Using Near-Misses to Drive Reliability
WECC HPWG Conference
October 30, 2014
Portland OR
Moffett Field - Hangar One
1932
ASRS History and Background

October 2014

AVIATION SAFETY REPORTING SYSTEM
Aviation Tragedy Leads to Genesis of ASRS

TWA 514, December 1, 1974
ASRS History

• The ensuing investigation revealed that six weeks prior, a United Airlines crew had experienced an identical ATC misunderstanding and narrowly missed the same mountain.

• At the time there was no method of sharing the United pilot’s experience with TWA and other airline operators.

• This solidified the idea of a national aviation reporting program that would enable information sharing.

• In April 1976, NASA and FAA implemented the Aviation Safety Reporting System (ASRS)
MOA signed by Administrators for FAA and NASA

... To provide information to the FAA and the aviation community to assist them in reaching the goal of identifying and eliminating unsafe conditions to prevent accidents.
ASRS Gov’t/Industry Stakeholders

- FAA provides reimbursable funding to NASA for ASRS Support & Management
- NASA provides funding for Director to provide overall management
- The Aviation Community provides support through advocacy for reporting, feedback, and communications
What is Safety Reporting?
ASRS Principles

VOLUNTARY PARTICIPATION
Aviation personnel voluntarily submit reports concerning events related to safety for the purpose of system alerting, understanding and learning.

CONFIDENTIALITY PROTECTION
Protection of identity is provided by NASA through de-identification of persons, companies, and any other information.

NON-PUNITIVE
FAA will not use, nor will NASA provide, any report submitted for inclusion under ASRS guidelines or information derived therein for use in any disciplinary or other adverse action (14CFR91.25 & AC 00-46E).

INDEPENDENT
Necessary for trust building and unbiased dissemination of safety information.
Simplified Event Chain

Operational System → Human Performance → Incidents → Detection & Recovery

Accidents
System-Wide Event Occurrences

ASRS is Complementary to Other Systems of Reporting
ASRS Contributions to a System Safety Process

- ASRS disseminates vital information to the aviation community
- This function is specifically designed to help the aviation community recognize accident precursors and take preventive action
- ASRS promotes the ability of safety professionals to conduct more prospective safety analysis
- By evaluating the experience of other reporters in the system, safety professionals can learn from other reporters in similar situations without having to have to experience the undesired outcome for themselves.

THE HUMAN FACTOR

Human Performance Contributions to Errors
March 24, 1989 - The Exxon Valdez runs aground off Alaska, spilling 11 million gallons of Alaska North Slope crude oil.

October 2000 - Oil Tanker runs aground off the Galapagos Islands, endangering fragile ecosystem.
April 26, 1986 - Chernobyl Nuclear Power Plant, site of the worst reactor disaster ever. A reactor fire and a massive escape of radioactive materials into the atmosphere.

March 28, 1979 - Three Mile Island Nuclear Power Station experiences a partial reactor meltdown.
May 2000 - "Controlled Burn" near Los Alamos, New Mexico consumes over 47,000 acres and destroys 200 buildings.

September 1999 - Mars Climate Orbiter crashes into the planet instead of reaching a safe orbit. The $125 million craft burns up in the Martian atmosphere.
Why Safety Reporting is Essential to Safety Efforts?
WHY CONFIDENTIAL REPORTING WORKS

• When organizations want to learn more about the occurrence of events, the best approach is simply to ask those involved.

• People are generally willing to share their knowledge if they are assured:
  > Their identities will remain protected
  > There is no disciplinary or legal consequences

• A properly constructed confidential, voluntary, non-punitive, independent reporting system can be used by any person to safely share information
ASRS Purpose and Mission

**Identify** deficiencies and discrepancies in the National Airspace System

**Provide data** for planning and improvements to the future National Airspace System
ASRS Purpose

**ALERTS**

Identify Deficiencies and Discrepancies

**PRODUCTS**

Provide Data for Planning and Improvements
Report Processing Flow

ASAP and ATSAP Reports Enter (Electronic and Paper)

Report Receipt
Date/Time Stamp
Screening
Alerting Messages

De-identification
Telephone Callback

ASRS Coding Form
Analyst Coding
Match Multiples

Quality Check
Database Entry

Research
Operational Responses
Publications
Structured Callbacks

Destruction of Originals
Incident Reporting and Analysis is an Iterative Loop*

U.S. Aviation Statistics *

- **FAA Aviation Personnel** *
  - Pilots 618,707
  - Air Traffic Controllers 14,305
  - Dispatchers 21,664
  - Mechanics 314,931
  - Flight Attendants 170,155

- **Active Aviation Labor Force** **
  - Pilots - Commercial/ATP 99,980
  - Aircraft Mechanics 35,070
  - Flight Attendants 87,190

**Potential Aviation Reporters**

TOTAL (Est.) 1,139,795

**Flight Volume***

62,000 Flights/Day (Air Carrier, Cargo, Military)

27,178 Flights/Day (General Aviation)

*July 2012 FAA Certification Database
** 2011 Bureau of Labor Statistics
*** RITA Statistics
ASRS Report Volume Profile

- 38 years of confidential safety reporting
- Over 1,200,000 reports received
- Over 5,900 alert messages issued
- Over 7,542 reports per month, or 359 per working day
- Total report intake for 2013 was 80,840
- Current rate estimate for 2014 is over 90,500

Monthly Intake
Incidence of ASRS Multiple Reports

Provides information from each person’s perspective on event

20%

100%
ASRS Products & Services

Incident Reports

- FAA & NTSB Quick Responses
- Alert Messages
- Research
- Database Search Requests
- CALLBACK Monthly Safety Newsletter
- ASRS Directline Quarterly Safety Bulletin

ASRS Database
Alerts are identified at any point from Screening to Callback
How Potential Alerts Are Processed

1. Alert Coordinator Screening of Red Tag Items
2. Determination of AB/FYI or TELECON
3. Expert Analyst Analysis & Call Back
4. Alert Item Tracking Forms Attached
5. Database Search For Similar Incidents
6. Distribution of Alert Message
7. Collect and Evaluate Feedback

- Alert Coordinator
- Database Search
- Determination of AB/FYI or TELECON
- Expert Analyst Analysis & Call Back
- Alert Item Tracking Forms Attached
- Database Search For Similar Incidents
- Distribution of Alert Message
- Collect and Evaluate Feedback
Safety Alerts – Alerting Subjects
Messages Issued October 2013 – September 2014*

- Aircraft Systems: 64
- Airports Facility Status and Maintenance: 28
- Hazards to Flight: 11
- Airport Lighting and Approach Aids: 11
- ATC Equipment: 9
- Aircraft Avionics: 9
- ATC Procedures: 7
- Navigation: 5
- ATC Operations: 4
- Aircraft Power Plants: 1
- Other: 11

Other Category may include Alerts involving: Company Procedure Issues, Dispatch Equipment Issues, Fatigue Related Events, etc.

*FY 2014 data through September 25th.
ASRS Alert Message Recipients

- Almost two-thirds of Alerts generate a positive response from one or more of the recipients
- Alerts often identify an anomaly that was not detected by other means
- FAA AFS and AVP receive every Safety Alert
## Alert Responses
*(October 2013 – September 2014)*

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action taken as a result of the AB/FYI</td>
<td>26%</td>
</tr>
<tr>
<td>Action initiated before AB/FYI received</td>
<td>26%</td>
</tr>
<tr>
<td>Action initiated in response to AB/FYI but not completed</td>
<td>5%</td>
</tr>
<tr>
<td>Issue raised by AB/FYI under investigation</td>
<td>5%</td>
</tr>
<tr>
<td>Addressee agrees with AB/FYI but unable to resolve</td>
<td>3%</td>
</tr>
<tr>
<td>Addressee in factual agreement but sees no problem</td>
<td>3%</td>
</tr>
<tr>
<td>Information in AB/FYI insufficient for action</td>
<td>13%</td>
</tr>
<tr>
<td>Addressee disputes factual accuracy of AB/FYI</td>
<td>8%</td>
</tr>
<tr>
<td>Action not within addressee's jurisdiction</td>
<td>5%</td>
</tr>
<tr>
<td>For information only, no response expected</td>
<td>5%</td>
</tr>
</tbody>
</table>

68%

*2014 data through September 25th.*
Environmental Visual Flight Hazard
  • 2013-11/9-5

Solar Array Inflight Visibility Glare
  • 2014:11/9-2

ALERT BULLETIN

TO: FAA (AV-J-W21)
INFO: FAA (AVP-1, AVP-200, AFS-230, AFS-200, Director of Western Terminal/Enroute Operations), AIA, ALPA, AOPA, APA, ASAP, ATSG, CAPA, FAA, IAM, ICASS, IPA, NAFI, NATCA, NBAA, NTSB, RAA, SWAPA, USAPA, California Energy Commission
FROM: Linda J. Connell, Director
NASA Aviation Safety Reporting System
SUBJ: Solar Array Inflight Visibility Glare

We recently received an ASRS report describing a safety concern which may involve your area of operational responsibility. We do not have sufficient details to assess either the factual accuracy or possible gravity of the report. It is our policy to relay the reported information to the appropriate authority for evaluation and any necessary follow-up. We feel you should be aware of the following:

ASRS received a report from a corporate jet Captain describing the effects of an inflight encounter with glare from a solar array installation while on the KEPEC3 arrival to LAG. Reporter stated both he and his First Officer were unable to look outside the aircraft without experiencing “pain and temporary blindness.” The Captain stated the First Officer was “literally blind for more than five minutes.” ATC reportedly stated they have received “lots of complaints” about the glare associated with the installation.

ASRS previously issued FYI Alert 2013-110/9-5 (attached) on this issue.
Solar Array Inflight Visibility Glare
Captain flying a corporate jet at 13,000 FT described the effects of an inflight encounter with glare from a solar array installation while on the KEPEC3 arrival to LAS

- Reporter stated both the crew members were unable to look outside the aircraft without experiencing “pain and temporary blindness.”
  - Captain stated the First Officer was “…literally blind for more than five minutes.”
FAA (AJV-W22) Office responded to this alert message:

- “...the Aeronautical Charting Forum has agreed to install a designation on charts for requested solar power plants. Presently, we have two large Concentrated Power Plant (CSP), Ivanpah and Tonopah. Both, sites will soon have charted a ‘SOLAR PLANT’ marker in addition to the obstruction symbol.”
ASRS Web Site

- Launched October 2007
  - Over 9 million sessions in 2012
- File an ASRS Report
  - Electronic
  - Print and Mail
- Database Online
- ASRS Publications
- Program Information
- Immunity Policies

http://asrs.arc.nasa.gov
ASRS Database Online (DBOL)

- DBOL launched August 23, 2006
  - Over 118,000 total online queries completed to date
  - Over 19,600 queries completed in 2012
- Fixed field and text search capability
- Data formats (export)
  - MS Word, Excel, CSV HTML
- Experts version (DBOL II) being proposed

http://asrs.arc.nasa.gov
ASRS Model Applied to Aviation & Other Industries

October 2014

AVIATION SAFETY REPORTING SYSTEM
North American:
- United States
  - ASRS (1976)
- Canada
  - CHIRP (1982)
- Mexico
  - RCSV (1997)

South American:
- Brazil
  - REPCON (2007)

European:
- United Kingdom
  - EUCARE (2000)
- France
  - REC (2000)
- Spain
  - SNS/SRS (2007)
- Germany
  - VASRP (1992)
- Russia
- Turkey
  - ASI-Net (1999)
- Switzerland
  - TACARE (2000)

Asian:
- Japan
  - REPCON (2007)
- China
  - ASI-Net (1999)
- South Korea
  - ICASS (2004)
- Australia
  - ICASS (2004)
- New Zealand
  - ICASS (2004)

Oceania:
- Australia
  - SECRUITAS (1995)
- New Zealand
  - ICASS (2004)

Africa:
- South Africa
  - SASCO (1995)

2011 ICASS Members
There is a growing interest in utilizing the ASRS reporting model for application to other disciplines such as medicine, fire fighting, railroad, maritime, security, and others.
ASRS Model Applied to Other Industries

• Confidential Close Call Reporting System (C3RS)
  • Railroad Safety Reporting System was modeled after ASRS
  • National system initiated at NASA ASRS through collaboration with Federal Rail Administration and Volpe National Transportation System Center

• Bureau of Safety and Environmental Enforcement (BSEE)
  • New Interagency Agreement with NASA ASRS for offshore oil and gas industry safety reporting system

• Fire Fighters Near Miss Reporting System
  • Launched August, 2005 was modeled after ASRS
  • Development Task Force included FAA and NASA ASRS
Lessons LEARNED, Lessons SHARED:
Near-miss reporting, one year later
System-Wide Perspective - capability to identify hazards identified by aviation personnel and match reports from all segments of aviation community

System-Wide Alerting - both national and international capability to provide ASRS Alert Messages to industry and government

Data Processing through Aviation Expert Analysts

- ASRS Office staff include Aviation Expert Analysts with a combined total of 380 years of experience in aviation (air carrier pilots, corporate pilots, general aviation pilots, air traffic control, and maintenance)
- Experts read and review 100% of reports and reliably code information to databases

Comprehensive and Time Tested Coding Taxonomy

- Fixed Field Codes combined with Narrative Text yields qualitative data for further secondary analysis techniques (Perilogn text mining, special studies, focused analytic techniques, etc)
Unique Aspects of ASRS Confidential Reporting Model

Strong Immunity and Legal Provisions

- Federal Law specifically addressing ASRS (14 CFR 91.25)
- FAA Advisory Circular 00-46D
- ASRS Addressed by Congress in 1980’s

Information Sharing - both nationally and internationally with industry and government

- Database Search Requests, Database Publicly Available, Topical Studies, Structured Telephone Callback Studies, Collaborations with Industry and Gov’t (FAA, NTSB, NASA, TSA, etc.)
- Largest source of airline ASAP data collected in central location

National and International Reputation

- ASRS Recognized Model for Proactive Contribution to Safety Process
- ASRS Model Being Utilized by Other Domains for Safety Improvements
Confidential reporting systems have the means to answer the question why?

why a system failed

why a human erred
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