24th Annual

Fiscal Year 2013 DOI Annual Aviation Safety Summary

An action resource for DOI and Bureau Executives (<u>back page tear away summary</u>), Managers, Supervisors, Trainers, and Field personnel to improve aviation safety and reduce loss

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Partnering for Better, Faster, Cheaper, Safer Aviation Missions

Fiscal Year 2013

DOI Annual Aviation Safety Summary

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DOI aviation safety and aircraft mishap prevention is based on the philosophy that all aircraft mishaps can be prevented and that mishap prevention is an inherent function of any position. **Zero aircraft accidents is every professional's goal regardless of the challenges**. Improved aviation safety saves lives, reduces cost, and drives efficiencies across all our mission areas.

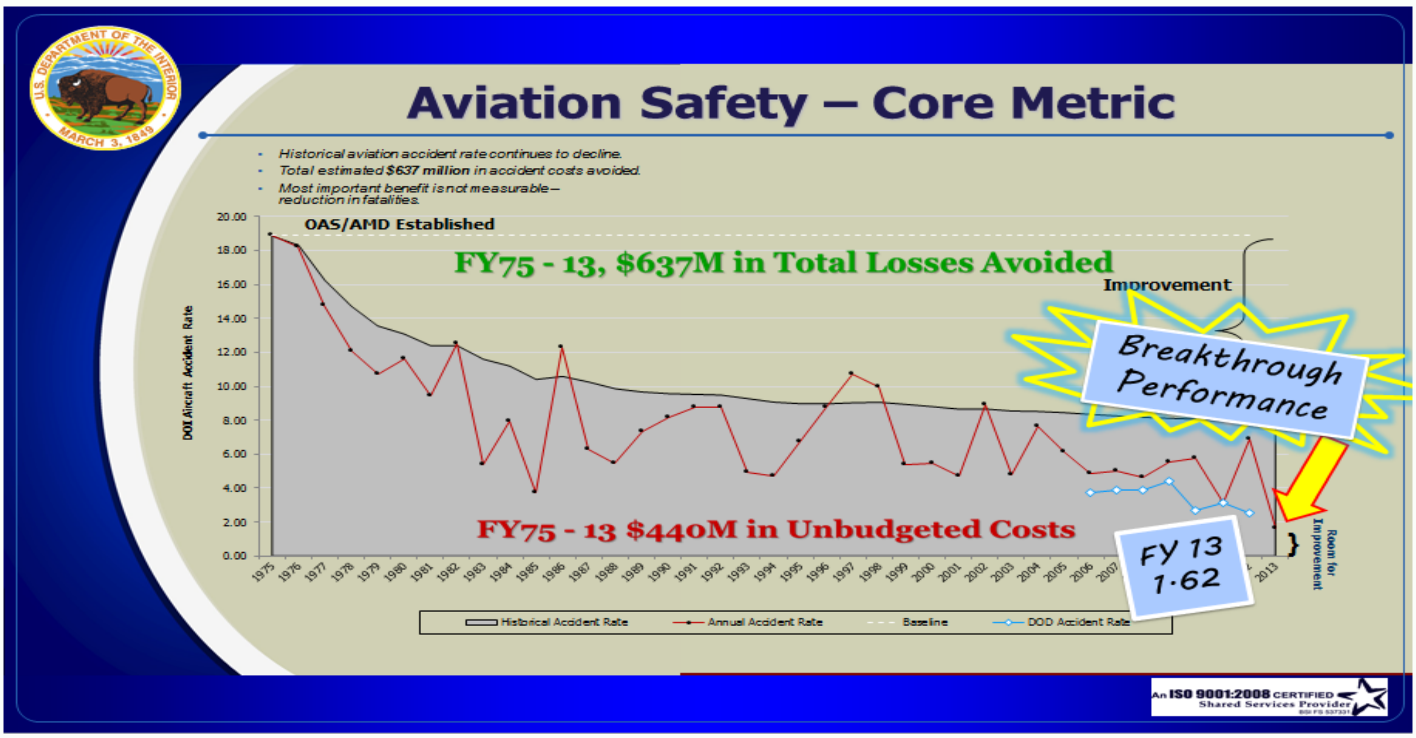
Successful aviation programs require a partnership fostering a just culture that fairly balances safety and accountability. An organization's safety culture requires the assembly of characteristics and attitudes establishing safety as an overriding priority that receives the attention warranted by its significance. It also requires components of accountability including clear expectations, required actions, and a means by which they will be evaluated.

DOI's Aviation Safety and Aircraft Accident Prevention program is founded on the four pillars of an integrated ***Safety Management System (SMS)***:

Aircraft Accident Rate

Based on accumulated flight data in FY13, the U.S. Department of the Interior (DOI) continued to **lower the <u>historical</u> DOI aircraft accident rate**[1] to an all time low reducing the rate by 0.12 to 7.98 accidents per 100K flight hours. The annual aircraft accident rate dropped to an all time low of 1.62 per 100K flight hours, a decrease of 5.30 from last year and completing **the best 8 consecutive years in DOI history**. This breakthrough performance reaffirms our belief that zero aircraft accidents is an attainable goal, one that can be obtained with the continued commitment of DOI and Bureau leadership to the principles of Safety Management Systems.

DOI Aircraft Accident Rate History



The Department's annual aircraft accident rate[2] in FY12 was 6.92 accidents per 100,000 flight hours. As of October 1, 2013, flight data captured for **FY13 reported 61,772.70 total flight hours**, which is 3,942.40 more than the previous year. Flight hour data captured for FY13 was higher due to an 18% increase from BSEE/BOEM flight operations followed by BLM with a 15% increase.

Since 1975, DOI's aviation safety program has resulted in estimated savings of $637M to the Department and its supporting vendors in reduced losses.

Flight missions performed for DOI were supported in part by: bureau requested and OAS supported aviation contracts which 1,219 vendor pilot evaluation, 822 vendor aircraft inspections, 425 Interior fleet pilot evaluations, and 92 Interior fleet aircraft inspections, Aviation Training had 69,007 student hours of training completed and nine courses revised or created in collaboration with bureau and interagency partners.[3]

[1] Historical aircraft accident rate is defined as total historical aircraft accidents per 100,000 flight hours flown.

[2] Annual aircraft accident rate is defined as total aircraft accidents in one year per 100,000 flight hours flown.

[3] Includes DOI Fleet, Commercial Vendor, and Cooperator aircraft from other agencies. Pilots receive evaluations for each specific special use mission area qualification.

Type	Airplane	Helicopter	Total Hours	Cost
Contract	21,163.20 (+31%)	16,498.90 (-3%)	37,662.10 (+14%)	$124,846,360.74 (+22%)
Fleet	14,844.30 (-10%)	1,150.40 (-53%)	15,994.70 (-13%)	$ 7,160,833.50 (-6.%)
ARA	7,184.50 (+19%)	931.40 (+107%)	8,115.90 (+25%)	$ 6,550,478.44 (+59%)
Total	43,192.00 (+12%)	18,580.70 (-3%)	61,772.70 (+7%)	$138,906,694.18 (+22%)

(Percentages are increases or decreases from FY12)

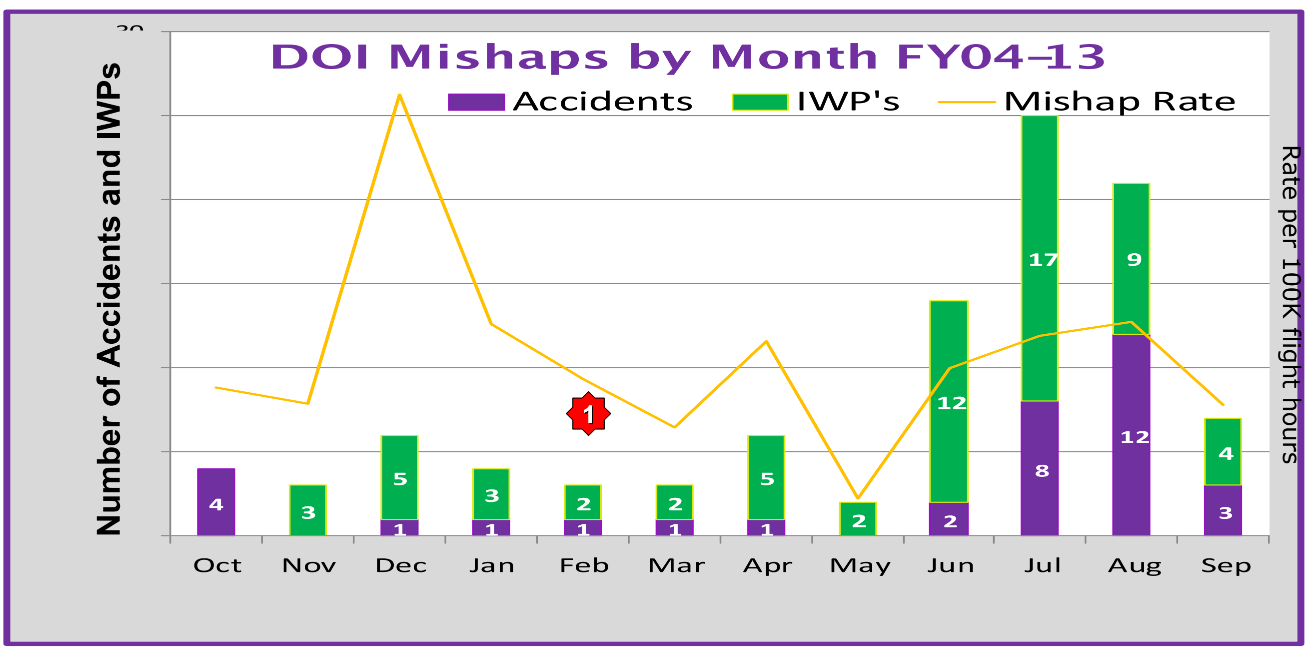
FY13 Annual accident rate = $\frac{\text{1 reportable accidents}}{\text{61,772.70 reportable DOI flight hours}}$ *** 100,000 = 1.62 accidents / 100,000 hours**

Historical accident rate = (40 fiscal years) $\frac{\text{260 reportable accidents}}{\text{3,258,628.40 reportable DOI flight hours}}$ *** 100,000 = 7.98 accidents / 100,000 hours**

In FY13, DOI experienced a 7% increase in total flight hours[1] and a 22% overall cost increase. There was a significant increase in ARA contracted helicopter and airplane utilization while both fleet categories decreased in usage.

Accident and IWP Costs Total DOI and related commercial vendor aircraft accident cost for one accident experienced in FY13 is estimated to be $3.5M, down from $9.08M in FY12. This primarily resulted from one fatality (as opposed to two last year). Total cost for the five FY13 DOI Incidents-With-Potential (IWP) is estimated at $102K, down from $127K in FY12.

Onsite Investigation Costs OAS's onsite unprogrammed[2] accident investigation cost for the aircraft accident in FY13 was $3,000. There were no unprogrammed IWP investigation costs. Lessons learned from the investigation of one aircraft accident or IWP can prevent the occurrence of a future accident resulting in a substantial monetary return on the investment of resources in accident and IWP investigations.



Key: Number of accidents that occurred in FY13

[1]Flight Hours are gathered from Aircraft Use Reports entered into the Aviation Management System (AMS).

[2]Unprogrammed costs are those not covered in the service level agreement between OAS and the bureaus and are not part of the bureaus' programmed budget but must still be paid by the bureau to cover the unforeseen costs of the mishap investigation.

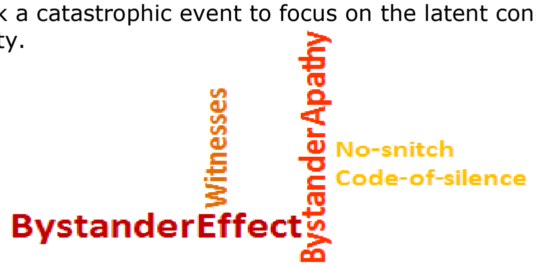
Bystander or Standing By?

Are you one to take action when you observe something out of place or poses a potential to cause a problem? Or are you more inclined to assume that someone else will (eventually) handle it? The term *bystander effect* refers to the phenomenon in which the greater the number of people present, the less likely one will become involved. Most often noted in emergency situations, observers are more likely to take action if there are few or no other witnesses present to assist.

In a series of studies, researchers Bibb Latane and John Darley found that the amount of time it takes someone to take action and seek help varies depending on the number of other observers in the room. In one experiment, people were placed in one of three scenarios: alone in a room, with two other participants, or with two co-conspirators who pretended to be normal participants. As the participants sat filling out questionnaires, smoke began to fill the room. When they were alone, 75% reported the smoke. In contrast, just 38% of participants in a room with two other people reported the smoke. In the last group, the two co-conspirators noted the smoke and then ignored it, which resulted in only 10% reporting the smoke.

In aviation, we rely heavily on the voluntary reporting of information as a primary means of mishap prevention and best practice sharing. We can never assume that "someone else" will either notice, report, take appropriate action, or share vital information. We must be ever vigilant and standing by to perform these functions if we are to continue to reduce mishaps and improve efficiencies.

The lone numerical value represented in our accident rate is insufficient to measure our entire safety performance and associated risk profile as it's a lagging indicator that fails to account for all of the near misses (recall our five IWPs that all could have easily resulted in an accident). The reporting of near misses is a fundamental element to understanding where organizational weaknesses lie and enables managers to effectively target areas in need of improvement. The challenge remains to improve near miss reporting. The BP Texas City refinery explosion is a perfect example as they possessed a very low work place injury rate yet many who worked there were fully aware of the numerous operational hazards and the organizational barriers that prevented their mitigation. Unfortunately, it took a catastrophic event to focus on the latent conditions that contributed to many deaths and the wide-spread destruction of property.



To overcome barriers in near miss reporting, many have implemented Petersen's (1993) six criteria of safety excellence. These can be used as a filter to determine the appropriateness of action. They must be in place to achieve safety success:

1) Top management is visibly committed to the process.
2) Middle management is actively involved in the program.
3) Supervisor performance is focused.
4) Employees are actively participating.
5) System is flexible to accommodate site culture.
6) System is perceived as positive by the workforce.

Next, consider concepts of the safety accountability cycle. Specifically:

1) Define expectations. What must be done at every level of the organization to ensure satisfactory near-miss reporting?
2) Provide training. What training is necessary to enable performance of these expectations?
3) Define metrics. How will performance be measured? How does the organization know, by affected individual and/or crew, whether expectations are being met?
4) Recognize outcomes. How is successful performance rewarded? Is it meaningful to those whose actions the organization is trying to motivate?

Information is powerful. Unfortunately, in the current culture of doing more with less, many managers are often dislocated from the operations to which they oversee. Information sources that allow them to accurately target areas in need of attention and adequately support field personnel are required to originate from those closest to operations. Translation:

If you SEE something SAY something!
If you think it's wrong…QUESTION IT!
If you know it's wrong, STOP IT!
Either way, REPORT IT!
(https://www.safecom.gov)

REPORT IT!

Manning, R., Levine, M. & Collins, A. (2007). The Kitty Genovese murder and the social psychology of helping: The parable of the 38 witnesses. *American Psychologist, 62(6),* 555-562.
Mike Williamsen; Near-Miss Reporting A Missing Link in Safety Culture; Professional Safety MAY 2013 .

FY13 Mishap Review

*Most of you have probably heard the saying **"there are no new accidents, only new participants."** That saying has proven to be true for FY13. Taking a look at the accident and Incidents-with-Potential that occurred in FY13 we see that the "contributing factors" and "present but not contributing factors" include:*

Human Factors

- Unsafe Acts
  - Skill Based Errors
- Preconditions for Unsafe Acts
  - Distraction
  - Attention failure
  - Complacency
  - Fatigue
  - Poor Crew Resource Management
- Routine Violations
  - Failure to use checklists
  - Failure to perform a load calculation
- Interagency Aviation Training compliance

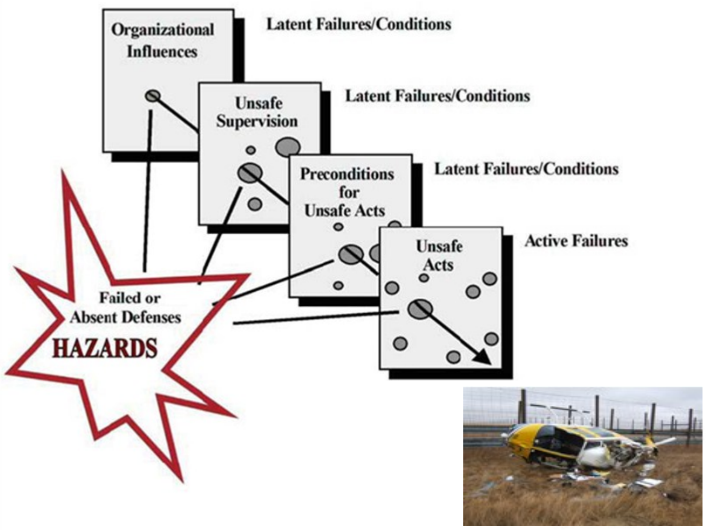
Management

- Inadequate management policy concerning
  - Flight following
  - Use of checklists
- Lack of management oversight concerning
  - Project Aviation Safety Plans
  - Preparation of Hazard Maps
  - Pilot qualification records
- Interagency Aviation Training compliance

Maintenance

- Landing gear warning systems (aural and visual)

We all know that "to err is human" so preventing human error makes for an effective safety program. Because humans make mistakes, DOI designed policies and procedures with checks and balances in order to catch human errors and prevent an event from becoming an accident. Unfortunately, when control measures fail to catch the human error, accidents happen. One approach to the genesis of human error is proposed by James Reason. Generally referred to as the "Swiss cheese" model of defenses, Reason attributes some holes in our control measures to active failures and others to latent conditions.



Until the development of the Human Factors Analysis and Classification System (HFACS) by Scott Shappell and Douglas Wiegmann, few tools were available to enable an accident investigator or accident review board to identify the "holes" in the control measures. HFACS was developed in response to a trend that showed some form of human error, at various levels, as a primary causal factor in 70 to 80 percent of all aviation accidents. Drawing upon Reason's concept of latent and active failures, HFACS describes four levels of failure.

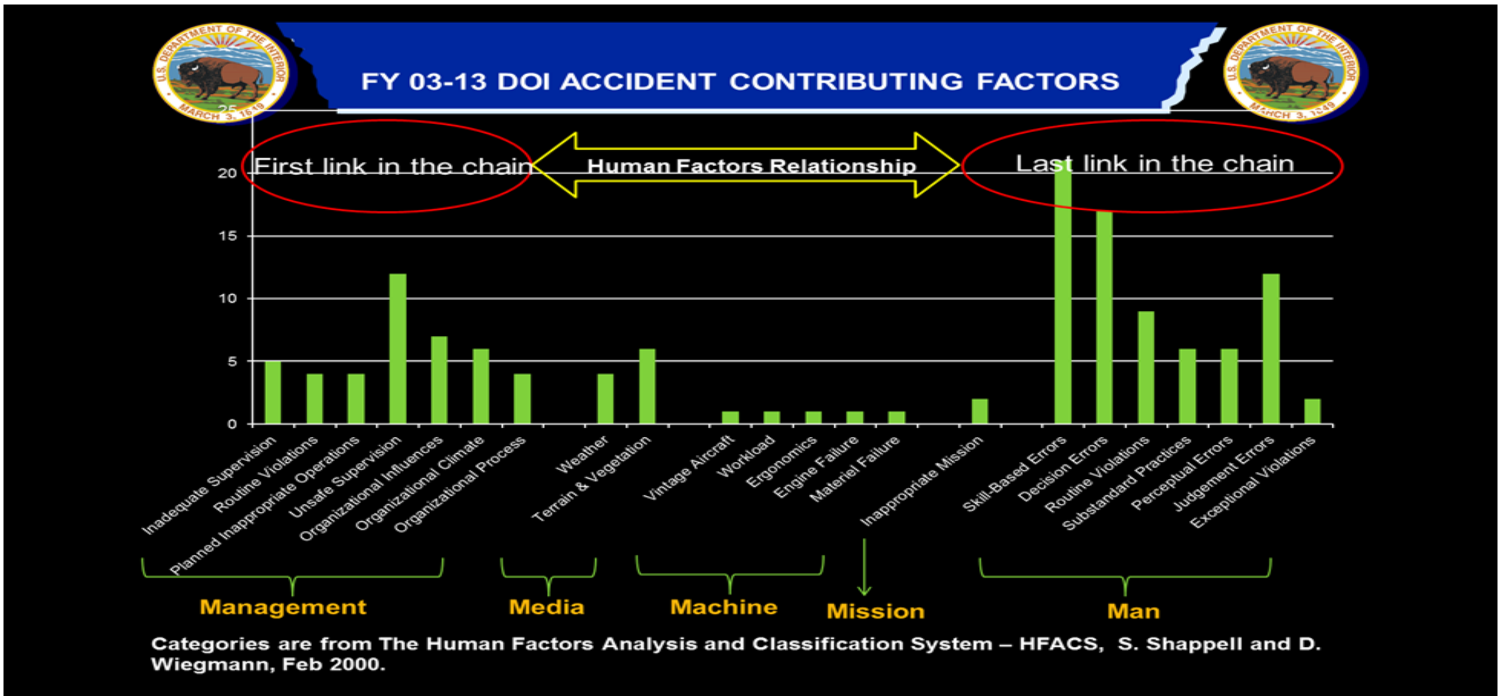
These levels include Unsafe Acts (operator error, or more commonly referred to as aircrew/pilot error), Preconditions for Unsafe Acts (such as fatigue and inadequate communication), Unsafe Supervision (such as pairing inexperienced aviators for a difficult mission), and Organizational Influences (such as lack of flight time because of budget constraints).

A contributing factor is defined as any item or condition that directly contributed to a mishap.
A present but not contributing factor is defined as any item or condition that was identified as a result of an investigation but did not directly contribute to a mishap.

HFACS identifies the human causes of an accident and provides a tool to not only assist in the investigation process, but to target training and prevention efforts.

But here's the deal – accidents will continue to occur if training and prevention efforts do not take place. Discovering the "holes" in the Swiss cheese is of little value if nothing is done to fill those holes.

Looking at the data presented below, we can see that the majority of our accidents contained latent organizational conditions that the operator(s) were forced to try and overcome. In other words, the deck was already stacked against them and that's asking a lot from the folks at the operational end of the chain.



Aircraft Mishap Review Board recommendations are developed to reduce latent conditions and fill the holes. Units are required to take a more proactive approach to identifying and correcting deficiencies prior to execution. **352 DM 1.3B:**

"Bureau Directors are ultimately responsible for the management of aviation resources and the implementation of an effective aircraft mishap prevention program."

Bureau Directives:

BLM - National Aviation Plan

FWS - 330FW5 (RA a requirement for aviation users)

BIA - National Aviation Plan and IA Manual Part 57

BOR – National Aviation Management Plan (NAMP)

NPS - RM 60, DO 60

USGS - Manual SM 445-2-H (RA for special use / low level only)

BSEE – BSEE (MMS) National Aviation Management Plan

As an aircrew member, passenger, or manager on the ground, if you see or feel that something is unsafe, it's your duty and responsibility to **SPEAK UP!** So if you SEE something SAY something. If you think it's wrong…**QUESTION IT!** If you know it's wrong, **STOP IT!** Either way, **REPORT IT** (https://www.safecom.gov/)! Nobody can fix it if they don't know about it. Everyone plays a part in maintaining an effective safety program.

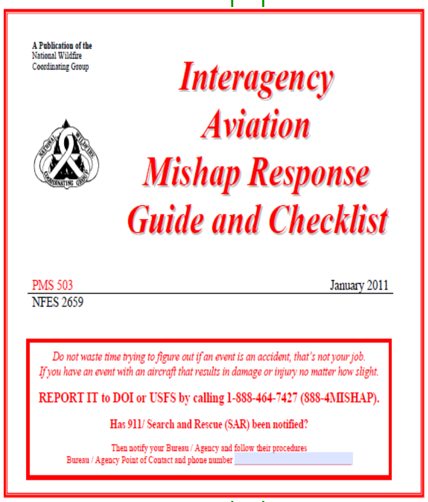
(1) The Human Factors Analysis and Classification System – HFACS, Shappell & Wiegmann, FAA Civil Aeromedical Institute, 2000.

Mishap Response Plans

Although no one conducts aviation operations with the intent of having a mishap, the possibility is always there. When a mishap occurs, the most common factor is confusion - during a time when clarity and decisive direction is needed most. A common finding on Departmental Aviation Program Evaluations includes the lack of a current and tested Mishap Response Plan or that it's absent altogether. The Interagency Aviation Mishap Response Guide and Checklist (http://oas.doi.gov/safety/iamrp.html) is designed to guide the organization's actions in the unfortunate event of a mishap, especially if the event involves an accident with fatalities. Pre-planning the critical steps that must take place in the event of an aviation emergency will eliminate confusion and ensure rescue or medical response has been initiated. Your plan should also address next of kin notifications as well.

This plan should become an integral part of your operations that's specifically tailored to your organization with supporting agency information that may be required to provide assistance in the event of a mishap regardless of size or severity. The plan needs to be reviewed at least annually and updated when changes occur. Unit Aviation Managers are responsible for training all personnel involved in aviation operations on these procedures as well as making copies available to appropriate personnel for quick access.

The Interagency Aviation Mishap Response Guide and Checklist is meant as a guide for your actions in the event of a mishap.


A Publication of the National Wildfire Coordinating Group

Interagency Aviation Mishap Response Guide and Checklist

PMS 503 January 2011

NFES 2659

Do not waste time trying to figure out if an event is an accident, that's not your job. If you have an event with an aircraft that results in damage or injury no matter how slight.

REPORT IT to DOI or USFS by calling 1-888-464-7427 (888-4MISHAP).

Has 911/ Search and Rescue (SAR) been notified?

Then notify your Bureau / Agency and follow their procedures

Bureau / Agency Point of Contact and phone number

It was developed from several agency resources and from the lessons that were learned from other mishaps. No plan can encompass all scenarios and sometimes the appropriate response will require the judgment of those responsible for putting it into action. This is another reason why the practice/testing of your plan is required for it to be effective. Don't delay in taking action because one or more pieces of information described in the plan are missing and get help when you feel you need it. Remember, initiate the plan and take action, get help when you need it, communicate, and use your best judgment.

Testing

The best test of how well your plan will work, and where it may need refinement, is to create a hypothetical mishap and initiate your Mishap Response Plan. The plan should be tested at least annually.

Reviewing

After testing your Mishap Response Plan, debrief what worked, didn't work, and determine the enhancements that could make it work better. As personnel and organizations constantly change, so should your plan. This will ensure the right points of contact are available when you need them and also affords the opportunity to improve processes. An incorrect or changed phone number can impede the efficacy of your plan. Version control may become an issue which is why it's imperative that the current plan possess a revision number and date printed on the front.

BUREAU AVIATION MANAGER—POINTS OF CONTACT

Below is a handy list of National Bureau Aviation Managers you can contact in regard to your Bureau's aviation program:

Bureau of Indian Affairs, Joel Kerley (208) 387-5371

Bureau of Land Management, (Acting) Brad Gibbs (208) 387-5182

Bureau of Reclamation, Jim Keiffer (303) 445-2044

Bureau of Safety and Environmental Enforcement, Brad Laubach (703) 787-1295

Bureau of Ocean Energy Management, Lee Benner (202) 513-7578

U.S. Fish and Wildlife Service, Anthony Lascano (703) 358-2059

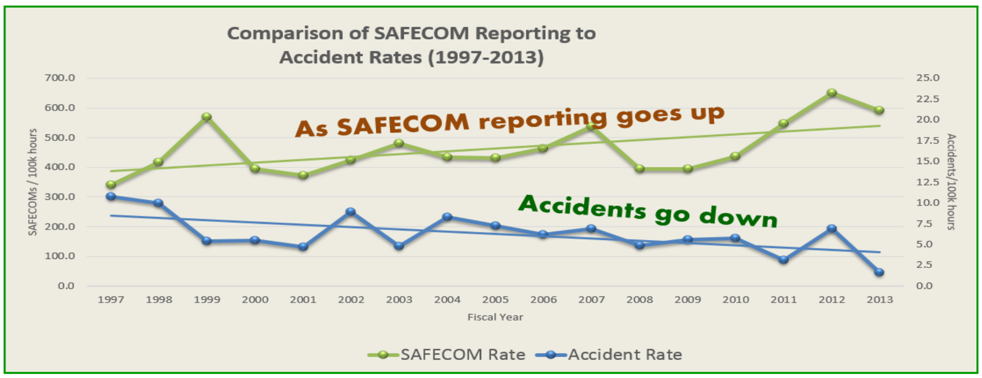
National Park Service, Jon Rollens (208) 387-5227

Office of Surface Mining, J. Maurice Banks (202) 208-2608

U.S. Geological Survey, David Johncox (303) 236-9171

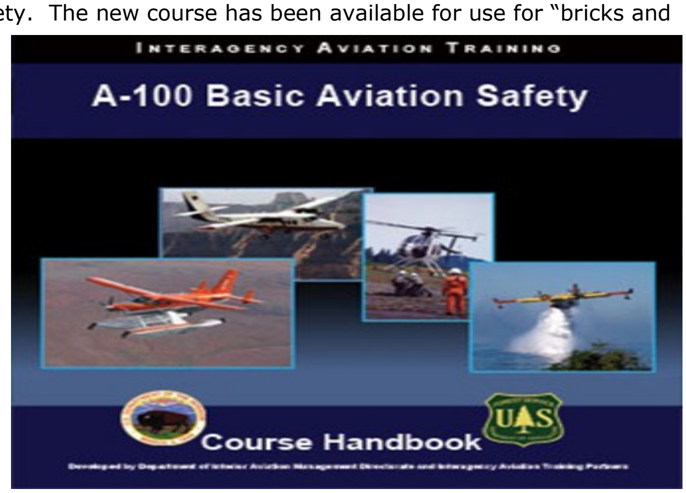
FY13 Mishap Summary

Location	Date	Severity	Operator	Aircraft
Gulf of Mexico	Aug 23, 2013	IWP	Vendor	AS350 B2
Takotna, AK (Non-Chargeable)	Aug 23, 2013	Accident	Vendor	Cessna 206F
Katmai, AK	Aug 01, 2013	IWP	Fleet	DHC-2 DeHavilland
Kotzebue, AK	Jul 09, 2013	IWP	Fleet	Cessna 185F
Eureka, NV	Feb 18, 2013	Accident	Vendor	Bell 206 BIII
Salisbury, MD	Feb 05, 2013	IWP	Vendor	Cessna 310Q
Manteo, NC	Jan 09, 2013	IWP	Fleet	Quest Kodiak



A-100 Basic Aviation Safety

In a collaborative effort, OAS Training Division worked with subject matter experts from DOI bureaus and the USFS to update and consolidate the existing B3 curriculum into one course: A-100 Basic Aviation Safety. The new course has been available for use for "bricks and mortar" delivery and is now available online.



The course replaces five older courses –

A-101 Aviation Safety

A-105 Aviation Life Support Equipment (ALSE)

A-106 Aviation Mishap Reporting

A-108 Preflight Checklist & Briefing/Debriefing

A-113 Crash Survival

DOI and USFS personnel who are required to take the B3 curriculum will now be required to take the A-100 Basic Aviation Safety course in order to maintain their qualifications. The next revision of the OPM-04 and the Interagency Aviation Training Guide will reflect these changes.

Personnel who previously completed the B3 curriculum will maintain currency in accordance with existing policy requirements. They are not required to take the A-100 prior to the date their B3 recurrence would be due. However, users are encouraged to take it sooner if able.

AT 2.0: Enhancements to the IAT.gov Web Site

Work began this year on enhancements to the IAT.gov web site. The new features will allow bureau and unit aviation managers to more easily monitor whether or not individuals are completing required aviation training. Robust reporting will provide DOI and interagency leaders with a dashboard of unit aviation training compliance within their respective organizations. The new features are collectively referred to as AT 2.0.

OAS will begin implementation of AT 2.0 in 2Q, FY2014.

PROGRAM EVALUATIONS

The DOI aviation program evaluation function serves as an integral element of the Department's Aviation Safety Management System "Assurance" pillar and a critical piece of the DOI A-123 management controls assurance program. In collaboration with the Bureaus, OAS led aviation program evaluations are held on-site at Bureau aviation unit locations. The objectives of the program evaluations include:

- Assessment of unit compliance with DOI aviation policy and Federal regulation.
- Evaluation of OAS's effectiveness in communicating and implementing DOI aviation policies.
- Identification of areas of potential improvement, sharing best practices, and support needs for each unit.

Location	Date	Result of Review
FWS–Midwest Region	10/12	**6** Findings
BSEE–Pacific Region	01/13	**8** Findings
BOR–Mid-Pacific Region	02/13	**9** Findings
BLM–Utah	04/13	**7** Findings
FWS–Northeast Region	04/13	**6** Findings
BLM–Oregon/Washington	05/13	**8** Findings
FWS–Southwest Region	06/13	**8** Findings
USGS–Pacific Region	07/13	**7** Findings
No Material Weaknesses Found		*Total* ***59*** *Findings*

FY13 Results & Performance

In FY13, OAS conducted 8 aviation program evaluations amongst 5 bureaus resulting in a total of 59 findings and **no material weaknesses.** Findings, corrective actions, and aviation program enhancements were collaborated with bureau aviation managers and tracked using OAS's ISO 9001-2008 certified program evaluation process (implemented in 2008). Since FY06, OAS has achieved a **71% reduction in completion time for aviation program evaluations**. **100%** of all Plan Of Action and Milestones (POAMs) have been fulfilled for the aviation program evaluations conducted to date in accordance with OAS's ISO 9001-2008 process requirements.

The Top 5 Findings, 2005-2013

1. Required Line Manager (M2)/Supervisor (M3) training not conducted or current (per OPM-04).

⇒ *49 of 75 evaluations, or 65.3%*

2. Lack a basic understanding of Project Planning.

⇒ *45 of 75 evaluations, or 61.1%*

3. Incomplete or out of date aviation plans.

⇒ *44 of 75 evaluations, or 60%*

4.MOUs/IAAs/SLAs are missing or out of date.

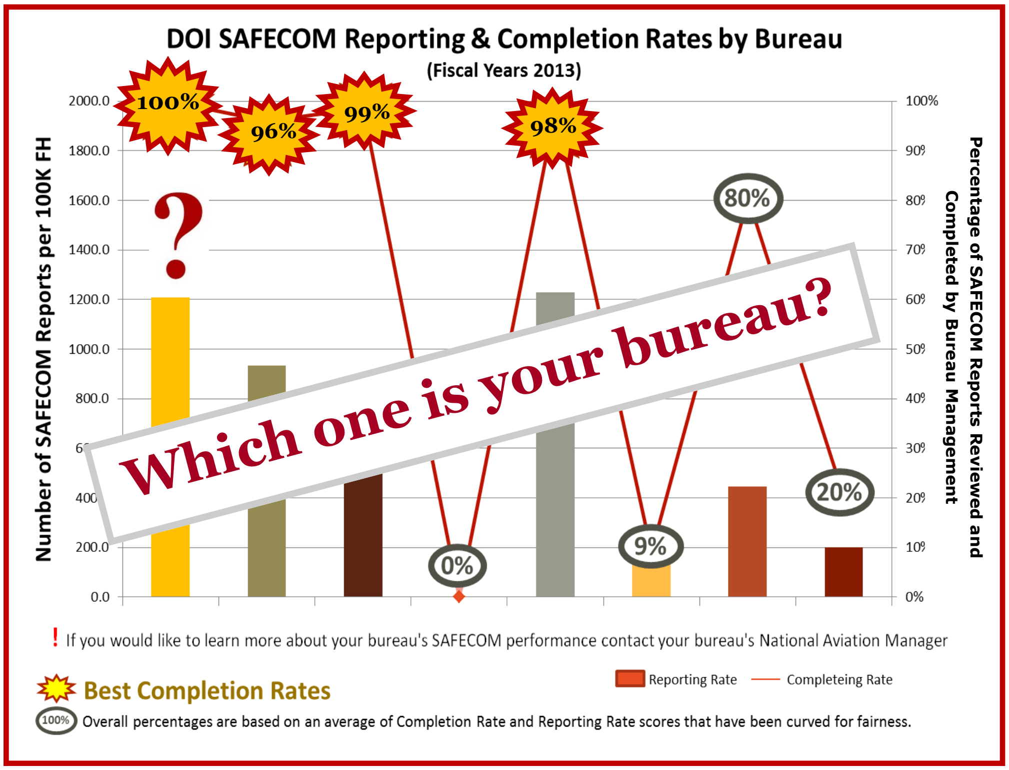
⇒ *37 of 75 evaluations, or 49.3%*

5. Minimal or no SAFECOMs compared to total amount of bureau flight time.

⇒ *20 of 75 evaluations, or 26.7%*

FY13 Analytics The aviation program evaluation system is a **proactive process** for gathering and analyzing data to assess the health of aviation programs within the Department. Regular monitoring of key "vital signs" provides a quality assurance system to assess the safety of aviation services provided, ensures efficiency in the management of complex resources, and provides a means of sharing best practices. From April 2005 to July 2013, a comprehensive analysis of 456 historical aviation program evaluation findings were completed within 75 evaluations. An analysis of these findings determined four major areas for improvement encompassing aviation program aviation plans, MOUs/IAAs, training, and safety.

SAFETY IMPROVEMENT OPPORTUNITIES



The purpose of SAFECOM is to report any condition, observation, act, maintenance problem, or circumstance with personnel or aircraft that has potential to cause an aviation-related mishap.

- A SAFECOM's sole purpose is for mishap prevention.
- A SAFECOM is not intended to fix blame and is not to be utilized in disciplinary action against an employee or vendor.
- A SAFECOM may be submitted by anyone.
- Supervisors DO NOT have to approve SAFECOM submittals, although they should be notified of all safety related issues immediately.

BUREAU CONTINUOUS ACCIDENT FREE MILESTONES

FY2013

BSEE	39 Years
OSM	27Years
BOR	16 Years
USGS	7 Years
BIA	6 Years
NPS	2 Year
USFWS	1 Year

SAFETY PUBLICATIONS

As part of the DOI mishap prevention program OAS in partnership with the U.S. Forest Service publishes a variety of safety publica-

Accident Prevention Bulletins

DOI APB 13-01, Budget Cuts & Risk Management
DOI APB 13-02, Thursdays and Holidays
DOI APB 13-03, Sweat the Details
DOI APB 13-04, UAS Operations
IA APB 13-01, PEDs in Cockpits
IA APB 13-02, Authorized Flight Helmet Parts
IA APB 13-03, TFRS
IA APB 13-04, Visibility and Thunderstorms

Safety Alerts

IA SA 13-01, Brace for Impact Positions
IA SA 13-02, Technisonic Industries TDFM-136/NV

Lessons Learned

IA LL 13-01, Fuel Planning and Management
IA LL 13-03, Dissemination of Mishap Information

SAFETY PUBLICATIONS LOCATED AT:
http://oas.doi.gov/ under "What's New"

Identifying Hazards

It is impossible to deny the importance of project planning and risk management in maintaining safe flight operations. The Interagency Helicopter Operations Guide (IHOG) contains some solid methods related to operational planning. It states that "missions can be accomplished safely provided that a high degree of pre-planning, risk management and analysis is applied." Despite its original intent for fire related operations, it can also serve as a basis for planning other types of natural resource missions.

All missions conducted within the Department of the Interior, aviation operations require detailed project planning. According to 352 DM 1.9C "Aviation operations shall be planned with the necessary consideration given to mishap prevention." It goes on to state that project planning shall include as a minimum: Flight routes/areas and altitudes, Risk assessment, Hazard identification (e.g., weather, takeoff or landing weights, landing areas, wire hazard, etc.), and Management approval for special use activities.

Many times, we review Project Aviation Safety Plans (PASP) in conjunction with an investigation or with a program review. Most of the PASPs are well documented and contain the details on the project and how it is be conducted. However, a common missed opportunity involves the lack of hazard identification.

What is a hazard? A hazard is any condition, act, or set of circumstances that exposes an individual to unnecessary risk or harm during aviation operations. In aviation risk management, the term "hazard" should be focused on the conditions which could cause or contribute to unsafe aircraft operation. Flushing out the hazards in projects can be challenging, but is the beginning of the Five Step Risk Management process. If you can't identify the hazards, then how can you mitigate them? Answer: you can't.

You might try what some call the "Ebenezer Scrooge" method. Like his visiting ghosts, he looked back on his past, his present and to the future. Using what you know of projects past, present, and future may help you identify potential hazards. The Ebenezer Scrooge method is really another way of looking at three more conventional hazard identification methodologies, Reactive, Proactive, and Predictive.

PAST

Reviewing similar, previous projects is a great way to prepare for the next one especially if there was an after action review that identified improvements to the plan (also known as continual improvement). But don't think that the old plan can just be dusted off and recycled by replacing the dates as there are probably considerable differences from the previous plan. Changes in terms of people, location, environment, and experience levels are just some that will pose new challenges and risk profiles. Review SAFECOMs for that mission or aircraft type and see where others may have experienced additional challenges. Review Accident Prevention Bulletins or Lessons Learned articles to see if there are common elements with your project. Accident reviews are another way to identify hazards that were present in previous mishaps.

PRESENT

Use your project team, aircraft manager, pilot, aircrew members and others that will be working on the project. Brainstorm to find what new hazards you can identify. Examine what is known now and identify those hazards. Step through the project plan with the team and envision hazards and other challenges. Using your team's experience and intuition is one of the most effective ways to identify hazards.

FUTURE

Predictive modeling can assist in planning by using likely scenarios. Determine the critical elements of your project and anticipate what may go wrong and try to envision the worst case scenarios. Use the "What if" technique to identify critical elements and what you might do if something happens unexpectedly. We all know that weather changes, the sun sets, people get tired, and schedules can slip. Anticipate those changes and plan for them. Set up triggers that will alert you to changing conditions. Some project plans include a scheduled break in order to afford the opportunity to assess the current situation, compare with the plan, and make necessary adjustments (if needed).

There are other tools and methodologies available. The Air Force Pamphlet, *Operational Risk Management Guidelines and Tools*, lists other simple and complex tools to identify hazards, such as the Operations Analysis/Flow Diagram, Preliminary Hazard Analysis, and the detailed Multilinear Events Sequence tool.[1]

There are many tools that are specifically geared towards pilots as well. At the right is a tool recently developed and implemented for OAS pilots.

However you label it, whether you view it in terms of past, present and future, or reactive, proactive or predictive, having an approach to hazard identification will provide a sound basis to performing risk management and improving your operation's overall safety and effectiveness. Remember, this is only one part of the risk management process. Assessing the risks associated with the hazards, mitigations, residual risk decision making (**<u>at the appropriate management level based on the level of residual risk</u>**), and monitoring are vital steps that remain after the hazard identification process.

OAS-87A (12/12)

INTERIM DOI AVIATION RISK ASSESSMENT MATRIX (Airplane)

• **<u>SUPERVISOR</u>'S RISK ACCEPTANCE REQUIRED**

•• **<u>DIRECTOR</u>'S RISK ACCEPTANCE REQUIRED**

Good aeronautical decision-making includes risk management, a process that systematically identifies hazards, assesses the degree of risk, and determines the best course of action.

Safe pilots understand the difference between what is "legal" in terms of the regulations, and what is "smart" or "safe" in terms of pilot experience and proficiency.

ADD APPLICABLE VALUE(S) IN EACH CATEGORY. PLACE TOTAL IN APPROPRIATE BOX.

1. MISSION PLANNING TIME		TOTAL	
	OPTIMAL	ADEQUATE	MINIMAL
Planning Time Available	1	2	3

2. MISSION COMPLEXITY		TOTAL	
TASK / MISSION	DAY	NIGHT (UNAIDED)	
SERVICE SUPPORT	1	4	
TRAINING GIVEN	1	4	
TRAINING RECEIVED	2	5	
MAINT RETURN TO SERVICE	3	•	
MAINTENANCE RECOVERY	5	•	
OTHER			

3. ADDITIONAL FACTORS			TOTAL
PROFICIENCY FLYING	6	SNOW SHOWERS <3 MILES VIS	8
FLIGHT CHECK	6	RAIN SHOWERS <3 MILES VIS	6
EXTENDED OVER-WATER OPS	•	MODERATE TURBULENCE	6
		COLD WX: 0°C TO –27°C (W/C)	6
		LDG CROSSWIND > in POH/AFM	10
		COLD WX: ≤-28°C (W/C)	••

4. PIC EXPERIENCE	PIC HRS=		TOTAL	
FLT TIME IN CRIT TASK/MISSION	TOTAL FLIGHT TIME			
	≥3000	<3000	<1500	<500
<25	3	4	5	6
≥25	2	3	4	5
≥50	1	2	3	4

5. CREW REST	PIC HRS=	DUTY DAY HRS=	TOTAL
	HOURS OF REST		
QUALITY OF REST	>24	>10	<10
NORMAL LIVING CONDITIONS	0	1	•
FIELD / BACK COUNTRY LIVING	1	3	•
MISSION COMPLETE - FIRST 1/3 of DUTY DAY			1
MISSION COMPLETE - SECOND 1/3 of DUTY DAY			2
MISSION COMPLETE - LAST 1/3 of DUTY DAY			4

6. WEATHER			TOTAL	
FLIGHT CONDITIONS	>3000' AGL >5 MILES	3000 to 1000' 5 to 3 MILES	999' to 500' <3 MI to 1 MI	<500' <1 MI
DAY	0	2	4	NO GO
NIGHT UNAIDED	3	N/A	N/A	N/A
WX WARNINGS				

7. DOI SPECIAL USE ACTIVITIES		TOTAL	
BACK COUNTRY OPERATIONS	8		
SMOKE JUMPING/PARACARGO	6		
WATER/RETARDANT APPLICATION	4		
WATER/RETARDANT APPL (SEAT)	4		
LOW-LEVEL FLIGHT	4		
MOUNTAIN FLYING	3		
WATER LDGS / FLOATS OR HULL	2		
AIR TACTICAL	2		
FIRE RECONNAISSANCE	1		
RESOURCE RECONNAISSANCE	1		

8. TOTAL RISK ASSESSMENT				
	LOW	MED	HIGH	EXTREME HIGH
	4 - 45	46 - 65	66-79	80+
APPROVAL AUTHORITY	PIC	SUPERVISOR	DIRECTOR	NO GO
IDENTIFIED HIGHEST MISSION RISK FACTOR				
PILOT IN COMMAND VERIFICATION	SIGNATURE		DATE	
APPROVAL AUTHORITY VERIFICATION	SIGNATURE		DATE	

CATEGORY CHANGES THAT OCCUR FOLLOWING INITIAL APPROVAL AND BEFORE DEPARTURE SHOULD BE <u>RE-EVALUATED</u> AND <u>APPROVED</u> *<u>AT THE APPROPRIATE LEVEL</u>*.

[1]AF Pamphlet 90-902. Operational Risk Management Guidelines And Tools, Dec. 14, 2000

FATIGUE RISK

Imagine you overheard this conversation between a Helicopter Manager and a pilot:

Helicopter Manager: Hey, Igor, are you ready to go fly?
Helicopter Pilot (Igor): Yeah, I'm good to go. I'm just a little tired.

Now, what would you do if that same conversation went like this?

Helicopter Manager: Hey, Igor, are you ready to go fly?
Helicopter Pilot (Igor): Yeah, I'm good to go. I'm just a little drunk.

In the first conversation, the Helicopter Manager might ask a few questions and get a little reassurance that Igor was ok and ready to fly, but the second conversation is totally ridiculous. Nobody would tolerate drinking and flying. But there is plenty of data to show that the drop in performance that results from fatigue can be very similar to the effects of alcohol.

Fatigue is a significant risk factor and poses a threat to aviation operations and other tasks that require vigilance, attention, and alertness. The laundry list of negative effects of fatigue is staggering. Here are a just a few. Have you experienced any of these before?

- Fixation or narrowing of attention
- Preoccupation with one task at the neglect of others
- Reduced alertness and failures in monitoring or scanning the flight environment
- Reduced communications that may hamper crew coordination.
- Increased reaction time or sensitivity to time on task
- Inconsistent performance
- Short term memory loss and inability to recall information from long term memory.
- Degradation in hand-eye coordination
- Impaired ability to judge performance of self or other crew members
- Reduced visual perception

But this isn't surprising. We have all been tired. We all may have experienced some of these symptoms of impaired performance associated with fatigue as the result of long work hours, maximum flight time, interrupted sleep, or rotating schedules, etc. With alcohol and flying, the rules are quite clear and easy to apply, but fatigue isn't quite as well defined.

The biggest concern is not pilots falling asleep on the controls. That is really the extreme case and happens rarely. It is the decrease in all the faculties that make us good pilots and air crewmembers. Pilots who are fatigued have demonstrated that there is a 20-50% loss in critical cognitive functions including memory decision making, reaction time and situational awareness. Losing half your ability to make good decisions and respond to your environment is the big problem.

Fact: Fatigue Happens! It is a physiological problem that cannot be overcome by will power, determination, motivation or sheer intestinal fortitude. It is just part of who we are; it is part of the human condition. Sleep is also a vital physiological function and one we can't do without.

One reason fatigue is dangerous, it's difficult to define it objectively. It is a personal experience. Studies have indicated that evaluations of one's own fatigue level are consistently inaccurate. There is usually a discrepancy between reports of sleep, alertness and performance compared to objective performance measures. It would be great to have a fuel gauge type indicator that you could stick on your head that would indicate your level of fatigue. People are just aren't good as identifying their own fatigue level.

People are equally bad about identifying fatigue in others. Remember the last time you woke up several hours early to catch a flight or travel? Later in that day, you might feel the effects of the loss of several hours of sleep, but others may not be able to tell without more obvious symptoms like falling asleep in front of them.

Another aspect of fatigue is that the factors which cause it are not predictable. What makes me tired, such as long hours of monotonous tasks, may not have the same effect on another and it may vary depending on the environment.

Over the years, one way that we have come to address the fatigue problem in aviation is by using flight and duty limitations. These prescriptive rules have been in place for years attempting to reduce or eliminate the impact of fatigue. They address significant contributors to fatigue, flight time and duty day, but not all of them. Other factors such as time since awake, poor quality or insufficient rest, and circadian disruption (such as time zone changes and shift changes) can all contribute to fatigue. Additionally, environmental factors such as noise, vibration, poor ventilation, and high workload cockpits can take their toll on us and contribute to fatigue.

The flight and crew duty limitation rules (351 DM 3.6 and by contract) tend to represent an absolute in our minds. Many view them as the only limits for fatigue management. I've heard people say, "I'm under 36 hours of flight time, so I am legal." This may be true as far as the crew rest limitations go, but if you have been losing out on sleep for several days due to a noisy motel room, newborn child, snoring spouse or mental distractions such as job related stress or financial problems, then you're probably not well rested and perhaps not fit to fly.

Although the rules require off duty or rest periods, using these periods effectively to get the required daily rest has been up to the individual. The rules haven't required that we get 8 hours of sleep in that off duty period, but that we have 10 hours free of job related duties. People need approximately 8 hours of sleep. Some people need more and some people can get by with less, but it is important to know what your normal requirement is and ensure you get it. When you don't get your normal requirement, the lost sleep can build a cumulative sleep debt. Just like an overdrawn bank account, you can increase your sleep debt where it will take longer than a normal night's rest to recover. Interrupted sleep can be caused by a variety of causes. Age, alcohol, and sleep disorders can be a few of the many causes that can significantly affect sleep.

We need to approach fatigue from a much more strategic perspective and not think that the flight time and duty day requirements are our only limits. Pilots, supervisors, and management should be educated about the risk of fatigue, the causes, the importance of good sleep habits, all of the ways of addressing fatigue in operational environments, such as time off, naps, tactical caffeine use, etc. Just because we are able to comply with regulations doesn't always mean that we are in compliance with its spirit and intent, thus requiring judgment.

An exhaustive study[1] (sorry, couldn't help the pun) looking at pilot fatigue had education of all aviation personnel as a primary recommendation. It included these goals for training programs:

1. Fatigue is a physiological problem that cannot be overcome by motivation, training, or willpower;

2. People cannot reliably self-judge their own level of fatigue-related impairment;

3. There are wide individual differences in fatigue susceptibility that must be taken into account but which presently cannot be reliably predicted;

4. There is no one-size-fits-all "magic bullet " (other than adequate sleep) that can counter fatigue for every person in every situation; but

5.There are valid counter-fatigue strategies that will enhance safety and productivity, but only when they are correctly applied.

Be aware of your own sleep needs, the quality and quantity of sleep and any disruptions so that you notice when changes occur. Treat sleep disruptions as "fatigue hazards" and adjust accordingly as you would with other operational hazards. Quality daily sleep is the best protection against fatigue. Learn more about fatigue at the NASA Fatigue Countermeasures Program (http://humanfactors.arc.nasa.gov/publications/B_Flight_Ops_XV_GAETM1.pdf).

[1]Fatigue Countermeasures in Aviation by: John A. Caldwell, Melissa M. Mallis, J. Lynn Caldwell, Michel A. Paul, James C. Miller, David F. Neri. Aviation, Space, and Environmental Medicine (January 2009), pp. 29-59.

Unmanned Aircraft Systems

Departmental Aviation Program Evaluations provided us the opportunity to educate many units about the potential use of Unmanned Aircraft Systems (UAS) to accomplish a variety of missions. First, individual units and their respective Bureau aviation management must accurately assess their mission requirements (what's the job that needs to be done) to determine if these platforms are appropriate for their missions. It is also important to understand the requirements involving Departmental UAS procurement and operations. These basic requirements are located in the 310 pages of existing DOI aviation policy and within OPM 13-11, DOI Use of UAS platforms for aviation missions. Program evaluations have revealed that field personnel are largely unaware of Departmental UAS procurement and utilization regulations contained in OPM 13-11 DOI Use of UAS.

In June 2012, the Department held an aviation summit with the 10 Bureau Deputy Directors and senior Department leadership. This summit included a discussion of seven strategic opportunities for future improvements. One of the identified strategic opportunities was the future use of UAS. With respect to UAS, there are some important points to remember. ***Most important among them is that UAS are, by Federal Aviation Administration (FAA) definition, considered <u>aircraft</u>, not "field equipment."*** This includes hobby store remote controlled aircraft and similar items which, when paid for with Federal funds and employed in support of Federal programs, are considered aircraft. Because UAS are considered "aircraft", Departmental requirements must be followed to include specific responsibilities for acquisition approval, operational control, credentialing of operators, inventory control, cost accounting, mishap reporting, risk identification and mitigation, and activity reporting. Department policy requires all aircraft be procured through the Office of Aviation Services (OAS). OAS initiated the Department's UAS program in 2006, establishing relationships with other Federal UAS users and establishing where needed, UAS specific policies and processes to support the test and evaluation of UAS technologies in actual Bureau missions. Since first flight in 2010, DOI has flown over 300 hours of UAS flight hours in a wide variety of missions.

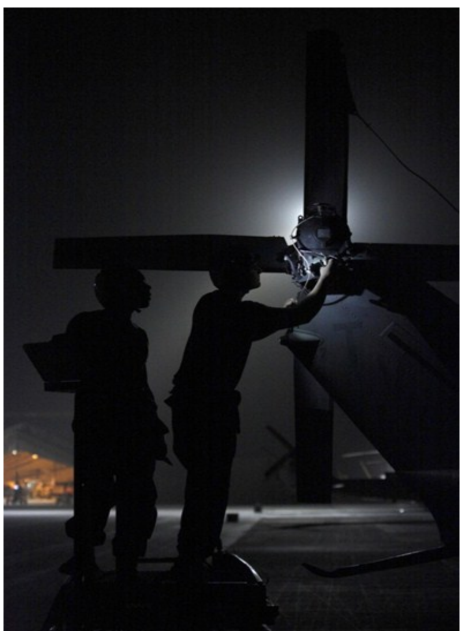
DOI's current UAS strategy is to leverage available excess DOD-owned small UAS (sUAS) assets to significantly reduce procurement and support costs. So far, DOI has been loaned over $15M in excess DOD sUAS aircraft at no cost. DOI has also established a cooperative Memorandum of Understanding with the Department of Homeland Security that allows DOI case-by-case access to products from DHS's larger UAS aircraft. Additionally, DOI is heavily involved in a White House led interagency policy committee charged with establishing the framework for the domestic use of UAS. Additionally, OAS (in conjunction with Executive Aviation Committee) is leading a collaborative effort with all 10 Bureaus to identify the scope of future DOI UAS requirements.

Aviation Managers at the local, state/regional, and national levels need must continue to educate field personnel on Departmental UAS procurement and operating regulations contained within OPM 13-11 DOI Use of UAS. Field units are required to coordinate any UAS activity with their respective National Aviation Manager and the OAS UAS Specialist. Valuable training on this subject can be obtained via Interagency Aviation Training course A-455, Overview of Small Unmanned Aircraft Operations, that can be scheduled with the OAS Training Division. It gives the student a brief history, overview, and application of small UAS's. It also provides managers an overview of the requirements for

Human Factors in Aviation Maintenance

What does it take to get an aircraft off the ground? Simple question right? Well, if you initially said a pilot, you may want to reconsider. A better answer would be an aircraft mechanic. It's easy to think it's a pilot since we often focus on aircrew when we look at aviation operations. But it's important to realize that without aircraft mechanics, there wouldn't be any airworthy aircraft for pilots to fly.

Since the end of World War II, human factors researchers have studied pilots and the tasks they perform. Yet until recently, maintenance personnel were overlooked by the human factors researchers. Whatever the reason, it's not because maintenance is insignificant. Maintenance is one of the largest costs associated with aircraft operations. Most importantly, maintenance errors can have a tremendous impact on flight safety. Just like aviation, over 80 percent of maintenance errors involve human factors. If they are not detected, they can cause events, worker injuries, wasted time, and even accidents.



Maintenance personnel are confronted with a set of human factors unique within aviation. Maintenance technicians work in an environment that is more hazardous than most other jobs in the labor force. Their work may be carried out at heights, in confined spaces, in numbing cold or sweltering heat.

Their work can also be physically demanding, yet it requires clerical skills and attention to detail. Maintenance personnel also face unique sources of stress. When maintenance personnel leave work at the end of their shift, they know that the work they performed will be relied on by crew and passengers for months or years into the future.

Pilots and aircrew need to understand that they can unintentionally place pressure on mechanics as well. Standing around while the mechanic is working on a problem could lead to other problems as a result of the perceived pressure to complete a task as quickly as possible. As a pilot or aircrew, think about how you feel when someone is pressuring you to fly into bad weather or wanting you to bust crew day by "just 15 minutes!"

You should always understand the maintenance that was performed, the impact on the aircraft's operating condition, and how it relates to your specific mission. However, there is a time and place for quality assurance to occur and you should always be aware of the atmosphere you bring to the engagement. All that said, never accept an aircraft to which you feel there are outstanding issues or require greater explanation. Notify the OAS Regional Office via your respective management channels if you're still unsure or not satisfied.

Here are the 12 most common maintenance-related causes of errors

(according to FAA AC 120-72):

Lack of Communication	Lack of Teamwork	Lack of Assertiveness
Complacency	Fatigue	Stress
Lack of Knowledge	Lack of Resources	Lack of Awareness
Distraction	Pressure or sense of urgency	Social or Organizational Norms

1. FAA AC 120-72, *Maintenance Resource Management Training.*
2. *An Overview of Human Factors in Aviation Maintenance*, Australian Transport Safety Bureau, Aviation Research and Analysis Report 2008-055, Alan Hobbs Ph.D., December 2008.

Crew Performance Standards

Situational Awareness

- Accomplishes appropriate pre-flight planning.
- Sets and monitors targets.
- Stays ahead of the aircraft by preparing for unexpected contingency situations.
- Monitors weather, aircraft systems, instruments, and ATC communications.
- Shares relevant information with the rest of the crew.
- Uses advocacy / inquiry to maintain / regain situational awareness.
- Recognizes error chain clues and takes action to break links in the chain.
- Communicates objectives and gains agreement when appropriate.

Stress

- Recognizes symptoms of stress in self and others.
- Maintains composure, calmness, and rational decision making under stress.
- Adaptable to stressful situations / personalities.
- Uses stress management techniques to reduce effects of stress.
- Maintains open, clear lines of communication when under stress.
- Manages low stress situations to prevent complacency and boredom.

Communication

- Establishes open environment for interactive communications.
- Conducts adequate briefings to convey required information.
- Recognizes and works to overcome barriers to communication.
- Operational decisions are clearly stated to other crew members and acknowledged.
- Crew members are encouraged to state their own ideas, opinions and recommendations.
- Crew members are encouraged to ask questions regarding crew actions.
- Decisions and answers are provided openly and non-defensively.
- Assignments of blame are avoided. Focuses on **WHAT** is right, not **WHO** is right.
- Keeps feedback loop active until operational goal / decision is achieved.
- Conducts debriefings to correct substandard / inappropriate performance and to reinforce desired performance.

Synergy and Crew Concepts

- Ensures that group climate is appropriate to operational situation.
- Coordinates flight crew activities to achieve optimum performance.
- Uses effective team building techniques.
- Demonstrates effective leadership and motivation techniques.
- Uses all available resources.
- Adapts leadership style to meet operational and human requirements.
- Encourages input / participation from all crewmembers.

Workload Management

- Communicates crew duties and receives acknowledgement.
- Sets priorities for crew activities.
- Recognizes and reports overload in self and in others.
- Eliminates distractions in high workload situations.
- Maintains receptive attitude during high workload situations.
- Uses other crewmembers.
- Avoids being a "one-man show."

Decision Making

- Anticipates problems in advance.
- Uses SOP in decision making process.
- Seeks information from all available resources when appropriate.
- Avoids biasing sources of information.
- Considers and weighs impact of alternatives.
- Selects appropriate courses of action in a timely manner.
- Evaluates outcome and adjusts / reprioritizes.
- Recognizes stress factors when making decisions and adjusts accordingly.
- Avoids making a decision and then searching for facts that support it.

The Birds Are Everywhere!

Birds have been a hazard to aviation ever since man began to fly. In FY13, there were six bird strikes reported in DOI and USFS. A search of the SAFECOM system for birdstrikes showed that since 2011, there have been 14 bird strike incidents.

Bird strikes can turn a routine flight into an emergency situation. Any bird, no matter the size, has the potential to cause damage to an aircraft. Very large birds (for example - Turkey Vulture, Canada goose and White Pelican) usually cause the most damage. Fortunately, only about 15% of all bird strikes result in damage to the aircraft. The force of the impact generally depends on the weight of the bird, the difference in velocity, and the direction at impact. Since the force increases with velocity, high speed impacts with aircraft cause considerable damage. Although the number of reported bird strikes is increasing each year, about 80% still go unreported. More bird strikes occur during the day (63%), than at night (27%) and twilight (10%). The vast majority of bird strikes occur during takeoff / climb (35%) and approach / landing (50%).

Bird strike risk is greatest during the bird migration seasons in spring and fall. More strikes occur during fall migrations because large flocks move to wintering areas over a short period of time, whereas spring migrations are slower and more irregular. In non-migratory periods, more than 90% of reported bird strikes occur below 3,000 feet above ground level (AGL) and 61% below 100 feet AGL.

Here are a few suggestions to minimize or mitigate the risk associated with bird strikes:

Before Takeoff:

Review web sites that provide predictive information on bird activity (www.usahs.com).

- Listen carefully to the Automatic Terminal Information Service (ATIS) and review the Notices to Airmen (NOTAMs) at your departure and destination airports for "birds in the vicinity."
- Ask airport / airfield managers to disperse any birds on or near the runway.
- For multi-crew aircraft, discuss the emergency procedures to be followed in the event of a bird strike, especially if windshield penetration results in pilot incapacitation.

In Flight:

- If possible, avoid flights along rivers or shorelines.
- Avoid low flight over bird havens such as sanctuaries and landfills.
- Remember that birds will generally break downward when threatened so attempt to pass above them.
- Hovering birds, searching for prey, have even been known to attack aircraft, so give them a wide berth.
- Maintain a slower speed in areas of bird activity. It will give you and the birds greater reaction time.
- Use landing lights whenever possible to make your aircraft more visible to birds.

Don't pick up an unexpected passenger during your flight

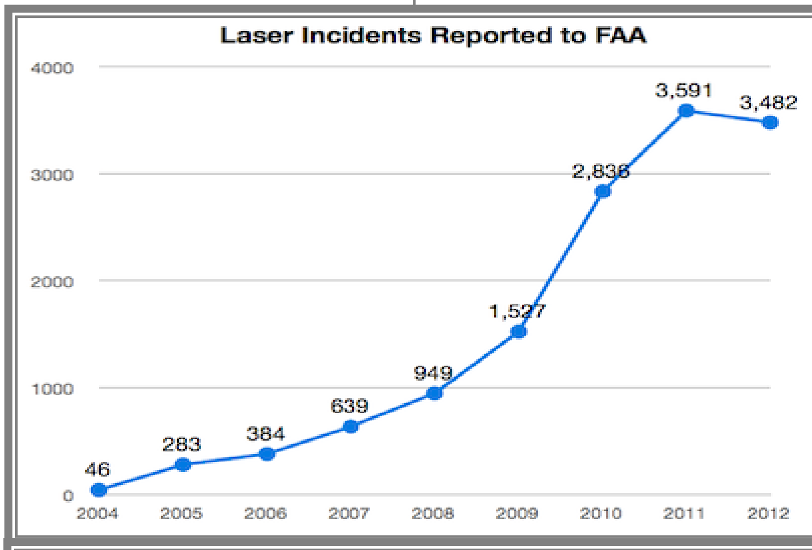
For further information see:
* The University of Puget Sound bird identification resources site: http://www.ups.edu/biology/museum/wingphotos.html
* The Air Force BASH site: http://safety.kirtland.af.mil/AFSC/Bash/home.html)
* The Bird Avoidance Model (BAM) site: http://www-afsc.saia.af.mil/magazine/htdocs/marmag98.htm
* The Bird Strike Committee USA site: http://www.birdstrike.org/commlink/links.htm
* "When Birds Strike," Bob Behren, AOPA Pilot, 87, April 2009.

Laser Safety

While conducting post 4th of July area sweeps of the Potomac River and surrounding shoreline, a U.S. National Park police helicopter was traveling south on the east bank of the river when a green laser struck the aircraft twice on the left side, illuminating the cockpit. Air Traffic Control and the DC Police were notified. There were no injuries or damage as a result of the laser incident (SAFECOM 13-0430).

From January 1, 2004 through December 31, 2012, there have been approximately 13,737 laser/aircraft incidents reported to the U.S. Federal Aviation Administration (FAA). The number of laser/aircraft incidents in the U.S. during 2012 was 3,482. Already in 2013 (January 1 - November 15), there have been approximately 3,434 laser/aircraft incidents reported to the FAA.

In most cases, laser beams are not tracking aircraft and most do not enter cockpit windows. A mid-2011 study by Rockwell Laser Industries of 6,903 incidents reported to the FAA found that in 27% of incidents, beams entered the cockpit (passed through the windscreen). Of these, the exposure appeared intentional in about 350 incidents (19% of the cockpit illuminations; 5% of all illuminations). “Intentional” was defined as multiple beam exposures or the beam tracking the aircraft. For example, in 2011, there were 3,591 incidents of which approximately 970 (27%) involved beams in the cockpit.



The number of U.S. laser incidents decreased slightly in 2012

Note: FAA mandated that pilots report incidents using Advisory Circular 70-2, begin-

In 36 (1.0%) of the 3,482 laser/aircraft incidents in 2012, a pilot or aircraft occupant reported a temporary adverse visual effect such as flash blindness after image, blurry vision, eye irritation and/or headache. In four of the 36 eye incidents, the eye effect may have been more serious or long-lasting. In no incidents, either in 2012 or in previous years, was there any permanent eye damage. So, with all the controversy over laser devices, why would OAS have laser rescue lights listed in the Aviation Life Support Equipment (ALSE) Handbook (2008, Appendix 2) as a survival equipment item for DOI flight activities? DOI and vendor aircrews are concerned, and rightfully so, about the safety of using laser flares. This article will explain why laser rescue lights are **not only effective, but also safe**.

All laser products—that is, equipment incorporating lasers as components—must be classified according to their output levels. In the United States, compliance with the regulations for lasers and laser products issued by the Center for Devices and Radiological Health (CDRH) of the Food and Drug Administration (FDA) is mandatory. The current CDRH regulations pertaining to laser emissions are found in 21 CFR 1040.10 and 1040.11. Lasers are classified sequentially for safety from Class 1 to Class 4, and the US Federal Government regulates laser manufacturers, permitting only Class 1, Class 2 and Class 3R (formerly called 3a) lasers to be sold for demonstration, alignment and leveling (to include laser pointers).

There are four primary areas of concern for aviation. The first three are "visual effects" that temporarily distract or block pilots' vision (these effects are only of concern when the laser emits visible light). The fourth concern, eye damage, is much less likely, as it would take specialized equipment not readily available to the general public. Commercial laser pointers do not pose a problem during daylight; the startling temporary visual effects are possible only during nighttime or twilight illumination. Visual effects on the aircrew also depends on the level of dark adaptation prior to the exposure.

Visual Effects

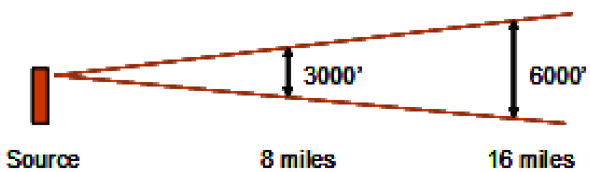
- **Distraction and startle.** An unexpected laser or bright light can distract the pilot during a nighttime landing or takeoff.
- **Glare and disruption.** As the light brightness increases, it starts to interfere with vision. The glare caused by scattered light would make it difficult to see out the windscreen. Night vision starts to deteriorate. Dirty or scratched windscreens tend to increase scatter of light and can produce a more dramatic visual effect in some instances.
- **Temporary flash blindness.** Similar to a bright camera flash. There is no injury, but night vision is temporarily disabled. There may be afterimages – again, exactly like a bright camera flash, leaving temporary spots.
- **Eye damage.** Though it's unlikely, high power visible or invisible (infrared, ultraviolet) laser light could cause permanent eye injury. The injury could be relatively minor, such as spots only detectable by medical exam or on the periphery of vision. At higher power levels, the spots may be in the central vision – in the same area where the original light was viewed. And most unlikely of all is injury causing a complete and permanent loss of vision.

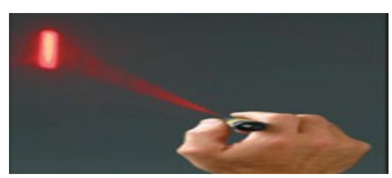
Based on data that have been collected to date, momentary laser pointer exposure does not produce a risk of permanent injury. In most individuals, the aversion response (i.e. looking away or blinking) will limit a commercial laser exposure to less than a quarter of a second. So there is no realistic risk of eye damage from accidental viewing of Class 3R commercial laser pointers even at relatively close distances. Brief exposures during the performance of critical tasks, however, can be very disruptive and could cause accidents.

After considerable research, OAS has approved the Rescue Laser Flare from Greatland Laser LLC and added it to their aviation life support and survival equipment. The handheld, 5 volt, battery powered, red diode laser source is equipped with plano-convex (flat on one side and convex on the other) optical lenses. In this design, the laser is not a pinpoint light source normally associated with a laser, but rather a thin, expanding vertical line of laser light. Swept across the surface horizontally, while the thin beam is held vertical, it covers a large area with each sweep, from near the point of origin to the far horizon. When it passes over a retro-reflective piece of material (or even any normally reflective material that is at the right angle or which is curved) it flashes very distinctively back at the laser source, much like a mirror flash. You can't miss it.

When comparing the amount of laser light power which illuminates an aircraft cockpit from the Laser Flare to that of a typical laser pointer at a common signaling distance of 1.5 miles, the laser power illuminating the cockpit and hitting the pilot's eye from the Laser Flare is about one trillionth of a watt. This power level is very low because of the 2 dimensional fan (line) of light, as compared to the relatively small one-dimensional pencil thin beam. Even at this power level, the light can be easily detected but will not obscure pilot vision in any way.

Area in which brilliant "flash" of light can be seen from the laser flare





As a safety precaution, all Class 3R (a) lasers should have one of the following warning labels attached:

(1) *CDRH and International Laser Product Safety*, Moe Lamothe, Compliance Engineering, Spring 2002. (2) *Are Laser Pointers Really a Hazard?* David Sliney, Laser Focus World, February 2, 2005. (3) *Code of Federal Regulations,* 21 CFR 1040.10, 1040.11. (4) http://www.laserpointersafety.com

FY13 ACHIEVEMENTS

In recognition of individuals, groups, and organizations for exceptional acts or service in support of aviation safety and aircraft accident prevention. The following awards have been given in FY13.

In-Flight Action

This award recognizes the successful recovery from an emergency or prevents aircraft damage or injury to personnel.

Jayson Danziger

Bureau of Safety and Environmental Enforcement

Safe Flying Award

This award is established to recognize DOI pilots who have distinguished themselves by safe flying for the period considered. This award is restricted to DOI employees.

Secretary's Award of Honor

More than 25 years or more than 10,000 hours of safe flying

Recipient: **James Hummel,** National Park Service
Recipient: **Bruce Lenon,** National Park Service
Recipient: **William W. Larned,** Fish and Wildlife Service

Award for Significant Contribution to Aviation Safety

This award was established to recognize significant contributions to aviation safety or accident prevention within DOI. This award is restricted to DOI employees only.

Individual Award to **Paul Castelli**, U.S. Fish and Wildlife Service

Airwards

This award was established to provide timely recognition to any individual who has demonstrated positive behavior or actions promoting DOI aviation safety, such as correcting a hazardous situation, submitting a good idea, or just making a difference.

Individual Awards

Alex Keller, Bureau of Land Management
Ted Nichols, U.S. Fish and Wildlife Service
Connie Stickel, Bureau of Land Management
Roland Landry, Bureau of Safety and Environmental Enforcement
Alan Bell, Bureau of Safety and Environmental Enforcement

Group Award

Ryan Brooks, Tom Fox, Jim Ranney and Garrett Stokes

Bureau of Land Management

Fiscal Year 2013

Accident Free DOI Pilot

Recognizing Excellence

OFFICE OF AVIATION SERVICES

Bannister, Gene
Castillo, James
Foster, Edward
Fowler, K. Dale
Howell, Gilbert
James, William
Kearney, Patrick
Mancano, Maria
Miller, Arlyn
Palmer, Earl Jr.
Ricks, Tom
Stone, Bart

BUREAU OF LAND MANAGEMENT

Bell, Donald
Curl, R. Ryan
Doherty, Jonas
Calderoni, Jonas
Duhrsen, Jeffrey L.
House, Greg
Lazzaro, Robert
McCormick, Robert
Warbis, Rusty

BUREAU OF RECLAMATION

Norton, Michael

FISH AND WILDLIFE SERVICE

Barnett, Heather
Bayless, Shawn
Bedingfield, Isaac J.
Bennett, Timothy
Beyer, Duston
Bollinger, Karen
Bredy, James
Clark, Stephen
Dillard, Les
Dobson, Garland
Earsom, Stephen
Ellis, James (Jim) F.
Ernst, Richard
Fox, Kevin
Guldager, Nikolina
Hink, Mike
Hinkes, Michael
Hurd, Shay
Koneff, Mark
Larned, William
Liddick, Terry
Lubinski, Brian
Mallek, Ed
Moore, Charles
Olson, Nathan
Powell, Doug
Rayfield, John
Rees, Kurt
Rhodes, Walt
Richardson, J. Ken
Rippeto, Dave
Roetker, Fred
Scotton, Brad
Sieh, Eric
Spangler, Robert
Spindler, Michael (Mike)
Stark, Rory
Sundown, Robert
Thorpe, Philip
VanHatten, G. Kevin
Wade, Mike
Ward, James
Wittkop, Jim
Wortham, James

NATIONAL PARK SERVICE

Alsworth, Leon
Cebulski, Curtis
Ellis, Lynn
Fink, Leon F.
Gilliland, Allen
Goodwin, Fred
Herring, J. Nick
Howell, Galen
Kangus, W.B. "Tug"
Kimmel, John
Loach, James
Mazur, Stephen
Milone, Colin B
Richotte, Richard
Sample, Scott
Shults, Brad
Stevenson, Dan
Taylor, Scott
Traub, James

NPS U.S. PARK POLICE

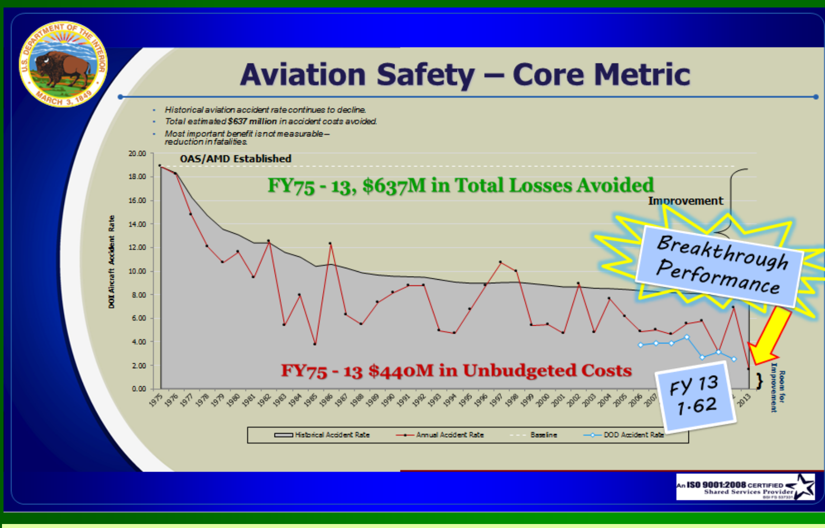
Bohn, Keith
Burchell, Kenneth
Chittick, Kevin
Haapapuro, Eric
Hertel, Jeffery
Lindley, Jonathan
Perkins, Christopher
Wright, Keaton

U.S. GEOLOGICAL SURVEY

Christiansen, William
Heywood, Charles
Wright, C. Wayne

EXECUTIVE SUMMARY

Take Away Sheet



DOI aviation accident rate = 1.62 per 100K flight hours
FY06-13 = Best 8 Consecutive Years Ever

1 Accident/1 Fatality
1 accident/1 fatality - Seeding/Fertilization

FY13 Annual accident rate =	1 reportable accident / 61,772.70 reportable DOI flight hours	* 100,000 = **1.62** accidents / 100,000 hours
Historical accident rate = (39 fiscal years)	260 reportable accidents / 3,258,628.40 reportable DOI flight hours	* 100,000 = **7.98** accidents / 100,000 hours

POLICY: Aviation Managers at the local, state/regional and national levels need to continue to educate field personnel on Departmental UAS procurement and operating regulations contained within OPM 13-11 DOI Use of UAS.

POLICY: Bureau Directors are ultimately responsible for the management of aviation resources and the implementation of an effective aircraft mishap prevention program.

RISK MANAGEMENT: If you SEE something SAY something! If you think it's wrong…QUESTION IT! If you know it's wrong, STOP IT! Either way, REPORT IT (safecom.gov)!

RISK MANAGEMENT: In the last three years, overall SAFECOM reporting increased by 20 percent although significant opportunities to improve remain for many bureaus in the areas of reporting and management follow-up rates.

PROMOTION: Bureaus maintaining excellence in aviation safety through their continuous accident-free flying record include: BSEE (MMS) 39 years, OSM-27 years; BOR-16 years; USGS-7 years; BIA-6 years; and NPS-2 years, USFWS 1-Year.

PROMOTION: BSEE dramatically increased both SAFECOM reporting and management follow-up rates.

ASSURANCE: The new IAT website will greatly enhance everyone's ability to check training compliance and also allows automated reminders for training coming due.

ASSURANCE: 59 Aviation Program Evaluation findings and no material weaknesses were found in FY13.

ASSURANCE: Top five Program Evaluation findings - 1) unmet training requirements 2) lack of basic understanding of project planning 3) incomplete or out of date aviation plans 4) MOUs / IAAs / SLAs missing or out of date 5) Lack of sufficient SAFECOM reporting.

ASSURANCE: From April 2005 to July 2013, a comprehensive analysis of 456 historical aviation program evaluation findings was completed within 75 evaluations.

ASSURANCE: DOI and USFS personnel who are required to take the B3 curriculum will now be required to take the A-100 Basic Aviation Safety course in order to maintain their qualifications.