



Session VIII – Runway Safety Data Collection and Processing

Michael Watkins, Senior Air Traffic Representative – Asia Pacific U.S. Federal Aviation Administration 5 March 2019, Singapore Aviation Academy "It is a capital mistake to theorize before one has data."- Arthur Conan Doyle, Author of Sherlock Holmes



"Without data you're just another person with an opinion." – W. Edwards Deming

> "Most of the world will make decisions by either guessing or using their gut. They will be either lucky or wrong."-Suhail Doshi, CEO, Mixpanel





Without data there can be no analysis





Swiss Cheese Model







Need for Voluntary Reporting

WW II	Industry and Military recognized value of voluntary incident reporting					
1958	Need for U.S. Incident Data System raised during FAA Enactment Hearings					
Oct. 1974	United Airlines incident foreshadowed TWA 514 Accident					
Dec. 1974	TWA 514 Accident					
Apr. 1975	Study of the National Air Transportation System as a Result of the Secretary's Task Force on the FAA Safety Mission					
May 1975	Aviation Safety Reporting Program (ASRP) Implemented (FAA)					
May 9, 1975	Advisory Circular 00-46A Issued					
Apr. 1976	Aviation Safety Reporting System (ASRS) Established (NASA/FAA) Source: NASA ASRS Program Briefing					



Aviation Safety Reporting System



ASRS captures confidential reports, analyzes the resulting aviation safety data, and disseminates vital information to the aviation community.

CALLBACK Receive FREE monthly newsletter by email! (Read Policy) Subscribe to CALLBACK

https://asrs.arc.nasa.gov/

ASRS Website Administrator: Mariana Carmona || NASA/ASRS Director: Becky L. Hooey NASA Privacy Statement || NASA Home || NASA Ames









ASRS Concept and Mission

The Aviation Safety Reporting System (ASRS) receives, processes and analyzes voluntarily submitted incident reports from pilots, air traffic controllers, dispatchers, cabin crew, maintenance technicians, and others. Reports submitted to ASRS may describe both unsafe occurrences and hazardous situations. Information is gathered from these reports and disseminated to stakeholders. ASRS's particular concern is the quality of human performance in the National Airspace System.





Headlines

Safety Through Confidentiality May 15, 2018 By Dan Namowitz, AOPA

Time To File a NASA Report December 3, 2013 By Talbot Martin, AOPA

FAA Offers 'Immunity' for Safety Reports January 15, 2000 By Don Phillips, Washington Post

Is the FAA After Your Ticket? Here is how changes in the way that pilot deviations are reported just might affect you. July 18, 2012 By Pia Bergqvist, FLYING Magazine

U.S. air traffic control error numbers double Feb 11, 2011 By The Associated Press





ASRS Monthly Reports

Monthly Report Intake

(January 1981 - December 2017)



- Total Program
 Report Intake =
 1,526,728
- Total Report Intake for 2017 = 94,302
- Averaging 7,858
 reports per month,
 377 per working day





ASRS Reporting Sources

January 2008 – December 2017





ASRS Report Processing





Research Studies Operations & Human Factors

- 64 Research Studies and Special Papers Published
 - Operations: Deviations, De-Icing/Anti-Icing, Rejected Takeoffs, Clearances, Weather Encounters, Landing Incidents, Runway Transgressions, TCAS II, Crossing Restrictions, etc.
 - Human Factors: Communication, Memory, Confusion, Time Pressure, Judgment, Training, Crew Performance, Flight Crew Monitoring, etc.
 - Confidential Reporting: ASRS Reporting Model, Case for Confidential Reporting, Development of ASRS, Cross Industry Applications, etc.
- Research agendas are developed in collaboration with government and industry safety organizations
- There are over 30 ASRS Research Papers available to download on the ASRS website
 Source: NASA ASRS Program Briefing



Safety Analysis Team (SAT)

- Collaborative Data Analysis
- SAT is composed of representatives from industry associations and government, including:

Aircraft Owners and Pilots Association (AOPA), Experimental Aircraft Association (EAA), General Aviation Manufacturers Association (GAMA), specific manufacturers, the instructor community, type clubs, National Transportation Safety Board (NTSB), NASA and the FAA.

 Research or data analysis supplied by the FAA Runway Safety Office.





SAT Recent Activity

2008 Runway Safety Call to Action Reducing Runway Incursions

- Divided into several task teams
- Reviewed records from the FAA Runway Safety Database.
- Looked for characteristics identified in Mandatory Occurrence Reports (MORs), investigator remarks from Flight Standards Service and Airports
- Provided insights into the cause of an incident or the sequence of events that led to the incursion





Visual Markings

- Focused on General Aviation (GA) pilots who ignore or miss runway signage and markings
- Data demonstrates pilots with 1,500 hours or more are primarily involved in these runway incursions.
- Most incidents had inadequate or missing signage, recent airfield modifications or construction, and confusing geometry
- In 25% of cases, pilots did not review the airfield diagram prior to taxi



Procedures and Awareness

- Considered risks caused by distraction, memory failure, expectation bias, multitasking, and inattention during clearance delivery
- More than 260 events indicate procedures and awareness played a role
- Reports highlight that pilots get lost on the airport surface or are taking wrong turns due to distractions or inattentiveness
- Many cases include experienced pilots, including Part 121 operations



TAXI INSTRUCTIONS

Common factors in current taxi instructions

- Infrequent use of progressive taxi instructions
- Use of the phrase "Via" vice "Turn Left/Right"
- Long and complex taxi instructions
- Heightened awareness around hot spots
- Consider when/where "Hold Short" instructions should be issued in the taxi instructions.





Communications

- Miscommunication occurred frequently, but the factors were not isolated to a common cause
- Pilots often mistake the intended recipient and commit read-back errors. Many of are pilots with more than 1,500 hours
- Errors not limited to specific airports or airport types
- Pilots rarely ask for clarification
- In 28% of cases, pilots reported a congested radio frequency
- In 10% of cases, pilots admitted that they did not "clearly understand the taxi instruction."
- More than 500 events associated with Airport Surface Detection Equipment – Model X (ASDE-X), installations.
 Communications was less often a contributing factor Suggests ASDE-X (surface surveillance) may reduce errors and incursion rates.





ASRS Runway Incursion Analysis

Concurrent Human Factors





Communication Factors

<u>Communication Breakdown</u> – Reported Explanations

- Airport Information Systems (ATIS, ASOS, etc.)
- Blocked/Stepped-On Transmissions
- Equipment Issues
- Expectation Bias
- Frequency Congestion
- Incomplete/Insufficient Clearance Information
- Intrafacility/Interfacility Coordination Issues
- Language Barrier
- Memory Lapse
- Misunderstood Clearance
- Non-Standard Phraseology or Procedure
- Readback/Hearback
- Similar Callsign
- Wrong Aircraft was Issued/Took Clearance

"...Tower inquired if we had already crossed the line and I acknowledged that we had. We were then cleared for an immediate departure. The small general aviation aircraft was asked to make a 180 back across his hold short line. ... When in question VERIFY! I did not do this. Verify your call sign in ANY ATC radio transmission. I assumed the takeoff clearance was for us and due to partially blocked radio call, missed the fact that it was not for us." (ACN 1447207 Excerpt)

Brauch, G. and Connell L. J. (2017). Data Analysis of ASRS Runway Incursion Incident Reports. NTSB Runway Incursion Safety Issues Prevention and Mitigation Forum. Sept 19-20, 2018, Washington DC. Accessed at: <u>https://ntsb.gov/news/events/Pages/2017-ri-FRM.aspx</u>



Confusion Factors

<u>Confusion</u> – Reported Explanations

- Airport Chart
- Airport Construction
- Airport Layout, Runway Configuration
- Airport Maintenance/Condition
- Airport Marking Issues
- Airport Signage Issues
- Language Barrier
- Policy/Procedure
- Readback/Hearback
- Similar Callsign
- Unclear ATC Instruction/Clearance
- Untimely ATC Instructions
- Weather Elements

"...As I came towards the end of what would be the downwind, I started to question whether I was understanding the layout of the runways. Buchanan has 4 runways in a set of two that are 30 degrees different from each other. It is a very confusing airport." (ACN 1443828 Excerpt)

Brauch, G. and Connell L. J. (2017). Data Analysis of ASRS Runway Incursion Incident Reports. NTSB Runway Incursion Safety Issues Prevention and Mitigation Forum. Sept 19-20, 2018, Washington DC. Accessed at: <u>https://ntsb.gov/news/events/Pages/2017-ri-FRM.aspx</u>



Distraction Factors

<u>Distraction</u> – Reported Explanations

- Airport Construction
- Airport Maintenance/Condition
- Checklist, Chart, or Other Documentation
- Co-worker Interruption/Interference
- Equipment Issue
- Non-Standard Phraseology
- Performing Heads-Down Task
- Scanning Traffic
- Traffic Volume
- Untimely ATC Instructions
- Visual Cues (Airport Markings/Signage)
- Weather Elements

"...Contributing factors were numerous taxiway and runway closures due to construction. This has been going on for an extended period of time. I listened to ATIS and copied the closures and other NOTAMS. This is my home airport, so the construction was not new to me. Also the flight was going to be long with a fuel stop, and arrival weather considerations in [destination]. This possibly distracted me from the non-standard taxi to 22L and ending up thinking hold short of 22L instead of 22R." (ACN 1426542 Excerpt)

Brauch, G. and Connell L. J. (2017). Data Analysis of ASRS Runway Incursion Incident Reports. NTSB Runway Incursion Safety Issues Prevention and Mitigation Forum. Sept 19-20, 2018, Washington DC. Accessed at: https://ntsb.gov/news/events/Pages/2017-ri-FRM.aspx



Aviation Safety Action Program

- Goal is to enhance safety by preventing accidents and incidents
- Encourages voluntary reporting of safety issues and events identified by employees of certain certificate holders
- FAA will not use ASRS information against reporters in enforcement actions
- Waive fines and penalties* for unintentional violations of federal aviation statutes and regulations which are reported to ASRS
- The FAA values the safety information and the products made possible, through incident reporting to the ASRS

*subject to certain limitations



FAA AVIATION SAFETY INFORMATION ANALYSIS AND SHARING (ASIAS) SYSTEM

• ASIAS connects 185 public and proprietary data sources and voluntarily provided safety data. including:

ACAS (AirCraft Analytical System) ASDE–X (Airport Surface Detection Equipment–Model X) ASRS (Aviation Safety Reporting System) FOQA (Flight Operational Quality Assurance) MOR (Mandatory Occurrence Reports) NOP (National Offload Program office track data) TFMS (Traffic Flow Management System) ASAP (Aviation Safety Action Program), ASPM (Airspace Performance Metrics), ATSAP (Air Traffic Safety Action Program), METAR (Meteorological Aviation Report), NFDC (National Flight Data Center), SDR (Service Difficulty Reports),

- FAA teams with Commercial Aviation Safety Team (CAST) and General Aviation Joint Steering Committee (GAJSC) to monitor known risk, evaluate effectiveness of mitigations, and detect emerging risk.
- Leverages voluntarily provided safety data from operators to represent 99% of U.S. air carrier commercial operations.
- CAST and GAJSC highlight benefits of sharing protected, non-punitive safety data.
- Partners with Aviation Safety InfoShare to publicize safety issues and best practices
- Provides a data-driven approach to identify systemic safety issues



ASIAS Members

Members include

46 air carriers63 corporate operatorstwo manufacturerstwo MRO

ASIAS Members							
Commercial Air Carriers (46)			General Aviation Operators (63)				
ABX Air Aerodynamics, Inc. Air Canada Air Transport Intl. Air Wisconsin Airlines Alaska Airlines Allegiant Air Aloha Air Cargo American Airlines Atlas Air Cape Air Compass Airlines Delta Air Lines Empire Airlines	Envoy Air Expresslet FedEx Express Frontier Airline GoJet Airlines Hawaiian Airline Horizon Air JetBlue Airways Kalitta Air Mesa Airlines Miami Air Intl. Mountain Air Ca National Airline Northern Air Ca	Polar Air Cargo PSA Airlines Republic Airlines Silver Airways SkyWest Airlines es Southern Air Southwest Airlines Sun Country Airlines Swift Air Trans States Airlines argo United Airlines es United Parcel Service rgo Virgin America	Abbott Laboratories Aero Charter Best Jets International Bombardier Flight Operations Cook Canyon Ranch Aviation Costco Wholesale Eli Lilly Embraer Executive Jets Flexjet Flight Options Gama Aviation Signature Jet Edge International Jet Linx JetSuite JetSuite	Johnson & Johnson LECO Corporation Luck Companies Mayo Aviation NetJets Northeastern Aviation Corp OnFlight, Inc. Priester Aviation REVA Stryker Corporation Textron Aviation Vulcan, Inc. XOJET 35 additional Operators*			
Endeavor Air Piedmont Airlines			Industry				
A4A—Airlines for America AIA—Aerospace Industries Association Arbus Controllers Association		ACSF—Air Charter Safety Foundation Embraer GAMA—General Aviation Manufacturers Association Gulfstream Aerospace	NBAA—National Business Aviation Association NJASAP—NetJets Association of Shared Aircraft Pilots Textron Aviation				
ALPA—Air Line Pilots Ass Boeing	iociation RAA—Regional Airline Association SAPA—SkyWest Airlines Pilot Association SWAPA—Southwest Airlines Pilots' Association		Maintenance, Repair & Overhaul				
Associations			AAR Aircraft Services	HAECO Americas			
Flight Training			Government				
University of North Dakota			AMC—Air Mobility Command FAA NASA	Naval Air Force Atlantic USAF Safety Center			
*Newest Member		As of 27 N	ovember 2017				





International Confidential Aviation Safety Systems (ICASS)

ICASS Group promotes confidential reporting systems as an effective method of enhancing flight safety in commercial air transport and general aviation operations.

https://asrs.arc.nasa.gov/international/overview.html#1





International Confidential Aviation Safety Systems

- 21 Current ICASS Programs
- All depend on voluntary reporting
- Non-punitive reporting culture
- Common risks across the globe
- Sharing of best practices and trends



https://asrs.arc.nasa.gov/international/overview.html#1



ASRS Model Applications

Because of the success of ASRS, the ASRS reporting model is also being applied to other disciplines such as railroad, medicine, security, firefighting, maritime, law enforcement, and others.



Thank You Michael.W.Watkins@FAA.gov



