United States Department of Agriculture

Forest Service

FY 2002

Aviation Safety Summary

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NOTE: Formulas used: Industry standard “per 100,000 hours flown”

Accident Rate = Number of accidents divided by the number of hours flown.

Fatal Accident Rate = Number of fatal accidents divided by the number of hours flown.

Fatality Rate = Number of fatalities divided by the number of hours flown.

Executive Summary

As a world-class leader in natural resources management, the Forest Service has a responsibility to protect its most valuable resource – our personnel. The success of our mission depends upon how effectively we incorporate safety and health into our culture and our daily behavior. We take a proactive approach in designing projects and activities, and in developing policy and procedure to ensure personnel safety.

The Forest Service was unsuccessful with our continuing plight to achieve a zero aviation accident rate in 2002. The number of mishaps that occurred in 2002 exceeds all other accident rates since 1979. Contributing factors such as record-breaking wildfire occurrence, extended periods of field deployment, greater than average numbers of aircraft and a corresponding peak in numbers of flight hours are recognized as culprits. However, we cannot ignore the need to redouble our accident prevention efforts and be better prepared for similar occurrences in the future.

In response to the season's high mishap rate an all-out effort is being made to plan a more safe and effective future aviation program. A Blue Ribbon Panel was chartered to "identify weaknesses and fail points in the current aviation program, focusing on safety, operational effectiveness, costs, sustainability, and strategic guidance". The panel's findings with regard to aviation safety are included in the appendix to this report.

We are working diligently to improve key direction and safety systems integrity. The Aviation Safety Council designed a new Safety Plan. The FSM 5720 has been revised to incorporate changes in the FS Accident Investigation Guide and to recognize our standards for SAFECOM reporting, AIRWARDS and other accident prevention efforts.

Our vision of the corporate culture, teamwork, and interagency cooperation in a wide array of key risk management arenas leads to one additional area of focus. This spring we unveiled a proposal for the development of a National Aviation Safety Center (NASC). That proposal was received with resounding support from the regions and we are now underway. The NASC is dedicated to the support of aviation program needs with safety information, lessons learned, risk management tools, safety training, accident prevention systems, and a heightened awareness of safety culture. By providing a cultural safety center we hope to raise the mark of achievement and close the gap between current performance and the "zero goal" for success.

We hope you will join us in making 2003 a banner year for aviation safety and the NASC.

Statistical Summary

Fiscal year 2002 was the highest mishap year for the Forest Service Aviation Program since 1979. Our accident rate peaked with 13 Accidents and 10 "Incidents With Potential". Sadly, we lost six professional aviators in three accidents and in one additional accident had two serious injuries. The USFS flew 109,063 hours (over 30% above the annual average) the vast majority of which in support of the wildland fire program.

The Forest Service utilizes aircraft for a wide variety of other missions, including routine administration, research, forest rehabilitation, law enforcement support, aerial photography, infrared surveillance and fire prevention.

The **primary** mission of USDA Forest Service Aviation is to support the ground firefighter through a variety of means, including, but not limited to:

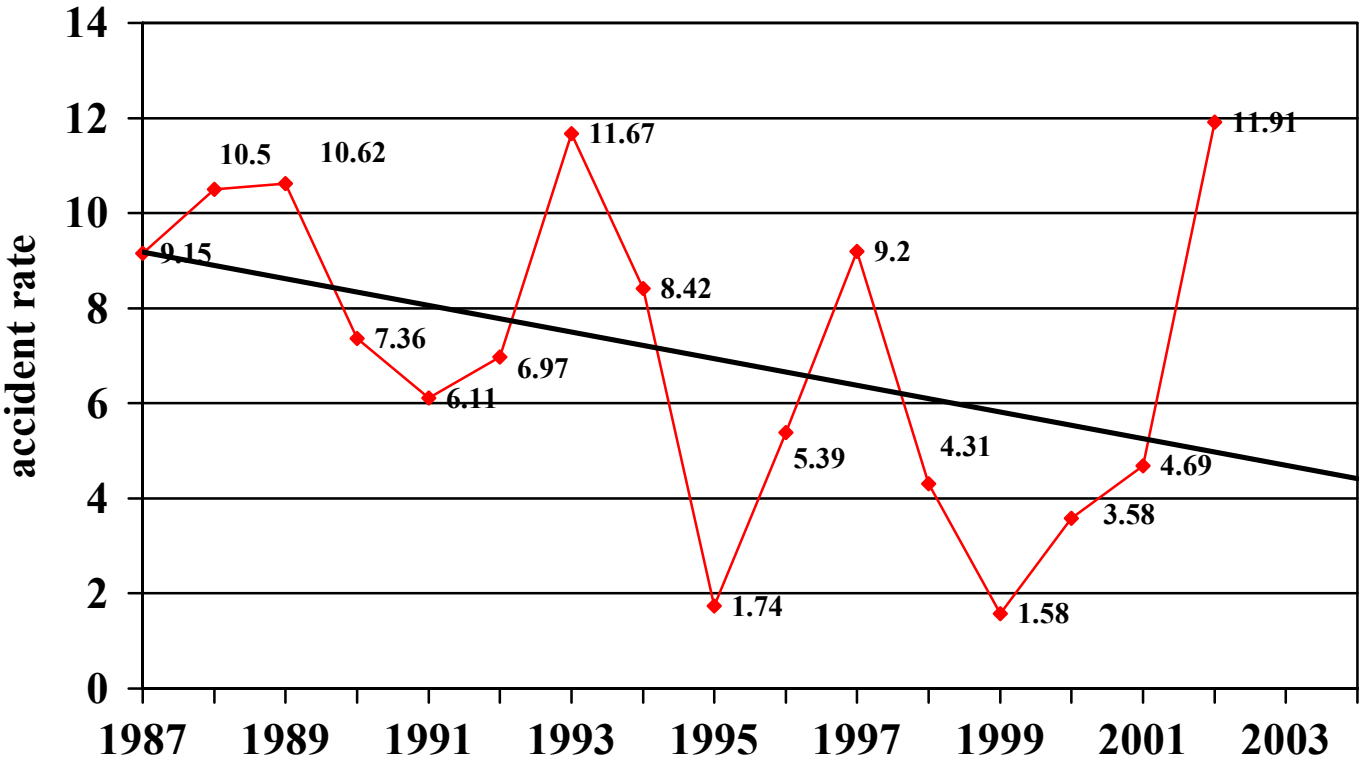
- ✓ Aerial delivery of firefighters by parachute, rappel line, or on site landing
- ✓ Air tactical command and control
- ✓ Firefighter transport
- ✓ Surveillance, reconnaissance, and intelligence gathering
- ✓ Aerial delivery of fire retardant and water

Aircraft Program Administration

Approximately 160 employees at the Washington Office and Regional levels administer the Forest Service aviation program. The national staff is located in Washington D.C. and at the National Aviation Safety Center in Boise, Idaho. The vast majority of aviation personnel are located at nine regional operations centers around the United States, providing day-to-day operational oversight and program guidance.

The Forest Service annually operates approximately 850 aircraft. These include government owned, chartered, leased, and contractor operated aircraft. The Forest Service owns approximately 250 aircraft and operates 44 aircraft (42 fixed-wing and 2 helicopters.) Over 200 Forest Service owned aircraft are operated by numerous states under the Federal Excess Personal Property (FEPP) program. Approximately 800 helicopters and fixed wing aircraft of various makes and models are chartered, leased or contracted including a vintage fleet of multi-engine airtankers. The aircraft are inspected and "carded" for government use by interagency inspectors, and are flown and maintained by the contractors.

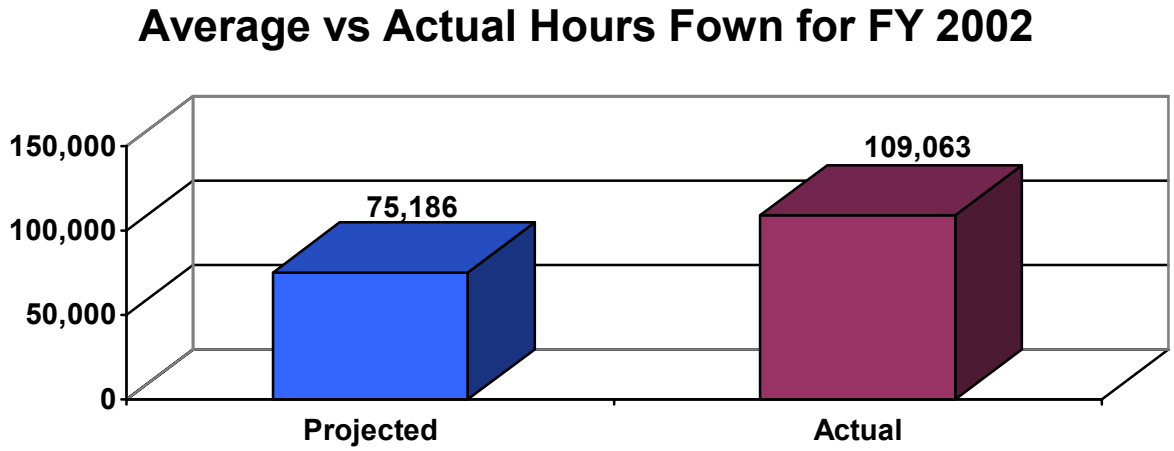
USFS Aircraft Accident History

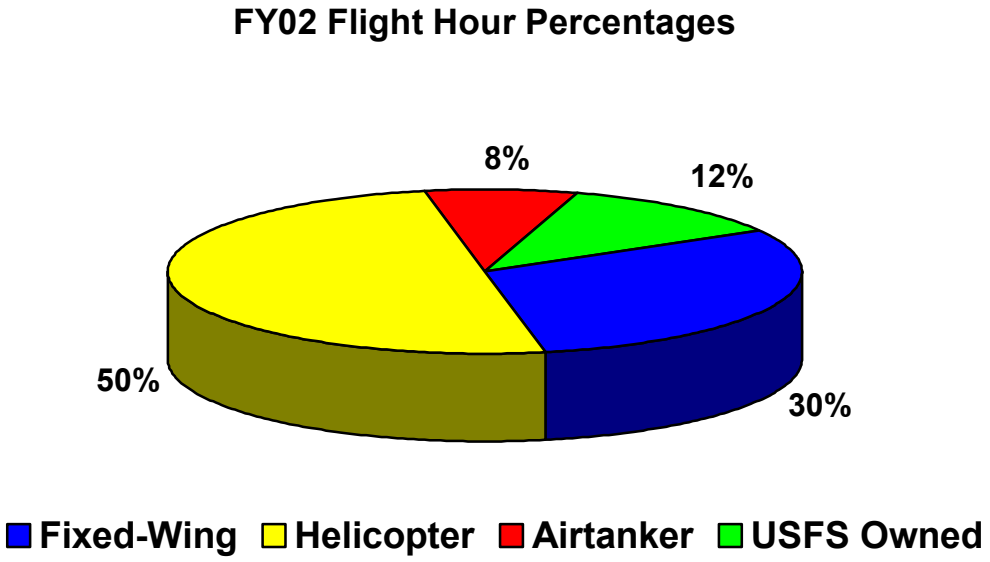


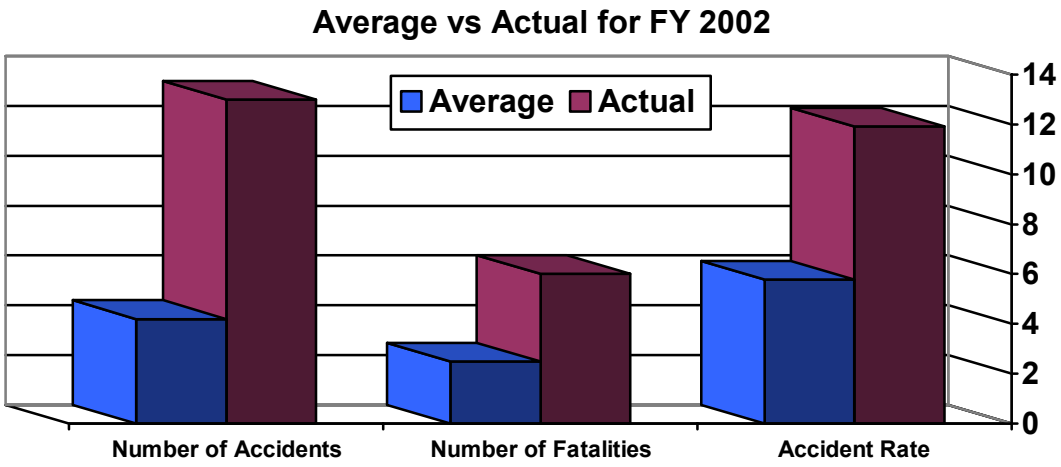
FY 2002 Accident Statistics

Aircraft Type	Hours	Number of Accidents	Accident Rate	Number of Fatal Accidents	Fatal Accident Rate	Number of Fatalities	Fatality Rate
Fixed-Wing	33,011	1	3.02	0	0	0	0
Helicopter	54,427	8	14.69	1	1.83	1	1.83
Airtanker	8,573	2	23.32	2	23.32	5	58.32
USFS Owned	13,052	2	15.32	0	0	0	0
Total	109,063	13	11.91	3	2.75	5	4.58

The actual hours flown in FY 2002 were above the average number of hours (75,186). Analysis of the data shows an increase (+33,877) in total number of hours flown.



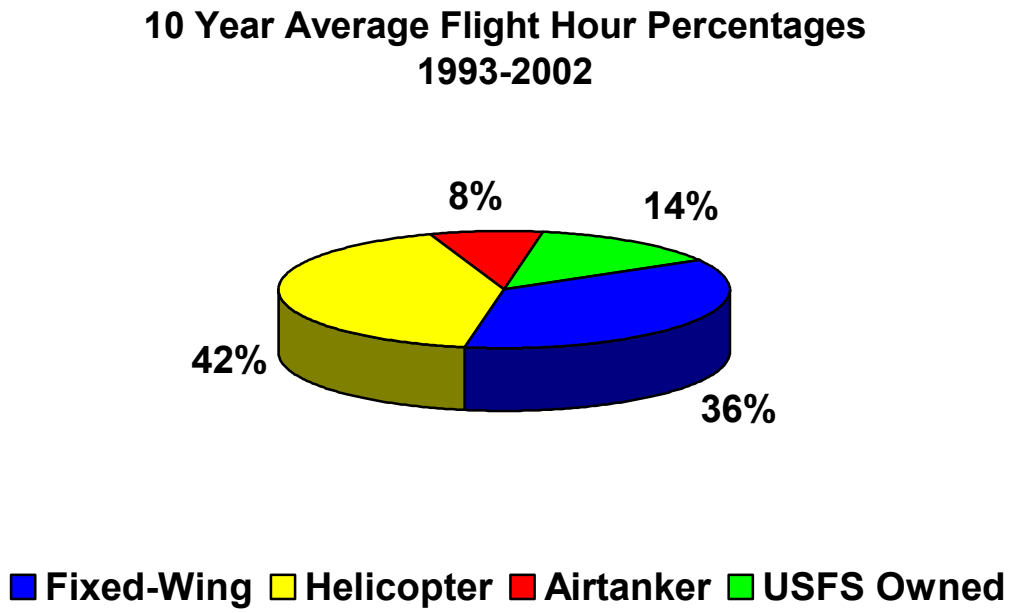




Comparison of Averages FY1993-2002			
	Average	Actual	Comparison
Hours flown	78,916	109,063	+30,147
Number of Accidents	5.1	13	+7.9
Number of Fatalities	1.5	6	+4.5
Accident Rate	6.46	11.91	+5.45

10-Year Statistics

Flight Hours:					
Fiscal Year	**Fixed Wing**	**Helicopter**	**Airtanker**	**USFS Owned**	**Total**
2002	33,011	54,427	8,573	13,052	109,063
2001	26,580	39,497	7,832	11,241	85,150
2000	34,976	53,145	10,616	12,749	111,486
1999	21,873	25,174	6,069	10,019	63,135
1998	32,416	24,423	3,685	9,055	69,579
1997	16,753	16,295	2,801	7,608	43,457
1996	31,919	36,307	8,407	11,648	88,281
1995	23,406	20,031	4,154	9,883	57,474
1994	44,995	49,200	10,100	14,405	118,700
1993	19,824	12,026	1,947	9,037	42,834
10-year totals	285,753	330,525	64,184	108,697	789,159
Averages	28,575	33,053	6,418	10,870	78,916

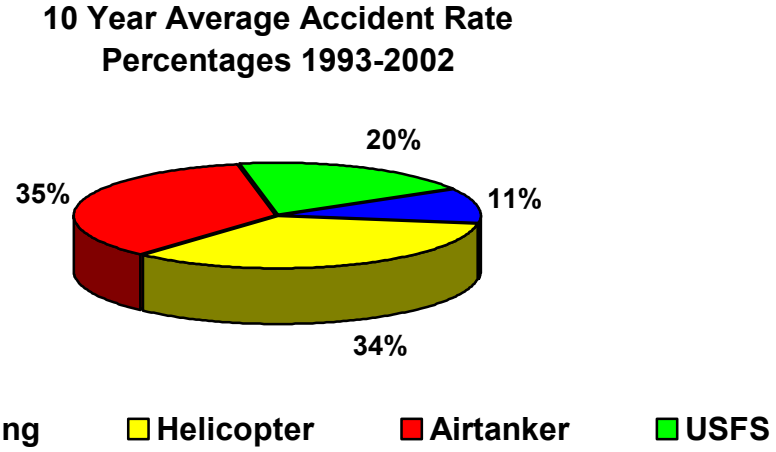


Accident Rates

Year	Number of Accidents	Accident Rate	Fixed-Wing Accident Rate	Helicopter Accident Rate	Airtanker Accident Rate	USFS Owned Accident Rate
2002	13	11.91	3.02	14.69	23.32	15.32
2001	4	4.69	3.76	5.06	0	0
2000	4	3.58	2.85	3.76	0	7.84
1999	1	1.58	0	3.97	0	0
1998	3	4.31	3.08	4.09	27.14	0
1997	4	9.2	0	24.55	0	0
1996	5	5.66	0	11.02	0	8.59
1995	2	1.74	0	0	24.07	10.12
1994	10	8.42	2.22	14.23	9.9	6.94
1993	5	11.67	15.13	8.31	51.36	0
10-year Average	5.1	6.46	2.79	9.07	9.34	5.18

Fatal Accident and Fatality Rates

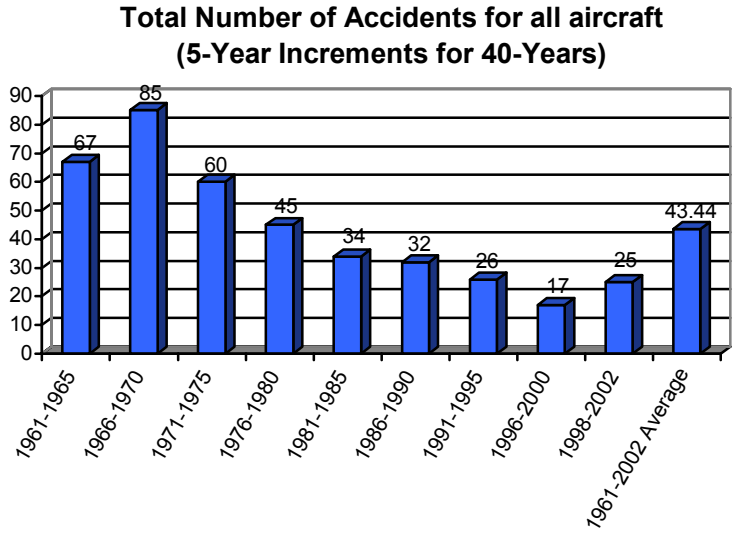
Year	Fatal Accidents	Fatal Accident Rate	Number of Fatalities	Fatality Rate
2002	3	2.75	5	4.58
2001	0	0	0	0
2000	1	0.89	2	1.79
1999	0	0	0	0
1998	2	2.87	4	5.75
1997	1	4.6	2	4.6
1996	0	0	0	0
1995	2	1.74	3	5.22
1994	4	2.53	6	5.05
1993	2	4.67	6	14.01
10-year Average	1.5	1.9	2.8	3.54

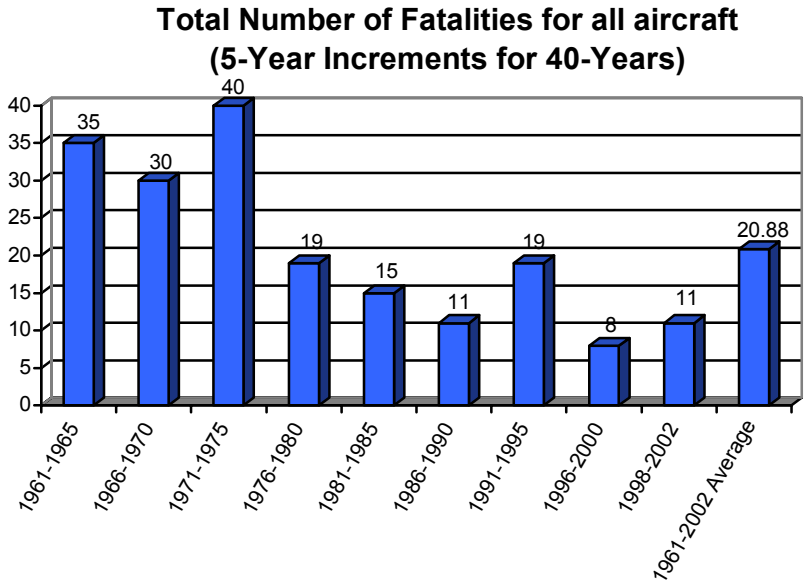


Forest Service Aircraft
Accident Statistics in 5-Year Increments

Observations

The 1998-2002 5-year increment shows an increase of hours flown over the previous 5-year increments. The total number of accidents in 5-year increments shows a steady decline, until the last period. The total number of fatalities in 5-year increments shows a major decline in the 80's from the 70's.



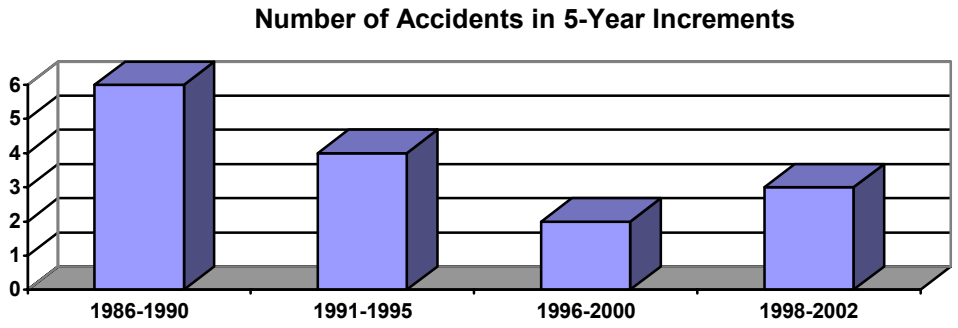


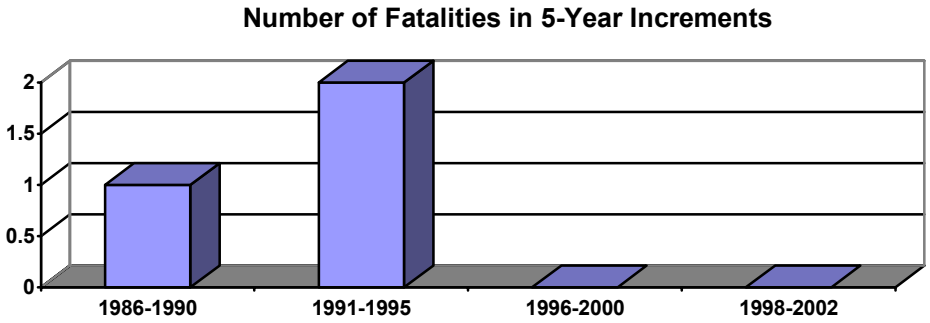
USFS Owned Aircraft

Forest Service owned aircraft accounted for approximately twelve percent of the total hours flown in FY 2002; the ten-year average is fourteen percent. Accident rates had steadily declined until FY02 and fatality rates continue to decrease.

USFS Owned 10-Year Statistics							
Fiscal Year	**Hours Flown**	**Accidents**	**Accident Rate**	**Fatal Accidents**	**Fatal Accident Rate**	**Fatalities**	**Fatality Rate**
2002	13,052	2	15.32	0	0	0	0
2001	11,241	0	0	0	0	0	0
2000	12,749	1	7.84	0	0	0	0
1999	10,019	0	0	0	0	0	0
1998	9,055	0	0	0	0	0	0
1997	7,608	0	0	0	0	0	0
1996	11,648	1	8.58	0	0	0	0
1995	9,883	1	10.11	1	10.11	1	10.11
1994	14,405	1	6.94	0	0	0	0
1993	9,037	0	0	0	0	0	0
Total	108,697	6		1		1	
Average	10,870	0.6	5.51	0.1	.91	0.1	1.01

USFS Owned 15-Year Statistics in 5-Year Increments					
Year	**Hours**	**Accidents**	**Fatalities**	**Accident Rate**	**Fatality Rate**
1998-2002	56,116	2	0	5.34	0
1996-2000	51,616	2	0	3.87	0
1991-1995	52,782	4	2	7.58	3.79
1986-1990	53,466	6	1	11.23	1.87
Average	53,495	3.5	.75	6.54	1.4





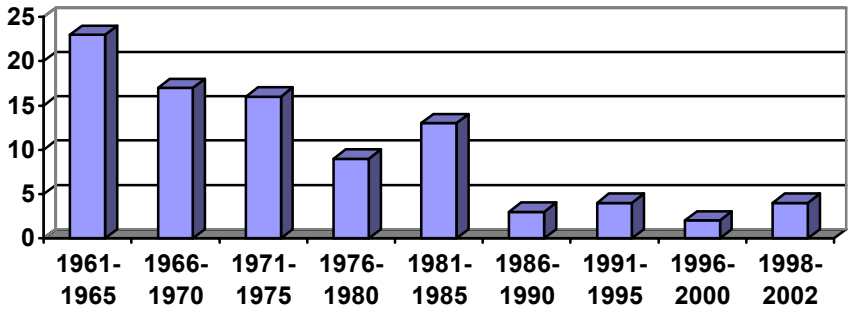
Fixed-Wing (Contract)

Fixed-Wing aircraft accounted for 30 percent of the total hours flown in FY 2002; the ten-year average is 36 percent. There were 33,011 hours flown in FY 2002, which is above the ten-year average of 28,575. Both accident and fatality rates have decreased over the past 40 years.

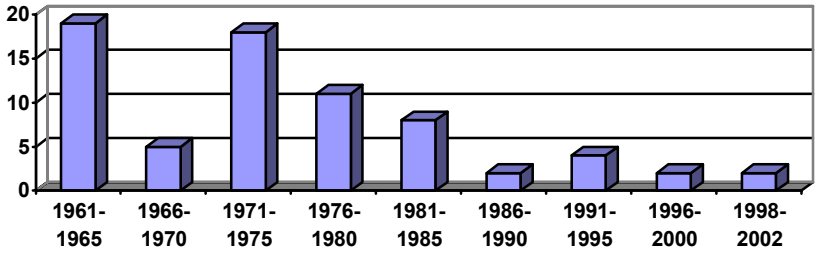
Fixed-Wing 10-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2002	33,011	1	3.02	0	0	0	0
2001	26,580	1	3.76	0	0	0	0
2000	34,976	1	2.85	1	2.85	2	5.71
1999	21,873	0	0	0	0	0	0
1998	32,416	1	3.08	0	0	0	0
1997	16,753	0	0	0	0	0	0
1996	31,919	0	0	0	0	0	0
1995	23,406	0	0	0	0	0	0
1994	44,995	1	2.22	0	0	0	0
1993	19,824	3	15.13	1	5.04	4	20.17
Total	285,753	8		2		6	
Average	28,575	0.8	2.79	0.2	0.69	0.6	2.09

Fixed-Wing 15-Year Statistics in 5-Year Increments					
Year	**Hours**	**Accidents**	**Fatalities**	**Accident Rate**	**Fatality Rate**
1998-2002	148,856	4	2	2.68	1.34
1996-2000	137,937	2	2	1.44	1.44
1991-1995	144,074	4	4	2.78	2.78
1986-1990	175,418	3	2	1.71	1.14
Average	151,571	3.25	2.5	2.14	1.64

Number of Accidents in 5-Year Increments



Number of Fatalities in 5-Year Increments

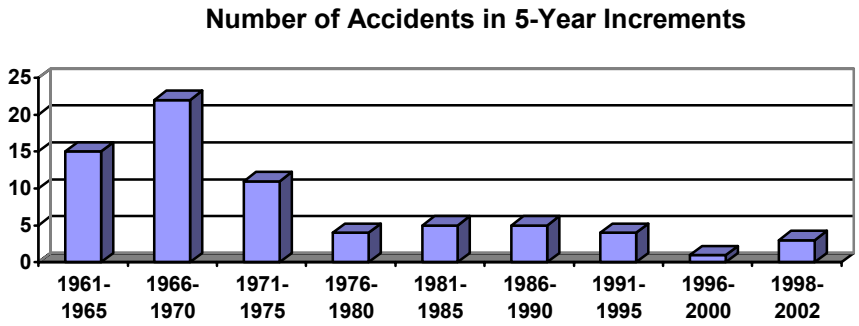


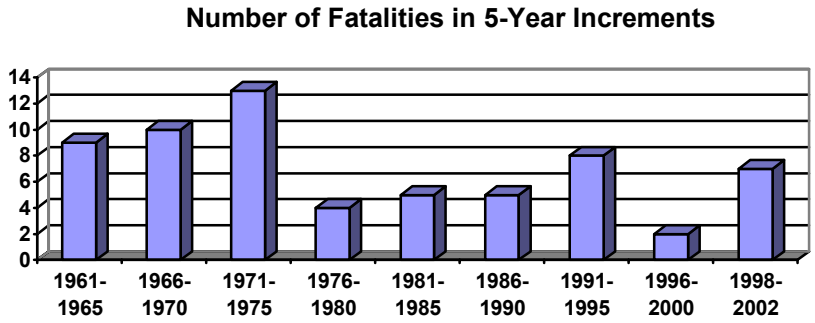
Airtankers

Airtankers accounted for eight percent of the total hours flown in FY 2002; which is the ten year average. Although they fly the least amount of hours, they have the highest accident rate. FY 2002 was the most disastrous year for the airtanker program in recent history.

Airtanker 10-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2002	8,573	2	23.32	2	23.32	5	58.32
2001	7,832	0	0	0	0	0	0
2000	10,616	0	0	0	0	0	0
1999	6,069	0	0	0	0	0	0
1998	3,685	1	27.13	1	27.13	2	54.27
1997	2,801	0	0	0	0	0	0
1996	8,407	0	0	0	0	0	0
1995	4,154	1	24.07	1	24.07	2	48.14
1994	10,100	1	9.9	1	9.9	2	19.80
1993	1,947	1	51.36	1	51.36	2	102.72
Total	64,184	6		6		13	
Average	6,418	0.6	9.34	0.6	9.34	1.3	20.25

Airtanker 15-Year Statistics in 5-Year Increments					
Year	Hours	Accidents	Fatalities	Accident Rate	Fatality Rate
1998-2002	36,775	3	7	8.15	13.59
1996-2000	31,578	1	2	3.16	6.33
1991-1995	24,130	4	8	16.58	33.15
1986-1990	21,529	5	5	23.22	23.22
Average	28,503	3.25	5	11.40	17.54





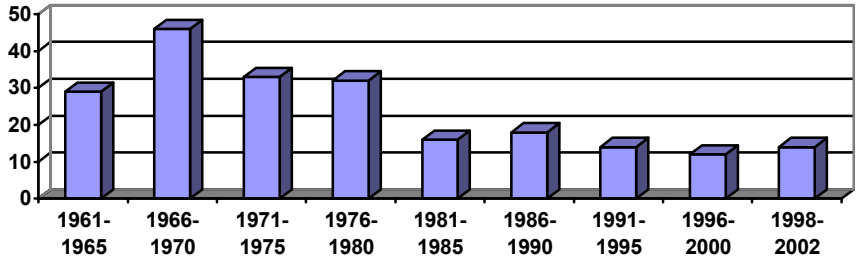
Helicopters

Helicopters accounted for the largest percent of the total hours flown in FY 2002. They flew 50 percent of the total hours flown in FY 2002. The 10-year average is 42 percent. The number of helicopter accidents in FY 2002 was the highest in recent history as well. The average number of accidents is three; we experienced 8 in FY 2002.

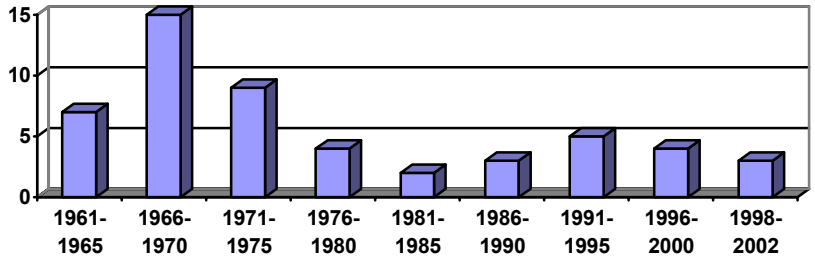
Helicopter 10-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2002	54,427	8	14.69	1	1.83	1	1.83
2001	39,497	2	5.06	0	0	0	0
2000	53,145	2	3.76	0	0	0	0
1999	25,174	1	3.97	0	0	0	0
1998	24,423	1	4.09	1	4.09	2	8.18
1997	16,295	4	24.54	1	6.13	2	12.27
1996	36,307	4	11.01	0	0	0	0
1995	20,031	0	0	0	0	0	0
1994	49,200	7	14.22	3	6.09	4	8.13
1993	12,026	1	8.31	0	0	0	0
Total	330,525	30		6		9	
Average	33,053	3.0	9.07	0.6	1.81	0.9	2.72

Helicopter 15-Year Statistics in 5-Year Increments					
Year	**Hours**	**Accidents**	**Fatalities**	**Accident Rate**	**Fatality Rate**
1998-2002	196,666	14	3	7.11	1.01
1996-2000	155,344	12	4	7.72	2.57
1991-1995	135,262	14	5	10.35	3.7
1986-1990	108,854	18	3	16.55	2.76
Average	149,032	14.50	3.75	9.72	251

Number of Accidents in 5-Year Increments



Number of Fatalities in 5-Year Increments



SafeCom Summary

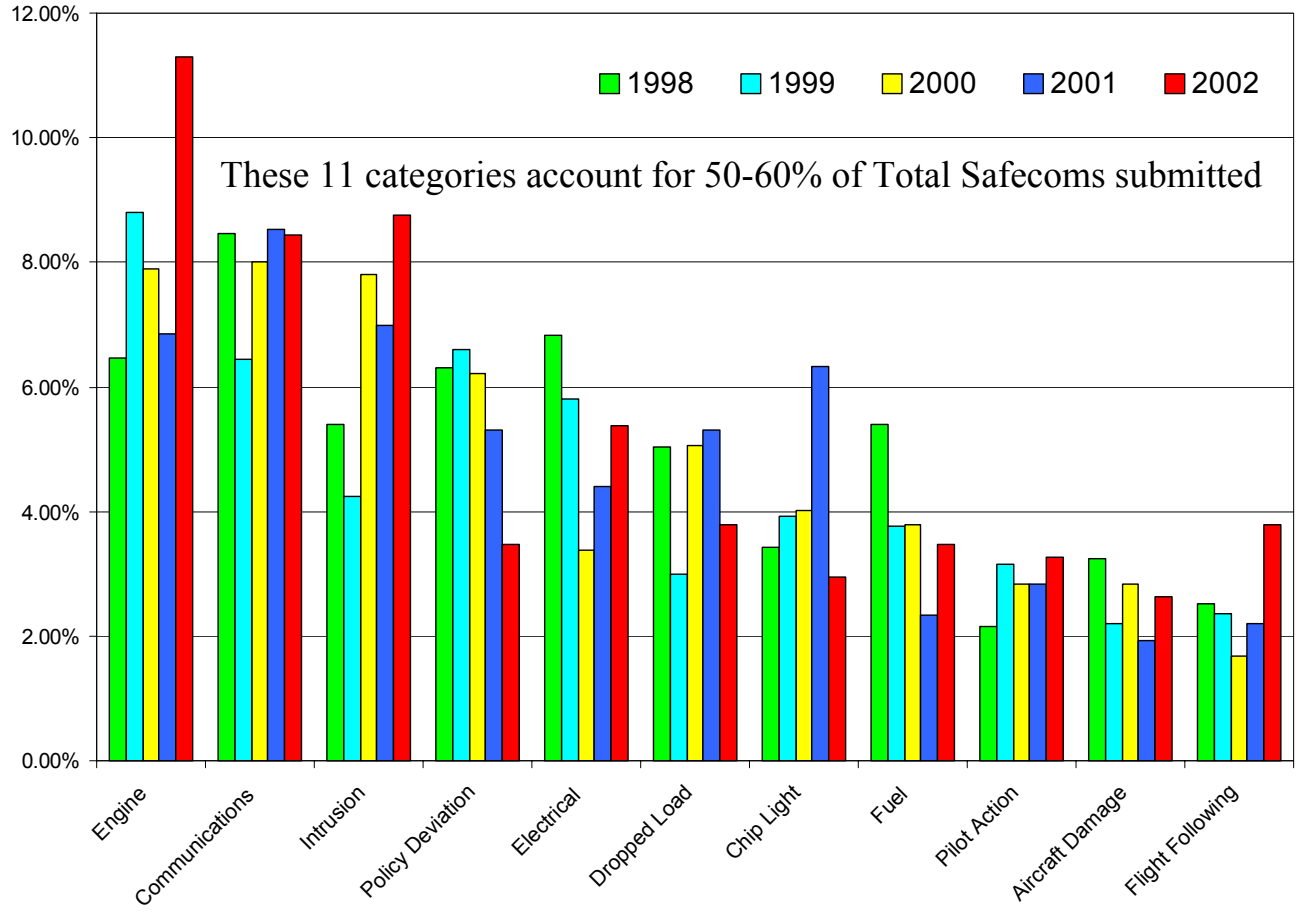
The SafeCom system satisfies Federal Aviation Regulations requirements for incident reporting, but more importantly, it provides management and front line supervisors with near real time trend information. Armed with data on emerging safety and effectiveness challenges, operators and management can take appropriate actions before a mishap occurs. The National Safety Office provided monthly safety summaries to the field by providing hard copy and internet access to vital risk management data.

These charts trend the SafeCom data posted on the Forest Service Aviation Internet site at http://www.fs.fed.us/fire/av_safety/index.html. The average of total numbers of submitted SafeCom's is 613 per year. The FY 2002 number is significantly higher at 962. The total number of SafeCom's submitted fluctuates with the total number of hours flown.

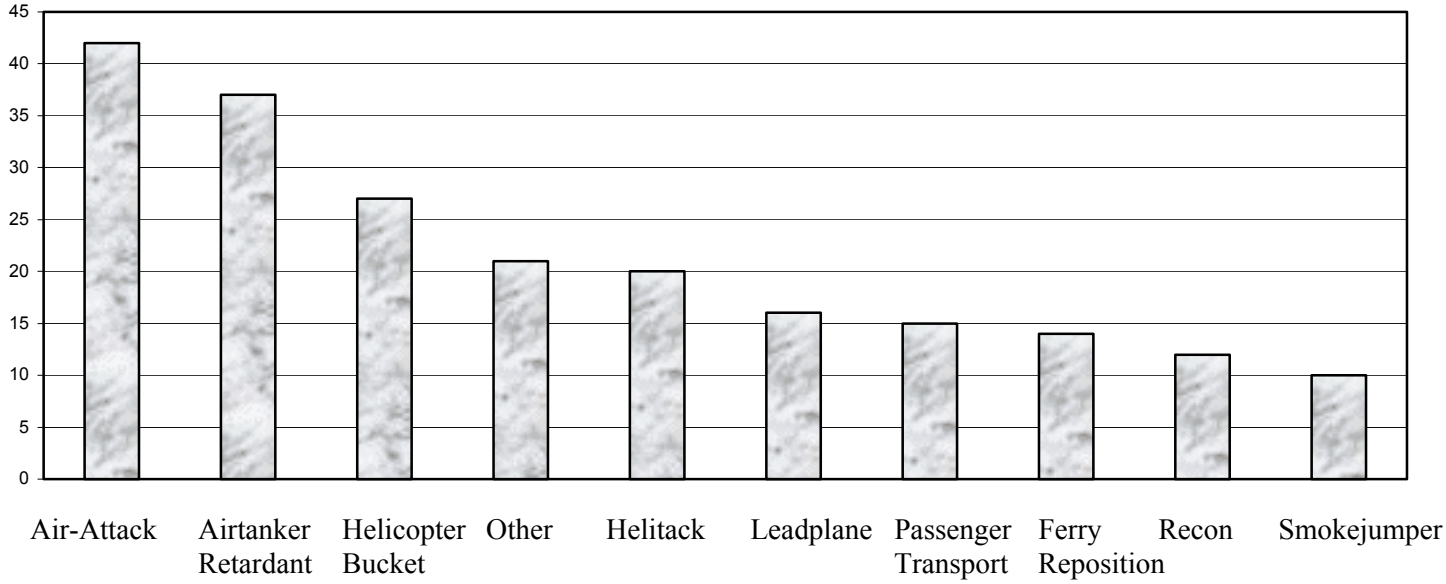
Again, this year no big surprises, the five most reported SafeCom's were engine, communications, intrustions, electrical and dropped loads. In an analysis of the past five years policy deviation was in the top five most reported, which decreased significantly in FY 2002.

FY 2002 SafeCom Information		
Aircraft Type	Number	Percent of all SafeCom's
Fixed Wing	197	20.5%
Helicopter	515	53.5%
Airtanker	135	14%
SEAT	13	1.4%
USFS Owned	62	6.4%
Other	40	4.2%
Total	962	100%
Category	Number	Percent of all SafeCom's
Airspace	130	14%
Hazard	290	30%
Incident	147	15%
Maintenance	395	41%
Total	962	100%

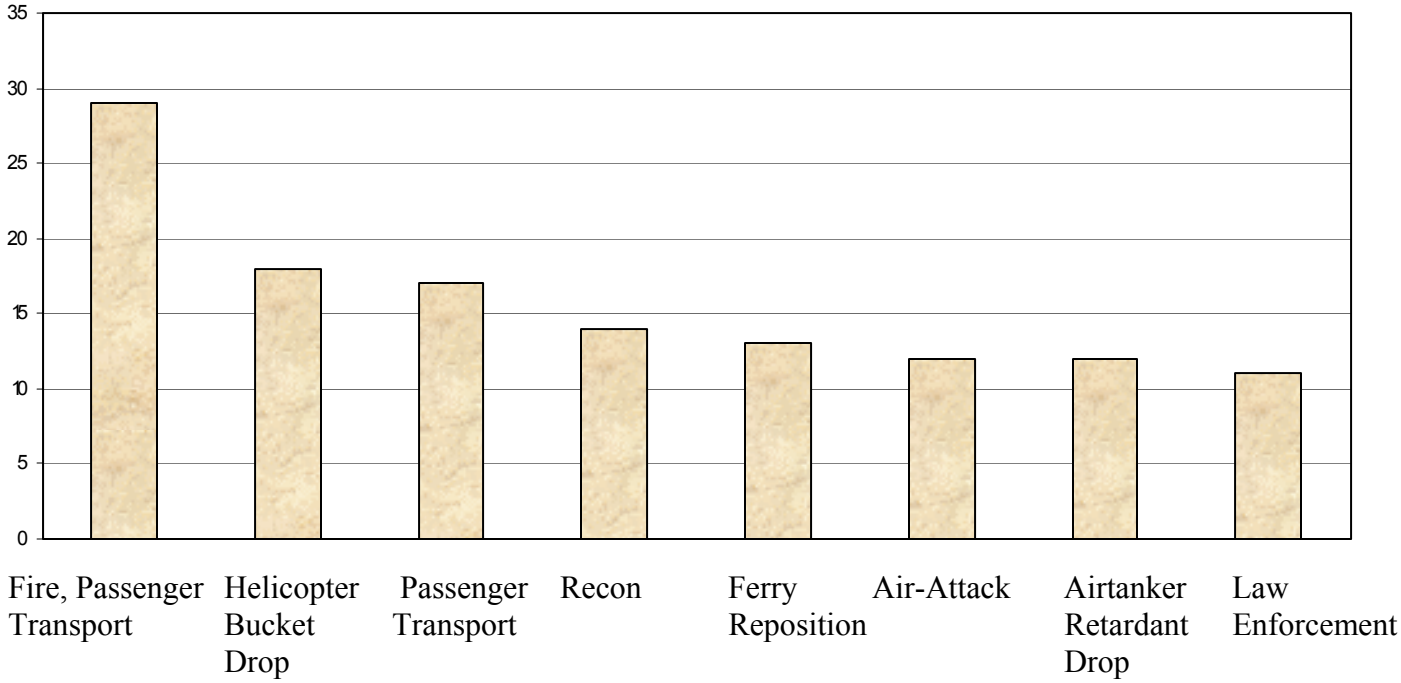
Top Eleven SafeCom Categories Reported For Five Years



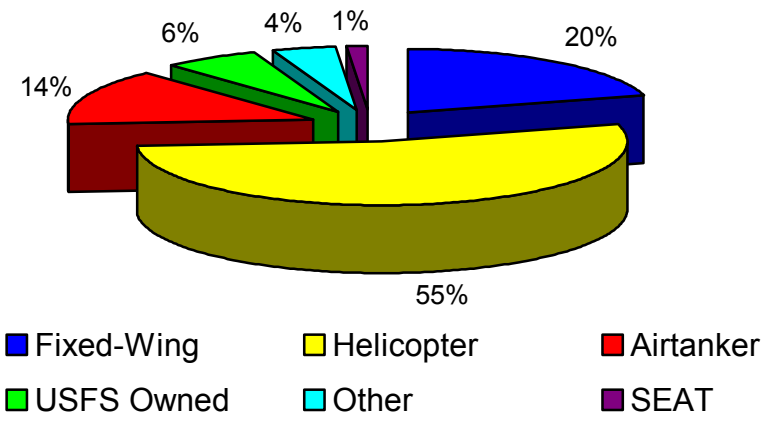
Communications SafeCom's Reported by Mission for 5 years



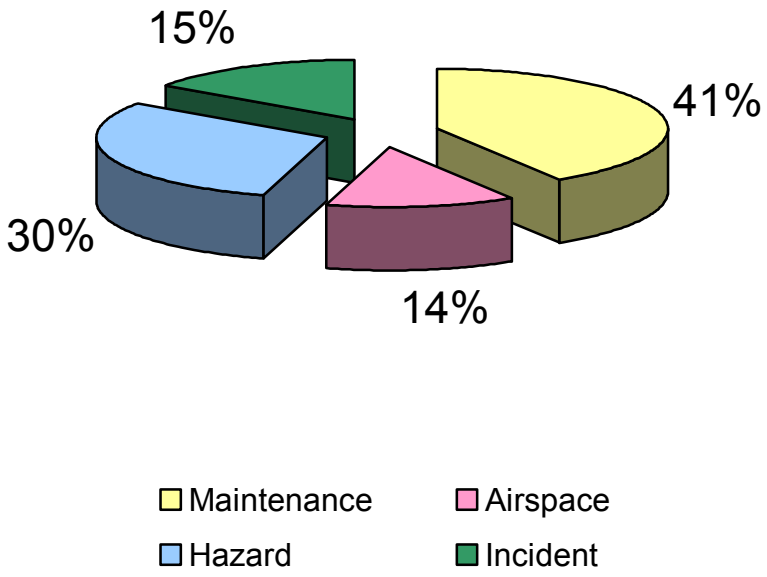
Policy Deviation SafeCom's Reported by Mission for 5 years



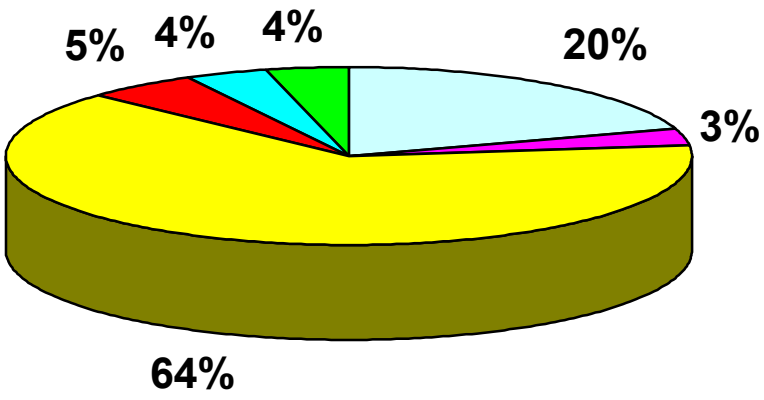
SafeCom's by Aircraft Type



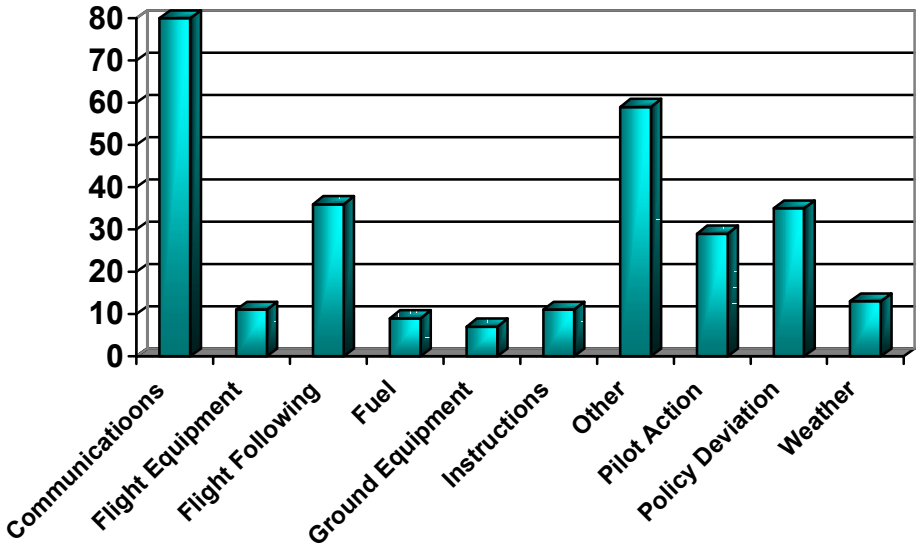
SafeCom's by Category



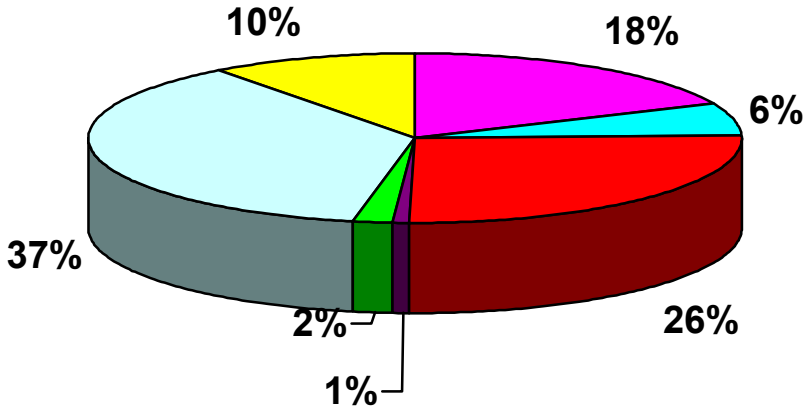
Airspace SafeCom's

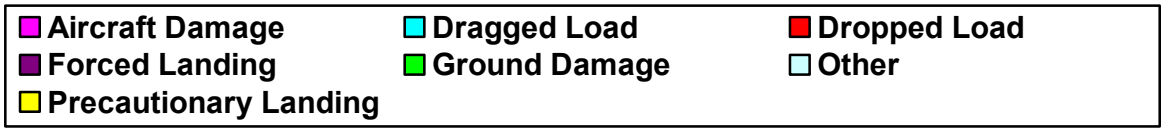


Hazard SafeCom's

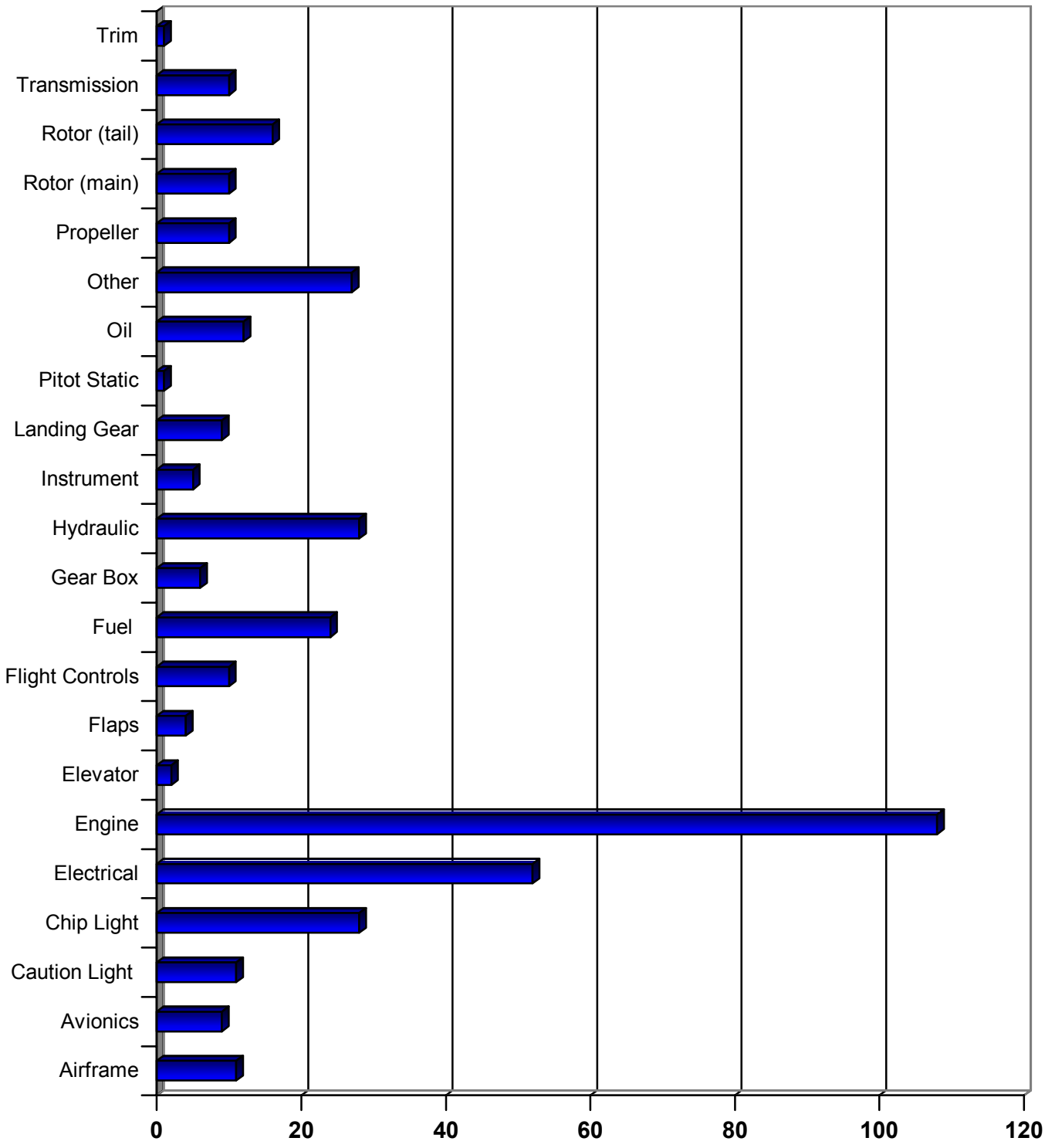


Incident SafeCom's



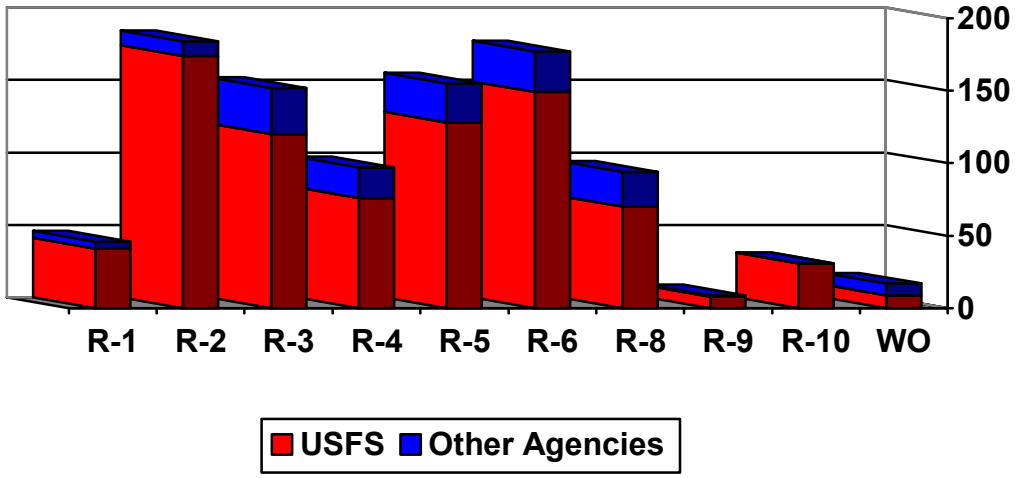


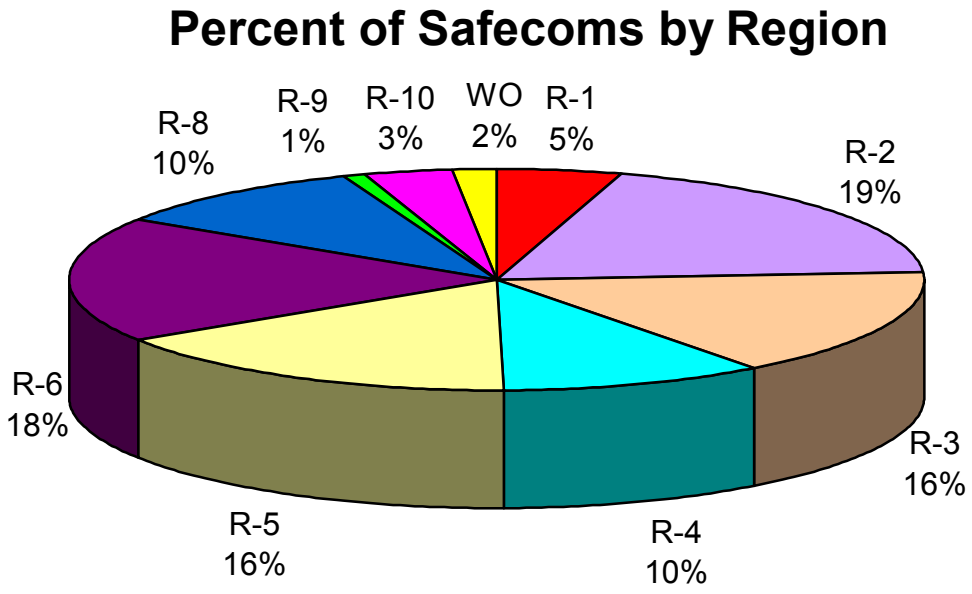
Maintenance SafeComs



SafeCom's by Region

The chart below shows the number of SafeComs by region (FS and other agency) reported in FY 2001. There were a total of 962 SafeComs reported, 806 were USFS and 156 were other agencies.





SafeCom's by Category and Region					
Region	Airspace	Hazard	Incident	Maintenance	Total
Region 1	2	12	9	23	46
Region 2	20	65	26	73	184
Region 3	31	42	14	65	152
Region 4	19	27	17	34	97
Region 5	18	39	19	79	155
Region 6	21	55	35	66	177
Region 8	16	22	20	36	94
Region 9	3	4	0	2	9
Region 10	0	13	6	12	31
WO	0	11	1	5	17
Total	130	290	147	395	962

SafeCom's by Aircraft Type and Region							
Region	Fixed-Wing	Helicopter	Airtanker	SEAT	USFS Owned	N/A	Total
Region 1	11	24	5	0	5	1	46
Region 2	28	100	33	3	11	9	184
Region 3	43	61	32	4	7	5	152
Region 4	15	53	14	1	8	6	97
Region 5	29	99	23	0	2	2	155
Region 6	32	101	18	4	16	6	177
Region 8	23	52	10	0	5	4	94
Region 9	6	1	0	0	2	0	9
Region 10	16	15	0	0	0	0	31
WO	4	4	0	1	6	2	17
Total	207	510	135	13	62	35	962

2002 Accident Review

Human actions are cited as causal factors in the majority of aircraft accidents and incidents.

The purpose of this class is to present an overview of the various components which constitute Human Factors and how their failures may have resulted in these USFS accidents.

Over the past 40 years, more than 80% of accidents and incidents may have been preventable through the proper application of Human Factors principles and a change in Aviation Safety Culture.

The Forest Service experienced thirteen accidents in the 2002 fiscal year. There were 6 fatalities and 3 serious injuries.

NTSB 831.13 Flow and dissemination of accident or incident information.
(b)…Parties to the investigation may relay to their respective organizations information necessary for purposes of prevention or remedial action. …However, no (release of) information… without prior consultation and approval of the NTSB.

Avoid discussion of "Probable Cause", unless determined and published by the NTSB

For accident prevention purposes only.

In Memory of


Steven Wass
Craig Labare
Michael Davis


N7620C
123
Rick Schwartz
Milt Stollak


Gordon Knight

Great Gulf Fire, Daniel Boone NF
November 12, 2001

Bell 407
Mission: Water Bucket Operations
Damage: Substantial
Injuries: One Serious
Procurement: CWN
NTSB ID: NYC02TA026

The helicopter was conducting bucket operations when the bucket, which was attached to the cargo hook came into contact with the tail rotor of the aircraft.

The total length of cable and bucket was 25 feet. The distance from the cargo hook to the tail rotor blade was 20 feet 2 inches.

Stocking Fire, Francis Marion NF
December 21, 2001

Bell 206

Mission: Water Bucket Operations
Damage: Substantial
Injuries: None
Procurement: CWN
NTSB ID: ATL02TA021

The pilot was attempting a water-dip when the cable slipped over the toe of the skid. As the pilot began a climb from the pond, the helicopter rolled right and collided with the water.

The pilot could not recover from the unbalance caused by the Bambi Bucket cable draped over the right skid and the forward acceleration of the aircraft.

The pilot was wearing a PFD. He exited the aircraft from underwater and escaped without injury.

Maintenance Test Flight, Boise, ID
January 2, 2002

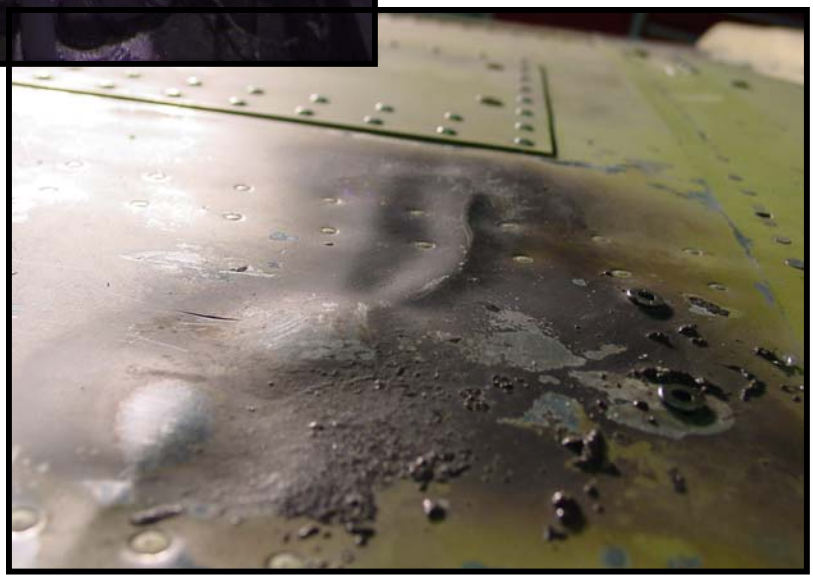
Beech 58P Baron

Mission: Maintenance Test Flight
Damage: Substantial
Injuries: None
Procurement: Fleet
NTSB ID: SEA02FA023

The pilot noticed flames from the engine nacelle just after liftoff.

He radioed the tower and notified them of the situation and that he was landing the aircraft on the departure runway.

The NTSB determined the probable cause(s) of this accident as follows:
Improper clearance between an alternator wire and a pneumatic line and fuel fumes.
The alternator wire chafe and arcing were factors.



Ferry Flight, Region 8 to Region 1
April 5, 2002

Douglas DC-3
Mission: Ferry Flight
Damage: Substantial
Injuries: None
Procurement: Fleet
NTSB ID: DEN02TA037

The Douglas DC-3C, N115Z, was substantially damaged when its left main landing gear collapsed while standing at Natrona County International Airport.

The landing gear hydraulic pressure was high. The pilot asked the copilot to cycle the landing gear handle to the down position in an attempt to lower the pressure. The copilot inadvertently raised the landing gear.

Ocala, NF
April 9, 2002

Aerospatiale SA 319B
Mission: Search & rescue
Damage: Substantial
Injuries: Two
Procurement: Exclusive Use
NTSB ID: MIA02TA082

U.S. Forest Service personnel dispatched the helicopter with inoperative brakes for the sole purpose of searching for a possible downed aircraft. A USFS employee was on board.

The pilot flying was assured that the chief pilot would be standing by with chocks upon returning to the helibase.

Upon landing at the helibase, the aircraft began to roll forward on the ramp. The pilot attempted to gain control of the aircraft by lifting to a hover when the main rotor struck the tail boom.

Cannon Fire, Humboldt-Toiyabe NF
June 17, 2002

Lockheed C-130
Mission: Retardant Drop
Damage: Destroyed
Injuries: 3 Fatal
Procurement: Exclusive
NTSB ID: LAX02GA201

N130HP broke apart in flight while executing a fire retardant delivery.

During the delivery, the wings separated from the fuselage near the wing roots. Subsequently, fire was ignited in the area of the separated wings.

Preliminary findings have found several cracks in the center wing box lower skin.

Specifically, the area of the wing that separated failed in fatigue as a result of the promulgation of the cracks.

San Bernardino NF
June 20, 2002

Cessna 337
Mission: Point to Point
Damage: Destroyed
Injuries: One Minor
Procurement: CWN
NTSB ID: LAX02TA207

N2671S was destroyed by fire after a hard landing to a residential road following a loss of engine power to both engines while on approach.

The pilot reported that both engines lost total power. Unable to reach the runway, the pilot executed a forced landing to a residential road.

Due to a compromise of the evidence, the cause of the loss of power is undetermined at this time.

Big Elk Fire, Arapaho-Roosevelt NF
July 18, 2002

Consolidated PB4Y
Mission: Retardant Drop
Damage: Destroyed
Injuries: 2 Fatal
Procurement: Exclusive Use
NTSB ID: DEN02GA074

T-123, N7620C, was destroyed when it impacted into mountainous terrain.

Prior to the impact, the airplane's left wing separated and aircraft control was lost.

Preliminary findings of the wing indicated that the left wing, forward spar, lower spar cap assembly failed in fatigue.

The copilot of T-161 said T-123 was in his base turn for the drop when the left wing separated from the airplane.

"The aircraft then went into a rotation and impacted the ground."

Big Elk Fire, Arapaho-Roosevelt NF
July 30, 2002

Aerospatiale SA-315B
Mission: Water Bucket Operations
Damage: Substantial
Injuries: One Fatal
Procurement: CWN
NTSB ID: DEN02GA085

N3978Y was destroyed when it struck terrain. Witnesses heard the pilot give a warning over the radio: "Helicopter going down."

Witnesses heard a high-pitched whine and saw the main rotor blades turning slowly as the helicopter descended.

There was a post impact ground fire that was quickly extinguished.

Preliminary findings indicate that an engine failure may have occurred prior to the crash.

An Aviation Safety Alert was published as a result of this accident.

Beaverhead-Deerlodge NF
August 24, 2002

Bell 206L1
Mission: Water Bucket Operations
Damage: Substantial
Injuries: None
Procurement: Exclusive Use
NTSB ID: SEA02TA164

N832AH settled into trees, the helicopter was substantially damaged.

It was only after a post-flight walk around that the pilot noticed damage to both main rotor blades.

Several missions had been flown the day of the accident and the pilot was unsure as to when the damage occurred.

The pilot later said he was "heli-mopping" when he descended into the trees with the 50-foot long line. During this maneuver, the main rotor blades came in contact with trees.

Rio Grande NF
August 26, 2002

Bell 206L3
Mission: Initial Attack
Damage: Destroyed
Injuries: 1 Serious
3 Minor
Procurement: CWN
NTSB ID: DEN02TA100

N801HM collided with trees and impacted terrain during landing approach.

The pilot was seriously injured and three passengers received minor injuries.

Witnesses reported the helicopter was approaching to land in gusty wind conditions when it started spinning to the right.

San Bernardino NF
August 30, 2002

Sikorsky S-55T
Mission: Water Bucket Operations
Damage: Substantial
Injuries: None
Procurement: CWN
NTSB ID: LAX02TA267

N747A collided with terrain while attempting a precautionary landing in a dry creek bed.

A hydraulic warning light illuminated and the flight controls became stiff.

The pilot began an approach, the cyclic moved "hard over," and the pilot was unable to regain control before the rotors made contact with a rocky shelf.

A sample of hydraulic fluid was taken from the reservoir and it appeared to be severely contaminated.

The fluid was sent to a laboratory for testing.

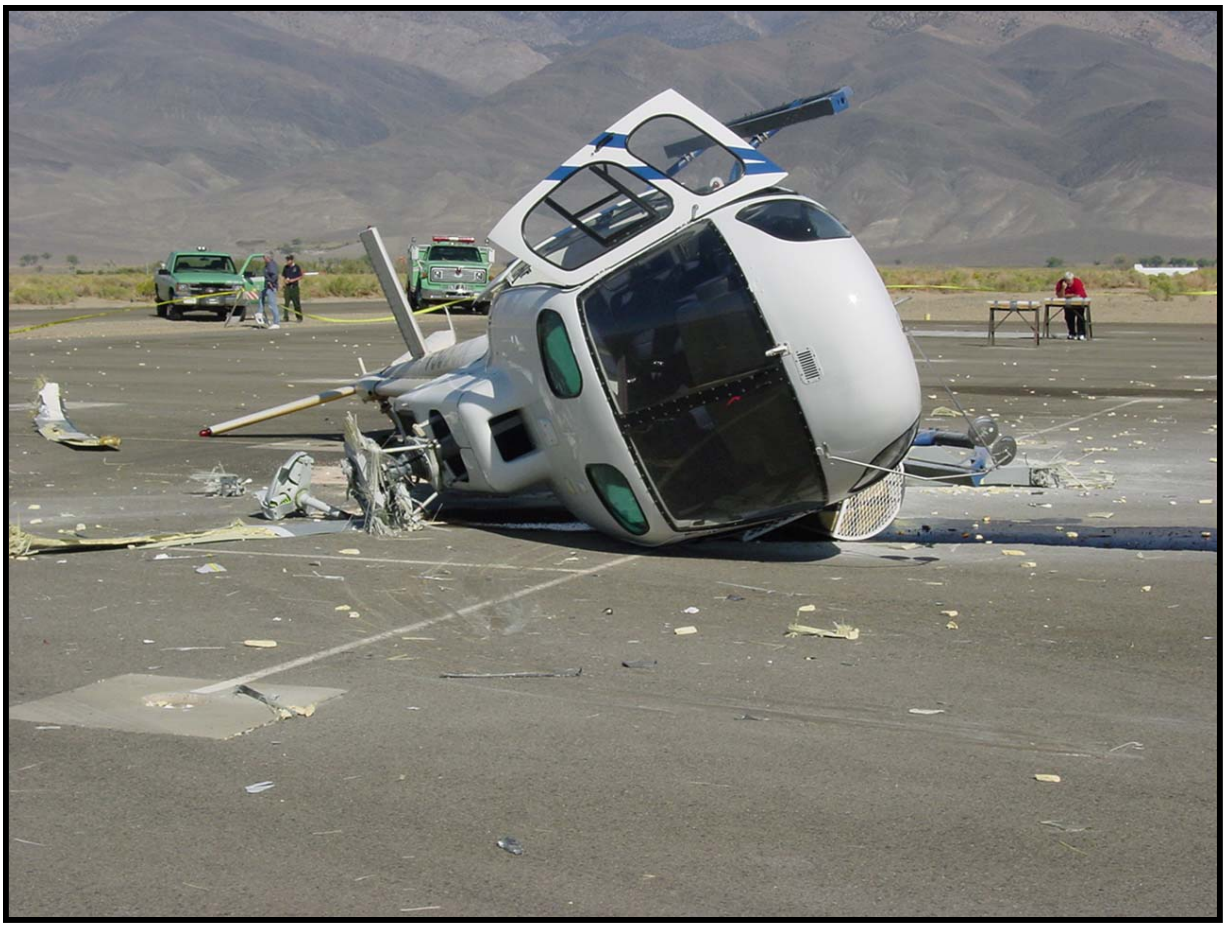
P.O. Number : PD CC# Client Code :USDAGB
Sample Date : 09/01/02 Description :1ST SAMPLE, N747A TAKEN FROM_HYD RESERVOIR
PO#91U24186

Sample was placed in graduated cylinder and allowed to separate. Two phases existed with top phase being 78% and bottom (water) phase being 22%. Karl Fischer water analysis was performed on the top phase (1.85%). Microbial Growth was detected in sample.

Test Performed	Result
Water by Karl Fischer, ASTM D6304……	18450 ppm
Microbial Growth, HL-1126 ……...	1126-2.0
Bacteria.....…..……..	NEGATIVE
Fungi.....…….	HEAVY

INYO NF
September 29, 2002

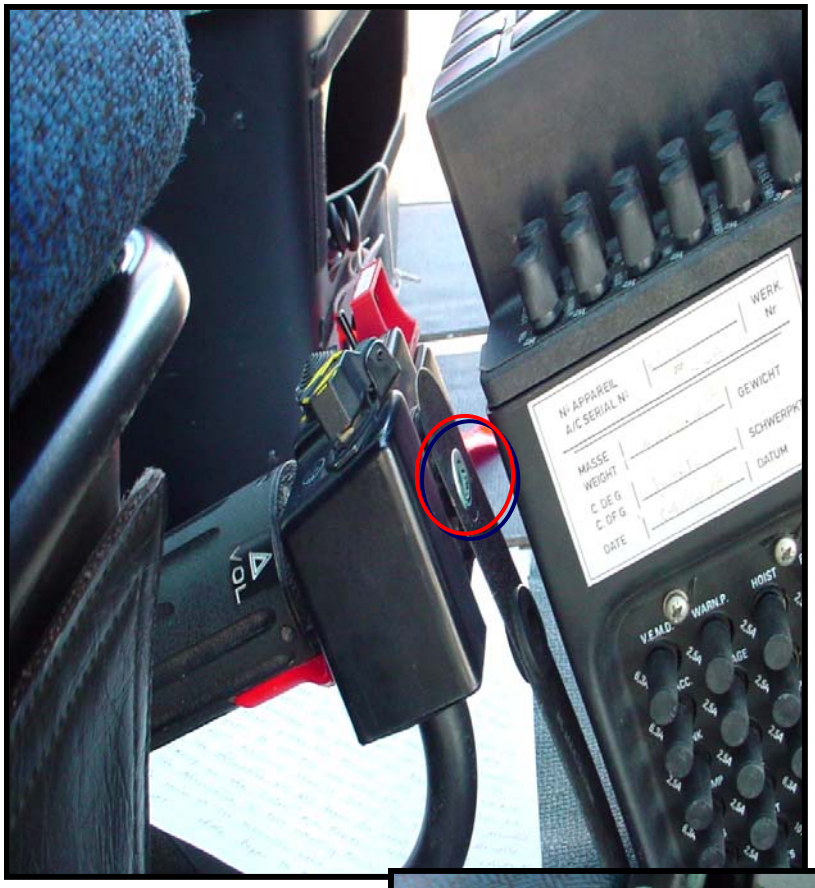
Aerospatiale AS 350 B3
Mission: Point to Point
Damage: Substantial
Injuries: None
Procurement: Exclusive Use
NTSB ID: LAX02LA299



AS350-B3, N352SA, collided with terrain while engaged in a pre-departure hydraulic flight control check.

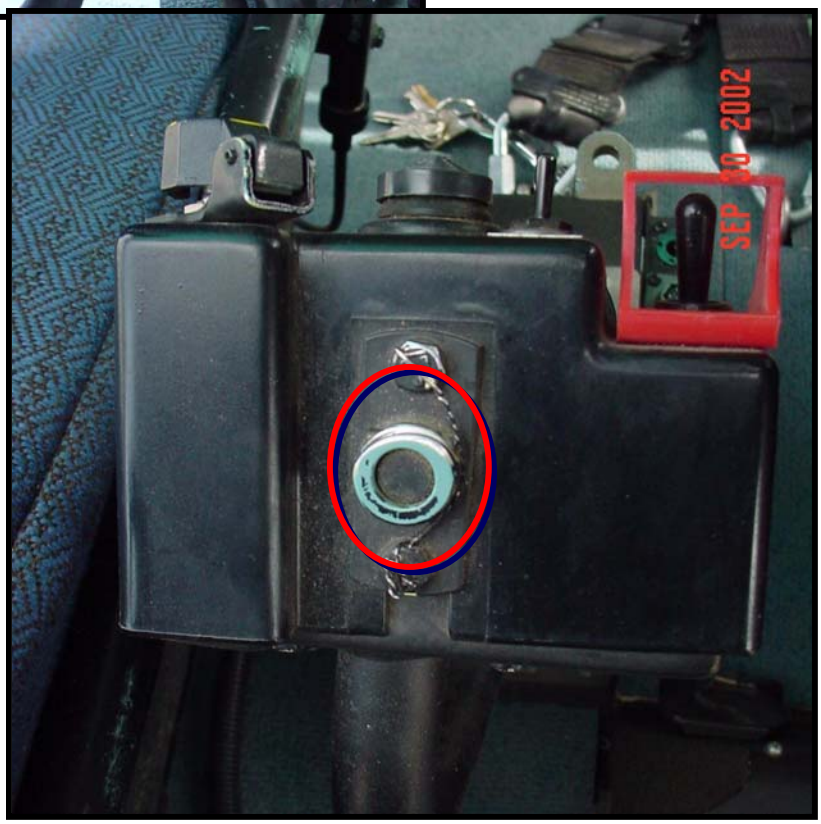
The collective had been placed in the down and locked position.

After depressing the hydraulic test switch, the pilot moved the cyclic fore and aft to confirm there was remaining pressure.



The collective indirectly rose and the helicopter moved forward in a nose down attitude.
The main rotor struck the ground and the helicopter made two revolutions before rolling over onto its side.

The collective's locking mechanism stud was worn and the collective came loose during movement of the cyclic.



Preliminary Findings

The following are Human Factors that have played a significant part in contributing to accidents in FY 2002. They are listed here as a source for study and application in future project planning and risk management.

◊ Sensory/Perceptual Factors:
- ▪ Misjudgment of distance, clearance, altitude, speed, etc.
- ▪ Loss of situational awareness
- ▪ Attention failure (e.g., failure to monitor or respond when correct information was available)
- ▪ Unintentional activation of control switch (slip)

◊ Medical and Physiological
- ▪ Self-medication (without medical advice or against medical advice)
- ▪ Cold, flu,or other known illness)

◊ Knowledge and Skill
- ▪ Inadequate knowledge of systems, procedures, etc. (knowledge-based errors)
- ▪ Used improper procedure

◊ Mission Factors
- ▪ Poor communication with other assets (ground, other aircraft, etc.)
- ▪ Lack or variation of standards

◊ Personality and Safety Attitude
- ▪ Demonstration of excessive motivation to achieve mission

◊ Judgment and Risk Decision
- ▪ Intentional deviation from safe procedure (imprudence)
- ▪ Intentional violation of standard operating procedure or regulation
- ▪ Violation of orders/regulations/SOP
- ▪ Accepted unnecessary hazard
- ▪ Noncompliance with prescribed mission profile/parameters

◊ Communication and Crew Coordination
- ▪ Inadequate mission plan/brief or preflight
- ▪ Inadequate understanding of communication or failure to acknowledge communication
- ▪ Inadequate training in communication/crew coordination

◊ Supervisory and Organizational
- ▪ Not adhering to rules and regulations
- ▪ Failure to provide proper training
- ▪ Failure of standards, either poorly written, highly interpretable, or conflicting
- ▪ Risk outweighs benefit
- ▪ Inadequate mission briefing/supervision
- ▪ Intentional violation of a standard or regulation

◊ Supervisory and Organizational (cont)
- Failure to perceive or assess the mission risks correctly, with respect to:
  - ▪ Hazards go unseen/unrecognized
  - ▪ Environmental hazards/operating conditions
  - ▪ Aircraft and equipment limitations

◊ Maintenance
- Procedures
  - ▪ Not Followed
- Records
  - ▪ Discrepancies entered but not deferred or cleared
  - ▪ Entries not recorded or not recorded in correct book(s)
- Quality Assurance
  - ▪ Not used (available)

Conclusion

"Human Factors is about people: it is about people in their working and living environments, and it is about their relationship with equipment, procedures, and the environment. Just as importantly, it is about their relationships with other people.... Its two objectives can be seen as safety and efficiency." (ICAO Circular 227)

What Can You Do?

If we are to make any major strides in Aviation Safety in the coming years, our greatest opportunity is in behavioral changes in our aviation safety culture with special emphasis on human error. The expansion of human factors awareness presents our aviation community with the single most significant opportunity to make aviation both safer and more efficient.

Appendix #1

Findings of the Blue Ribbon Panel

Safety:

The safety record of fixed wing aircraft used in wildland fire management is unacceptable.

The Panel determined that contractor personnel flying large air tankers are subject to a lower safety standard than government personnel flying federally owned and operated lead planes and smoke-jumper aircraft. Further, the level of safety for both contractor and government aerial firefighting operations is lower than can be financially justified, and is less than expected for any employer concerned about his employees. This disparity in safety standards stems from a government contracting process that assumes the airworthiness of today's large air tanker fleet has been assured by the FAA's type certification process. However, responsibility for the continued airworthiness of aircraft converted to air tankers is up to the contractors who own and operate the aircraft.

The panel saw no reports that identified in-flight structural failures or break-ups of helicopters. However, in reviewing a document that summarized 36 aviation accidents related to fire service rotorcraft during the past 10 years, there were many accidents with similar features. The panel also found that varying airworthiness standards required under federal firefighting contracts had an impact in helicopter safety. However, much of the helicopter work associated with firefighting is consistent with the helicopter's original mission design.

The Forest Service owns and operates a fleet of 19 pressurized Beechcraft Baron BE-58P aircraft. Although flown in a variety of roles, the Baron's principal mission is to serve as lead plane for large air tankers. Many lead plane missions are flown over mountainous terrain during summer months when temperatures are well above those of a standard day. Under these conditions, air density is much lower than at sea level, which reduces the capability of an aircraft to maintain altitude. In addition, much of the terrain in fire-prone regions, particularly in the western United States, is higher than the Baron's single-engine service ceiling, which is the maximum altitude that a multi-engine aircraft can maintain a 50-foot/minute rate of climb when flying on one engine. The Baron fleet is also experiencing a high rate of maintenance problems, raising concerns about the long-term sustainability of safe operations. The structural life expectancy for Barons flying the firefighting mission also is questionable. It would appear that Baron operations cannot be easily limited to missions that can be conducted safely, and there are no other suitable aircraft available to assume firefighting functions.

Damage resistant voice and data recorders on aircraft are essential for effective accident investigations. However, no Forest Service or BLM policy requires recorders to be installed on either government-owned or contractor-flown aircraft.