

**United States Department of Agriculture
Forest Service**



FY 2005

Aviation Safety Summary

Prepared by the
National Aviation Safety Center
Boise, ID

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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 times 100,000.

Fatal Accident Rate = Number of fatal accidents divided by the number of hours flown times 100,000.

Fatality Rate = Number of fatalities divided by the number of hours flown times 100,000.

Departure Accident Rate = Number of accidents divided by the number of departures times 100,000

Executive Summary

The year 2005 will forever be marked by the significant decisions regarding the future of the fire and aviation program. The initiation of Doctrine as a management philosophy and application of System Safety in aviation are innovations that affect both the immediacy and the expectations of the organizational will.

High reliability organizations are characterized by many and varied decision-making styles, and often by decision-making that is tailored to the needs of the organization. In large-scale systems, negotiation and bargaining are central features of decision making and risk management. Avoidance of contradictions between doctrine and actions can also mitigate risk in a system by enhancing flexibility and wisdom - two important antidotes to risk:

Wisdom in decision making is a mixture of knowledge and ignorance: when one of them grows, so does the other. To know something better is also to discover that new questions about it are also raised. Wise organizations know what they don't know. Thus, when they act on the basis of their past experience, wise organizations act as if that experience is both credible and limited. They simultaneously believe and doubt they know what is up.

The attitude of wisdom is one way to remain alert, because it leads people to remain open to what is happening and to rely cautiously on their past experience. Crews and commanders need to keep learning and updating their models. This won't happen if they presume that nothing can surprise them, if near misses are treated as testimonials to safe practices, and if they are certain that they've experienced all possible ways in which a system can fail. (Weick, 1995).

These observations suggest several ideas with respect to risk mitigation in large scale systems: first, managers can sometimes mitigate risk if they provide safe areas and "escape routes" in the system where decision makers can consider potential impacts of their decisions.

Second, managers can mitigate risk by requiring individuals to take responsibility for their actions, and to indicate when they are unsure-about decisions, situations, or other individuals or groups in the system. This concept ties in closely with the need for talk and communication. Responsibility and ownership for outcomes are both important in mitigating risk because they create a culture where "the buck stops everywhere".

Finally, managers can mitigate risk by understanding the dynamics of negotiation and bargaining in a large scale system, and by working to insure consistency among Doctrine, actions, and decisions. Reduced confusion, enhanced flexibility, and increased wisdom are clearly important risk mitigation measures.

We are moving ahead with Doctrine, principles and convictions in the design of new accident prevention measures. It is clear when reviewing the environment, failure sequence and causal factors of accidents and incidents in 2005 that human performance failures and especially poor decision-making are the key elements to be mitigated. A fresh focus on management systems, training, performance measures, and leadership will have positive effects on the culture that are so desperately needed for the elimination of error.

Our goal remains the same; a relentless pursuit of zero accidents. A look at the historical accident rate confirms that we remain on a downward trend, if even only a gradual one. For now there is some wisdom in the knowledge that there is progress, also in maintaining a sobering awareness that the most difficult challenges still lie ahead.

R.G. "Ron" Hanks

National Aviation Safety and Training Manager

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 to 900 aircraft. These include government owned, chartered, leased, and contractor operated aircraft. The Forest Service owns approximately 250 aircraft and operates 29 aircraft (27 fixed-wing and 2 helicopters.) Over 200 Forest Service owned aircraft are operated by numerous states under the Federal Excess Personal Property (FEPP) program, these aircraft are not included in these statistics or mishap data. Approximately 600 helicopters and fixed wing aircraft of various makes and models are chartered, leased or contracted annually. The aircraft are inspected and "carded" for government use by interagency inspectors, and are flown and maintained by the contractors.

Aviation Safety Accomplishments

The USFS Aviation Safety Council adopted the System Safety management process and began implementation in 2005. Accomplishments achieved in aviation safety in FY 2005 included the following:

Safety Initiatives:

- Safety Alerts (4)
- Technical Alert (1)
- Airwards (2 issue)
- Coordinated investigation teams on 3 accidents and 3 incidents with potential
- Support and mentor Automated Flight Following project
- Implement System Safety program
- Introduced System Safety to DOI cooperators
- Completed Airtanker program risk assessment
- Initiated helicopter program risk assessment
- Monitored SEAT program mitigation measures

Policy/Procedure Recommendations

- Draft 2005 aviation Safety Plan
- 5720 Requirement for Interagency aviation Training (IAT) training standards
- 5709.16 Requirement for Fixed-Wing Flight Manager to replace Chief of Party
- Changes to FS SEAT contracts to improve performance planning
- Assisted in development of Doctrine

Training Programs:

- Coordinated/funded project with DOI for Interagency Aviation Training program
 - On-line computer based training/ contracted course development
 - ACE classroom training held at 4 locations
- Coordinated/Funded project with BLM for SEAT pilot training
- Contracted for professional curriculum development
- Coordinated USFS ACE instructor assignments, preparation

Statistical Summary

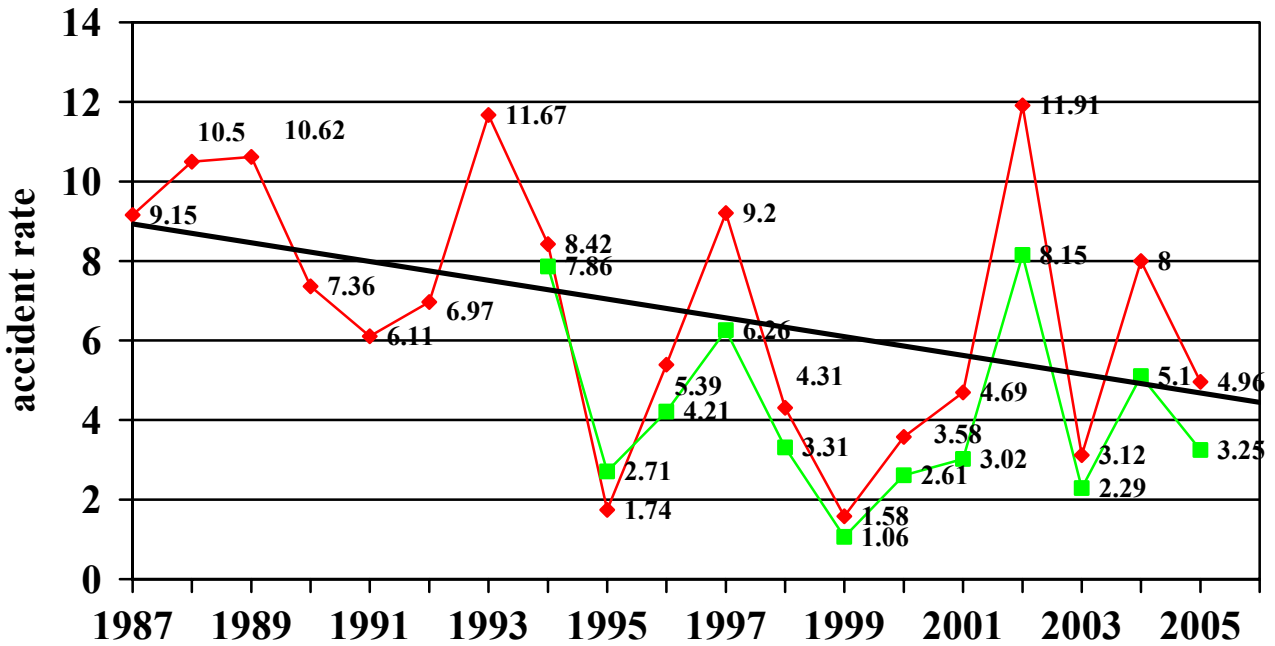
The accident rate for fiscal year 2005 is 4.96, which is below the 10-year average of 5.70. We experienced 3 accidents and 3 "Incidents with Potential" (IWP). Unfortunately, we did not make it through the year without any fatalities. There were three fatalities in one of the helicopter accidents. The USFS flew 60,424 hours, which is 18,486 hours less than the 10-year average.

The Forest Service utilizes aircraft mainly for fire suppression. 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
- ✓ Infrared mapping
- ✓ Aerial delivery of fire retardant and water

Aircraft are also used for a wide variety of other missions, including administration, research, forest rehabilitation, forest health, law enforcement, aerial photography, and infrared surveillance.

USFS Aircraft Accident Rates 1987 to 2005



◆ Accident Rate ■ Departure Accident Rate — Linear (Accident Rate)

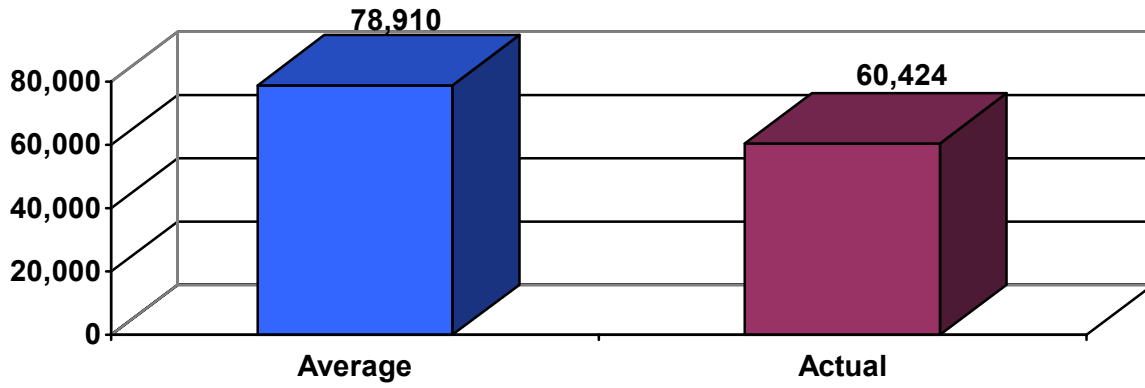
FY 2005 Accident Statistics

Aircraft Type	Hours	Number of Accidents	Accident Rate	Number of Fatal Accidents	Fatal Accident Rate	Number of Fatalities	Fatality Rate
Fixed-Wing	22,521	1	4.44	0	0	0	0
Helicopter	28,362	2	7.05	1	3.52	3	10.57
Airtanker	3,682	0	0	0	0	0	0
* SEAT	674	0	0	0	0	0	0
USFS Owned	5,185	0	0	0	0	0	0
Total	60,424	3	4.96	1	1.65	3	4.96

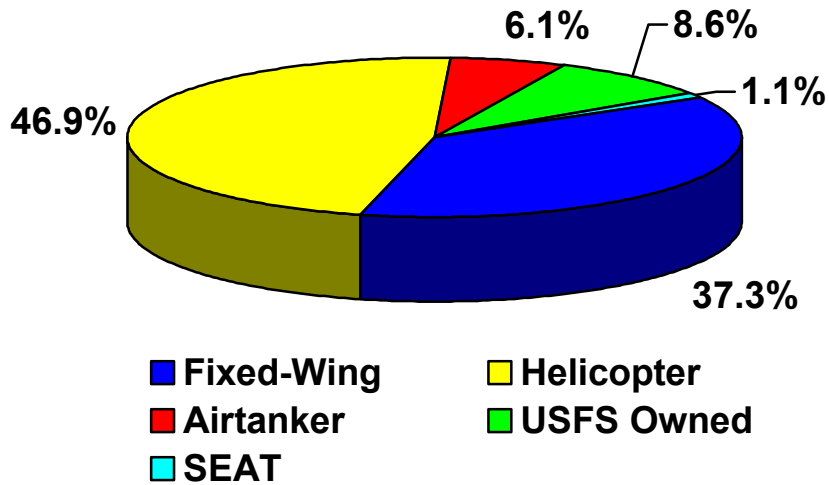
The actual hours flown in FY 2005 are below the ten-year average of 78,910. Analysis of the data shows a decrease (-18,486) in total number of hours flown.

*SEAT – flight hours for SEAT aircraft on USFS lands were obtained from the DOI, Aviation Management Directorate

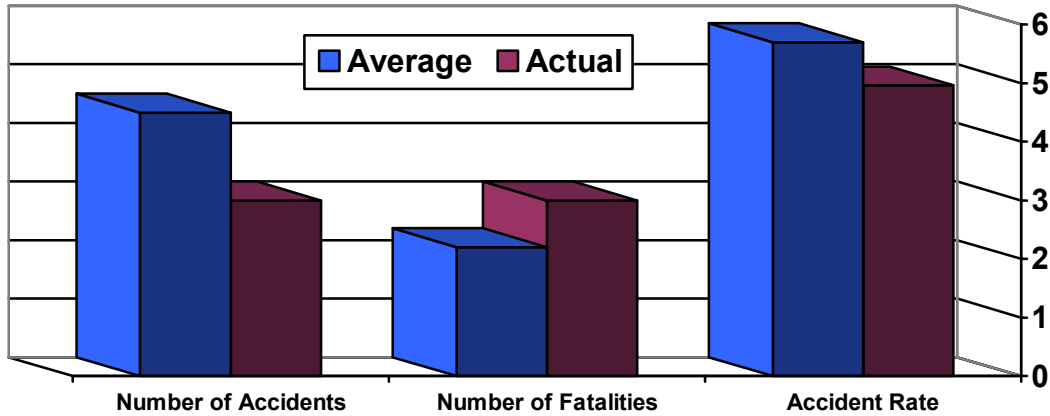
Average vs Actual Hours Flown for FY 2005



FY05 Flight Hour Percentages



Average vs Actual for FY 2004



Comparison of Averages FY 1996-2005

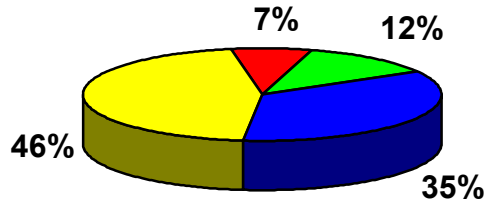
	10 Year Average	Actual	Comparison
Hours flown	78,910	60,424	-18,486
Number of Accidents	4.5	3	-1.5
Number of Fatalities	2.2	3	+1.2
Accident Rate	5.70	4.96	-.74

10-Year Flight Hour Statistics

Flight Hours:						
Fiscal Year	Fixed Wing	Helicopter	Airtanker	SEAT	USFS Owned	Total
2005	22,521	28,362	3,682	674	5,185	60,424
2004	22,713	29,885	1,535	1,006	7,333	62,472
2003	32,704	50,662	5,082		7,607	96,055
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
10-year totals	275,466	358,177	58,282		95,497	789,102
Averages	27,547	35,818	5,828		9,550	78,910

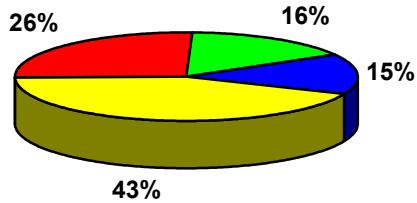
Accident Rates by Flight Hours Vs. Departure

10 Year Average of Flight Hour Percentages
1996-2005



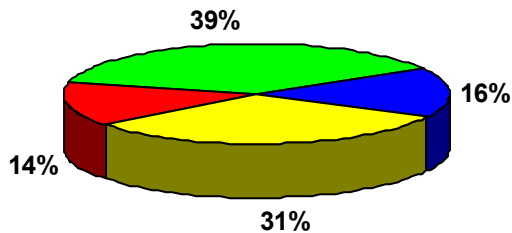
■ Fixed-Wing ■ Helicopter ■ Airtanker ■ USFS Owned

10 Year Average Accident Rate
Percentages 1996-2005



■ Fixed-Wing ■ Helicopter ■ Airtanker ■ USFS Owned

10 Year Average Departure Accident Rate
Percentages 1996-2005



■ Fixed-Wing ■ Helicopter ■ Airtanker ■ USFS Owned

Total Accident Rates

Year	Total Number of Accidents	Total Accident Rate	Fixed-Wing Accident Rate	Helicopter Accident Rate	Airtanker Accident Rate	USFS Owned Accident Rate
2005	3	4.96	4.44	7.05	0.00	0.00
2004	5	8.0	8.8	6.69	0.00	0.00
2003	3	3.12	3.05	3.94	0.00	0.00
2002	13	11.91	3.02	14.69	23.32	15.32
2001	4	4.69	3.76	5.06	0.00	0.00
2000	4	3.58	2.85	3.76	0.00	7.84
1999	1	1.58	0.00	3.97	0.00	0.00
1998	3	4.31	3.08	4.09	27.14	0.00
1997	4	9.20	0.00	24.55	0.00	0.00
1996	5	5.66	0.00	11.02	0.00	8.59
10-year Average	4.5	5.70	2.9	8.48	5.05	3.18

Total Fatal Accident and Fatality Rates

Year	Fatal Accidents	Fatal Accident Rate	Number of Fatalities	Fatality Rate
2005	1	1.65	3	4.96
2004	2	3.2	4	6.4
2003	1	1.04	2	2.08
2002	3	2.75	5	4.58
2001	0	0.00	0	0.00
2000	1	0.89	2	1.79
1999	0	0.00	0	0.00
1998	2	2.87	4	5.75
1997	1	2.30	2	4.60
1996	0	0.00	0	0.00
10-year Average	1.1	1.39	2.2	2.78

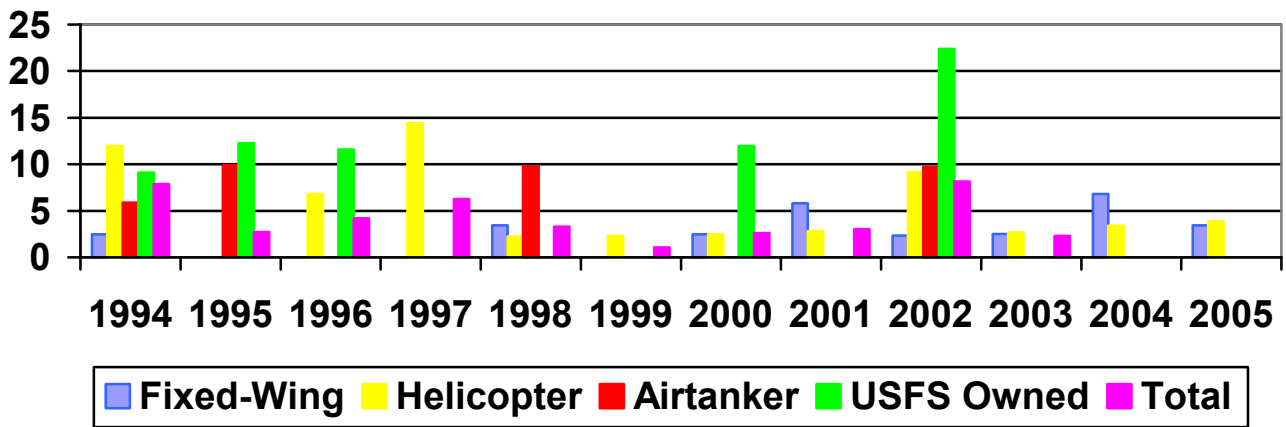
10-Year Departure Data Number of Departures by Year and Aircraft Type

Number of Departures:					
Fiscal Year	Fixed Wing	Helicopter	Airtanker	USFS Owned	Total
2005	28,993	51,406	7,130	4,666	92,195
2004	29,391	58,851	4,399	5,258	97,899
2003	39,643	74,133	11,463	5,545	130,784
2002	42,581	87,387	20,553	8,932	159,453
2001	34,427	70,503	19,382	8,015	132,327
2000	40,541	81,034	22,856	8,353	152,784
1999	27,594	43,559	15,348	7,571	94,072
1998	28,941	44,322	10,214	7,014	90,491
1997	21,558	27,729	8,793	5,776	63,856
1996	33,100	58,814	18,037	8,616	118,567
10-year totals	326,769	597,738	138,175	69,746	1,132,428
Averages	32,677	59,774	13,817	6,975	113,243

Year	Total Number of Accidents	Total Departure Rate	Fixed-Wing Departure Rate	Helicopter Departure Rate	Airtanker Departure Rate	USFS Owned Departure Rate
2005	3	3.25	3.44	3.89	0	0
2004	5	5.1	6.8	3.4	0	0
2003	3	2.29	2.52	2.69	0	0
2002	13	8.15	2.34	9.15	9.73	22.39
2001	4	3.02	5.8	2.83	0	0
2000	4	2.61	2.46	2.46	0	11.97
1999	1	1.06	0	2.29	0	0
1998	3	3.31	3.45	2.25	9.79	0
1997	4	6.26	0	14.42	0	0
1996	5	4.21	0	6.8	0	11.6
10-Year Average	4.5	3.97	2.44	4.68	2.17	5.73

Departure Accident Rate is the number of accidents divided by the number of departures times 100,000.

Departure Accident Rate by Aircraft Type

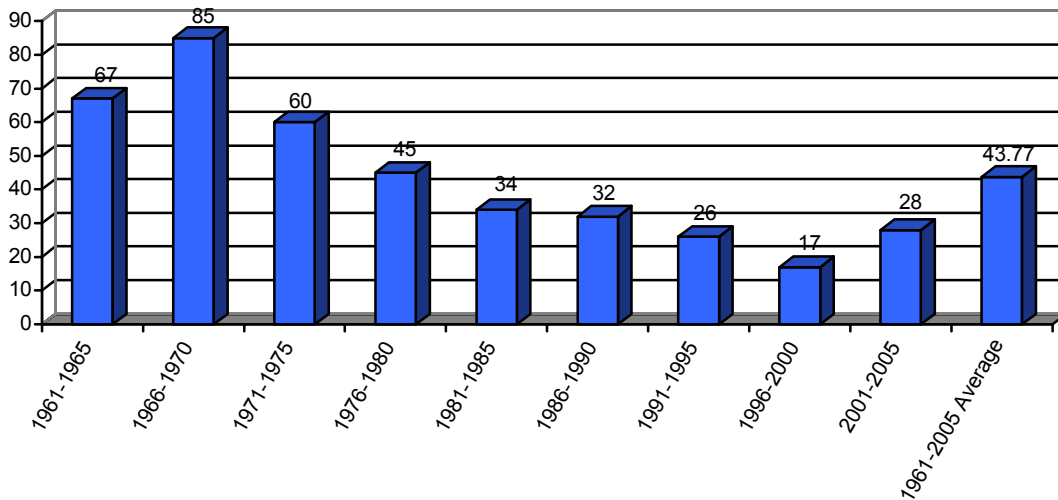


Forest Service Aircraft Accident Statistics in 5-Year Increments

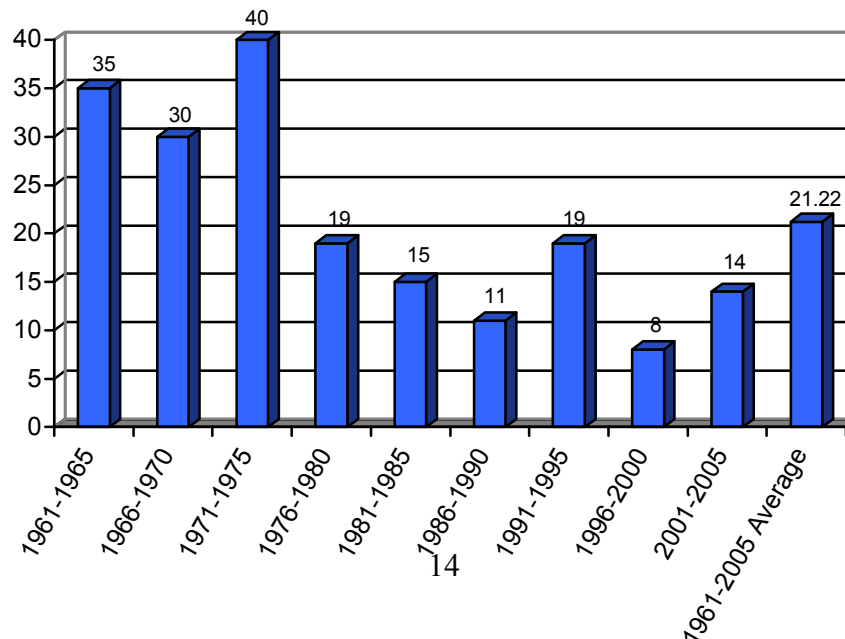
Observations

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; however, a couple of spikes in the early nineties and the latest five year period.

Total Number of Accidents for all aircraft (5-Year Increments for 45-Years)



Total Number of Fatalities for all aircraft (5-Year Increments for 40-Years)



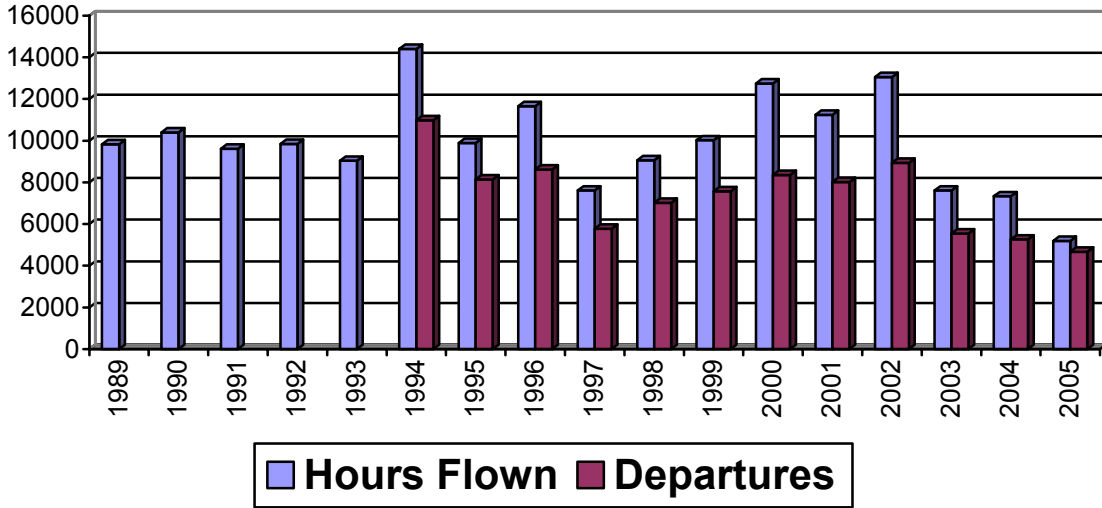
USFS Owned Aircraft

Forest Service owned aircraft accounted for only 8.6 percent of the total hours flown in FY05; the ten-year average is 12 percent. There have not been any accidents since FY02 when we experienced two accidents. There have not been any fatalities for the past ten years

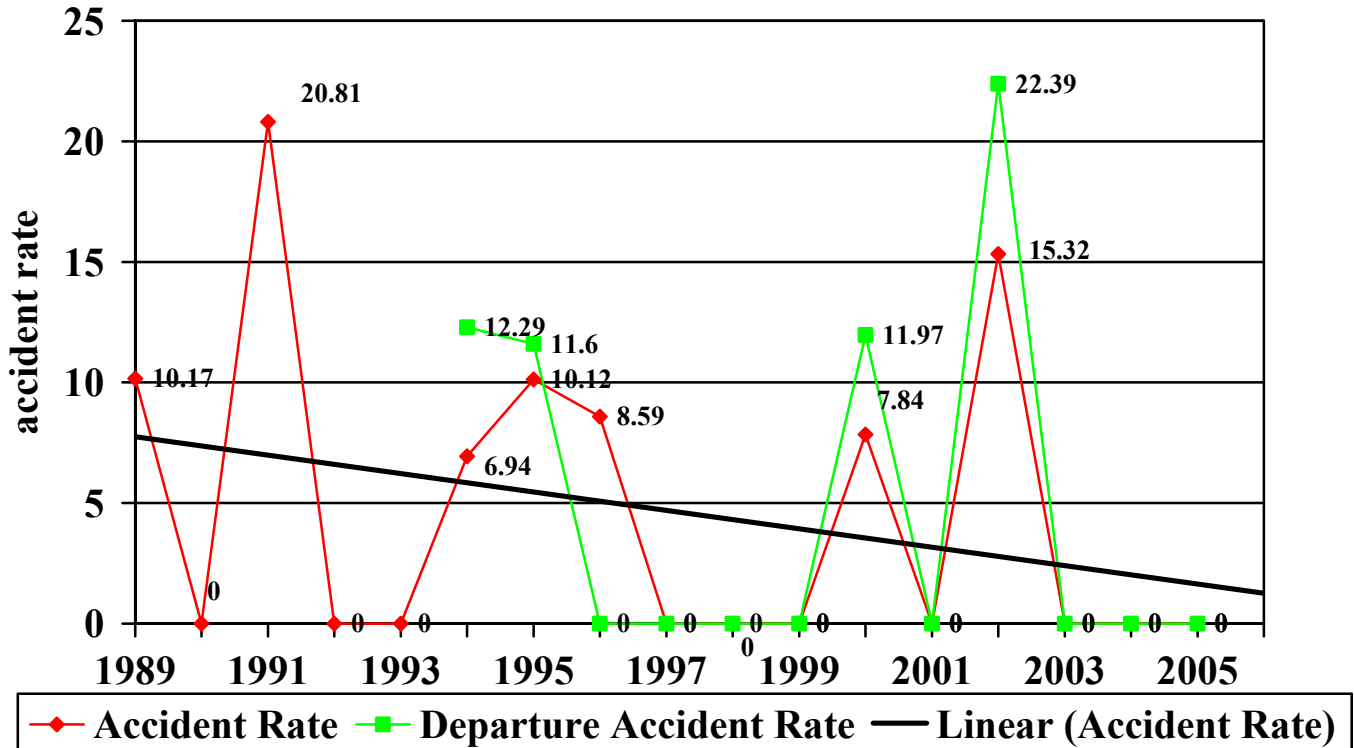


USFS Owned 10-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2005	5,185	0	0.00	0	0.00	0	0.00
2004	7,333	0	0.00	0	0.00	0	0.00
2003	7,607	0	0.00	0	0.00	0	0.00
2002	13,052	2	15.32	0	0.00	0	0.00
2001	11,241	0	0.00	0	0.00	0	0.00
2000	12,749	1	7.84	0	0.00	0	0.00
1999	10,019	0	0.00	0	0.00	0	0.00
1998	9,055	0	0.00	0	0.00	0	0.00
1997	7,608	0	0.00	0	0.00	0	0.00
1996	11,648	1	8.59	0	0.00	0	0.00
Total	95,497	4		0		0	0.00
Average	9,550	0.4	4.18	0	0.00	0	0.00

USFS Owned Hours Flown and Number of Departures



USFS Owned Aircraft Accident Rates 1989 to 2005



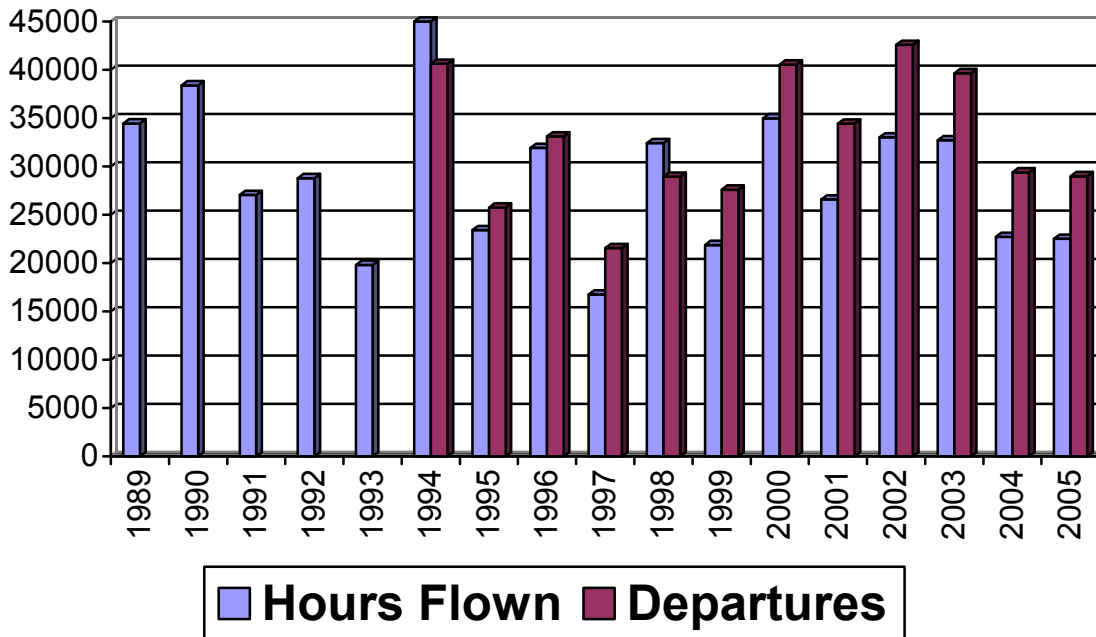
Fixed-Wing (Contract)

Fixed-Wing aircraft accounted for 37.3 percent of the total hours flown in FY05; the ten-year average is 35 percent. There were 22,521 hours flown in FY05, which is below the ten-year average of 27,547.

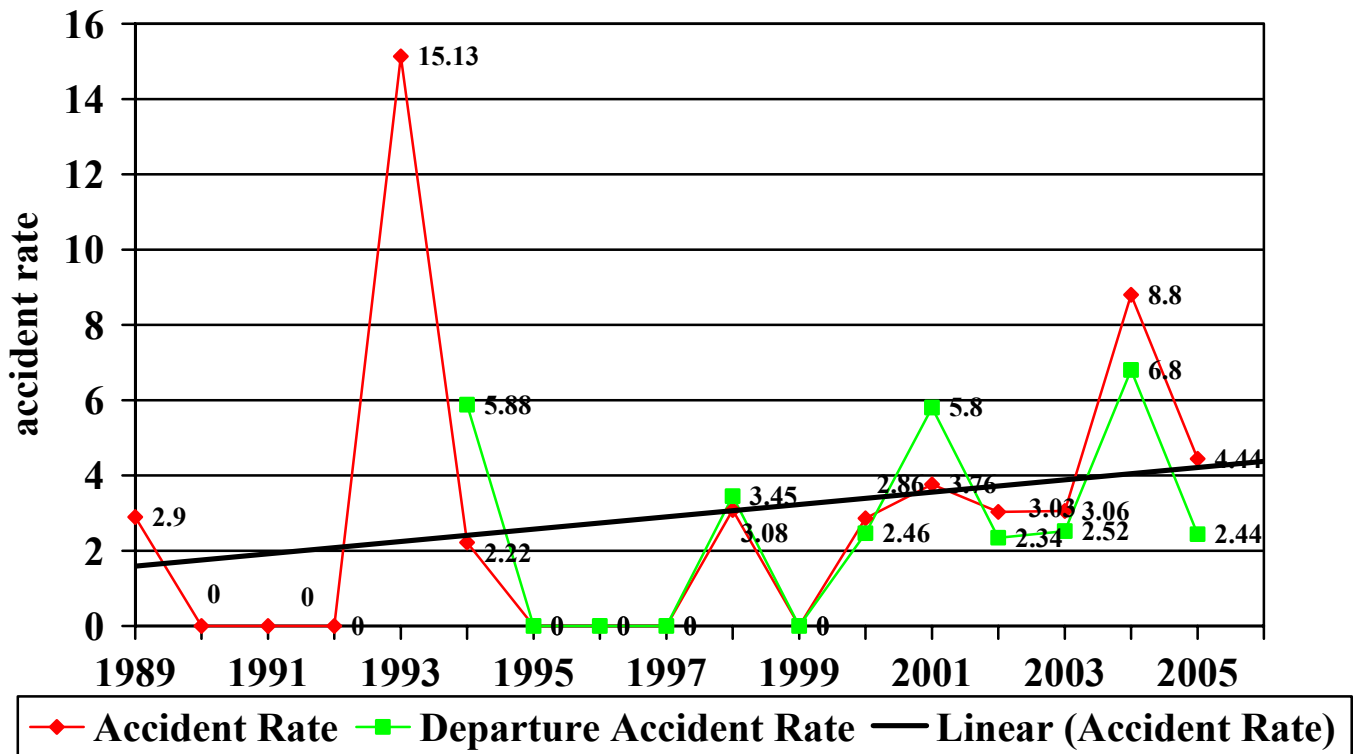


Fixed-Wing 10-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2005	22,251	1	4.44	0	0.00	0	0.00
2004	22,713	2	8.80	1	4.40	3	13.2
2003	32,704	1	3.06	0	0.00	0	0.00
2002	33,011	1	3.03	0	0.00	0	0.00
2001	26,580	1	3.76	0	0.00	0	0.00
2000	34,976	1	2.86	1	2.86	2	5.72
1999	21,873	0	0.00	0	0.00	0	0.00
1998	32,416	1	3.08	0	0.00	0	0.00
1997	16,753	0	0.00	0	0.00	0	0.00
1996	31,919	0	0.00	0	0.00	0	0.00
Total	275,196	8		2		5	
Average	27,520	0.8	2.9	0.2	0.72	0.5	1.81

Fixed-Wing Hours Flown and Number of Departures



Fixed-Wing (Contract) Aircraft Accident Rates 1989-2005



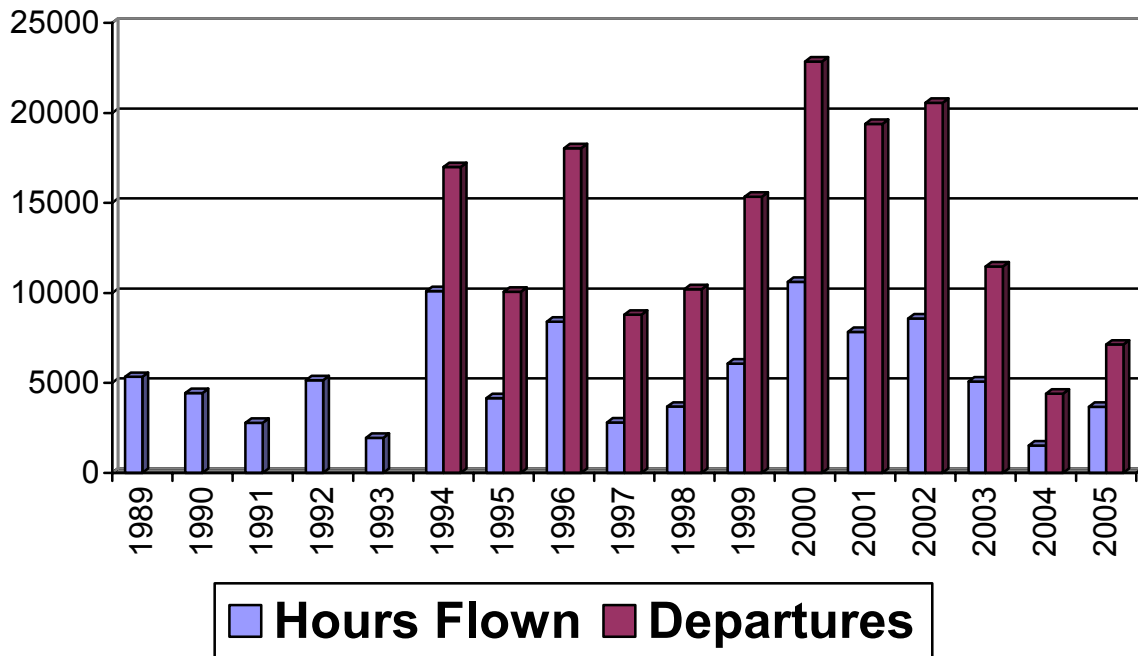
Airtankers

Airtankers accounted for 6.1 percent of the total hours flown in FY05; which is slightly below the ten-year average of 7%. There have not been any airtanker accidents for the past three years.

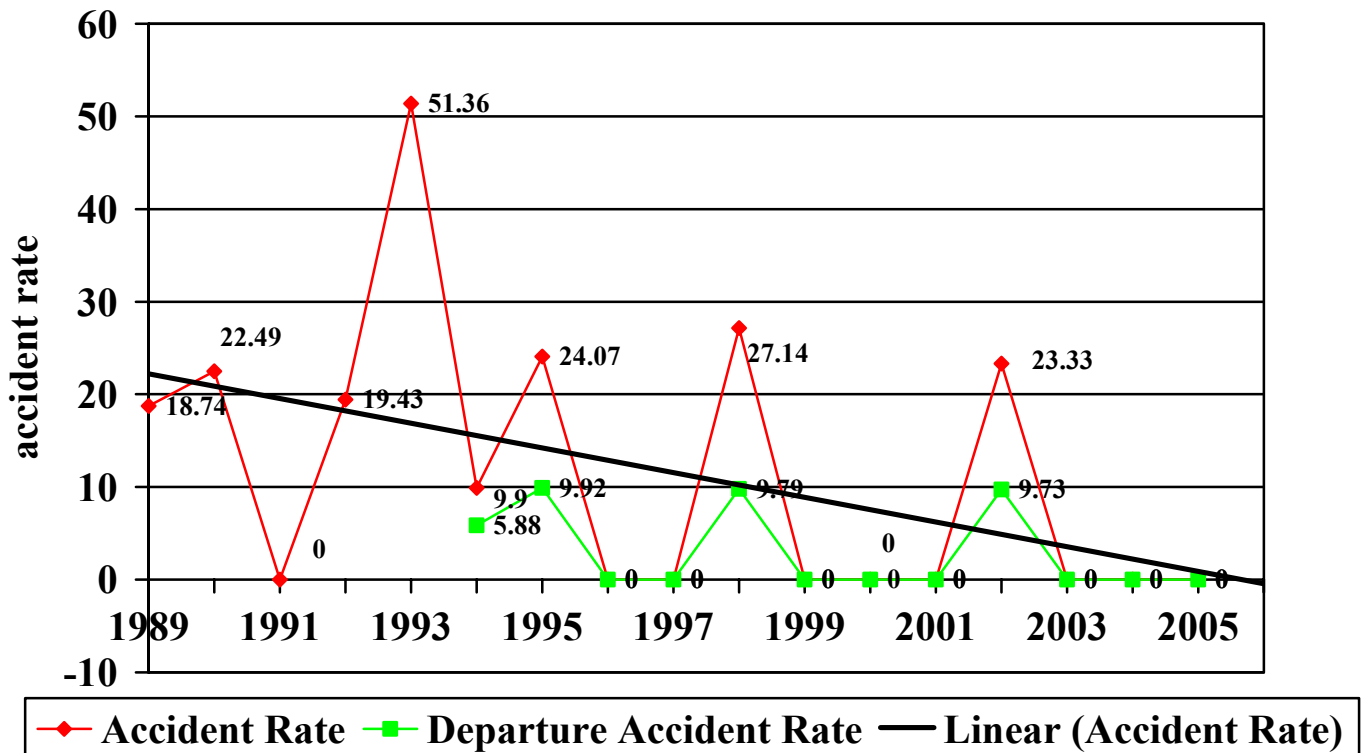


Airtanker 10-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2005	3,682	0	0.00	0	0.00	0	0.00
2004	1,535	0	0.00	0	0.00	0	0.00
2003	5,082	0	0.00	0	0.00	0	0.00
2002	8,573	2	23.33	2	23.33	5	58.32
2001	7,832	0	0.00	0	0.00	0	0.00
2000	10,616	0	0.00	0	0.00	0	0.00
1999	6,069	0	0.00	0	0.00	0	0.00
1998	3,685	1	27.14	1	27.14	2	54.27
1997	2,801	0	0.00	0	0.00	0	0.00
1996	8,407	0	0.00	0	0.00	0	0.00
Total	58,282	3		3		7	
Average	5,828	0.30	5.14	0.30	5.14	0.70	12.01

Airtankers Hours Flown and Number of Departures



Airtanker Accident Rates 1989 to 2005



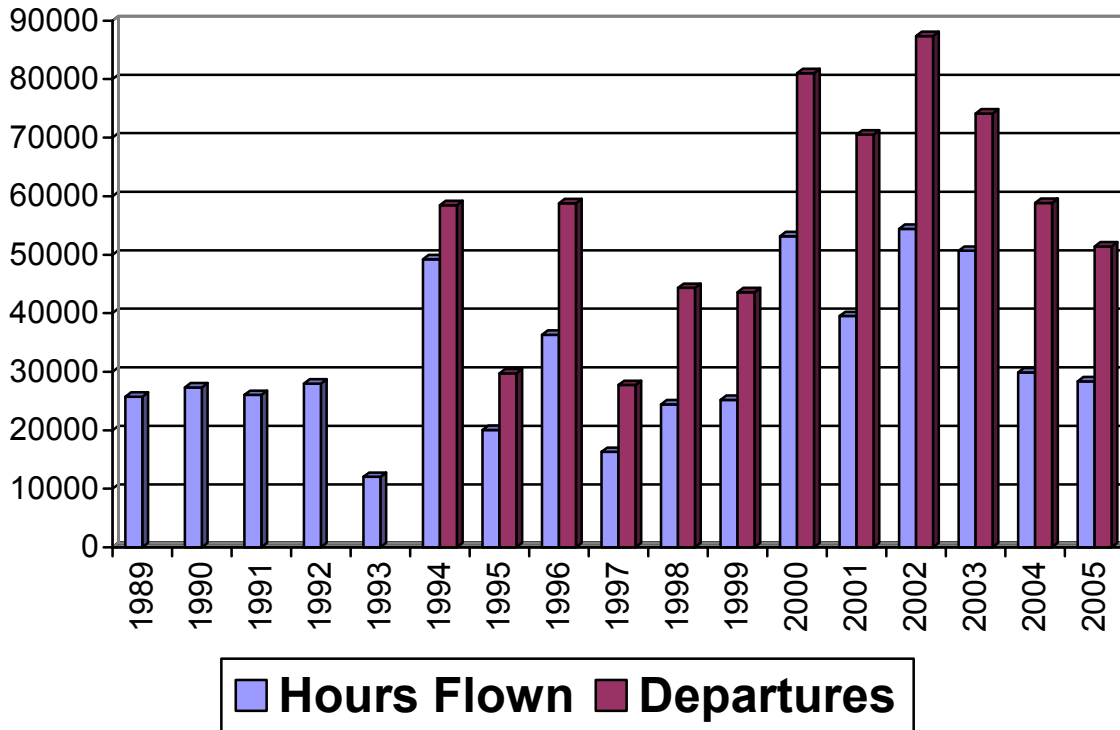
Helicopters

Helicopters accounted for the largest percent of the total hours flown in FY05. They flew 46.9 percent of the total hours flown, which is very close to the 10-year average of 46 percent. We experienced two helicopter accidents in FY05; sadly we lost two employees and one contractor in one of the accidents

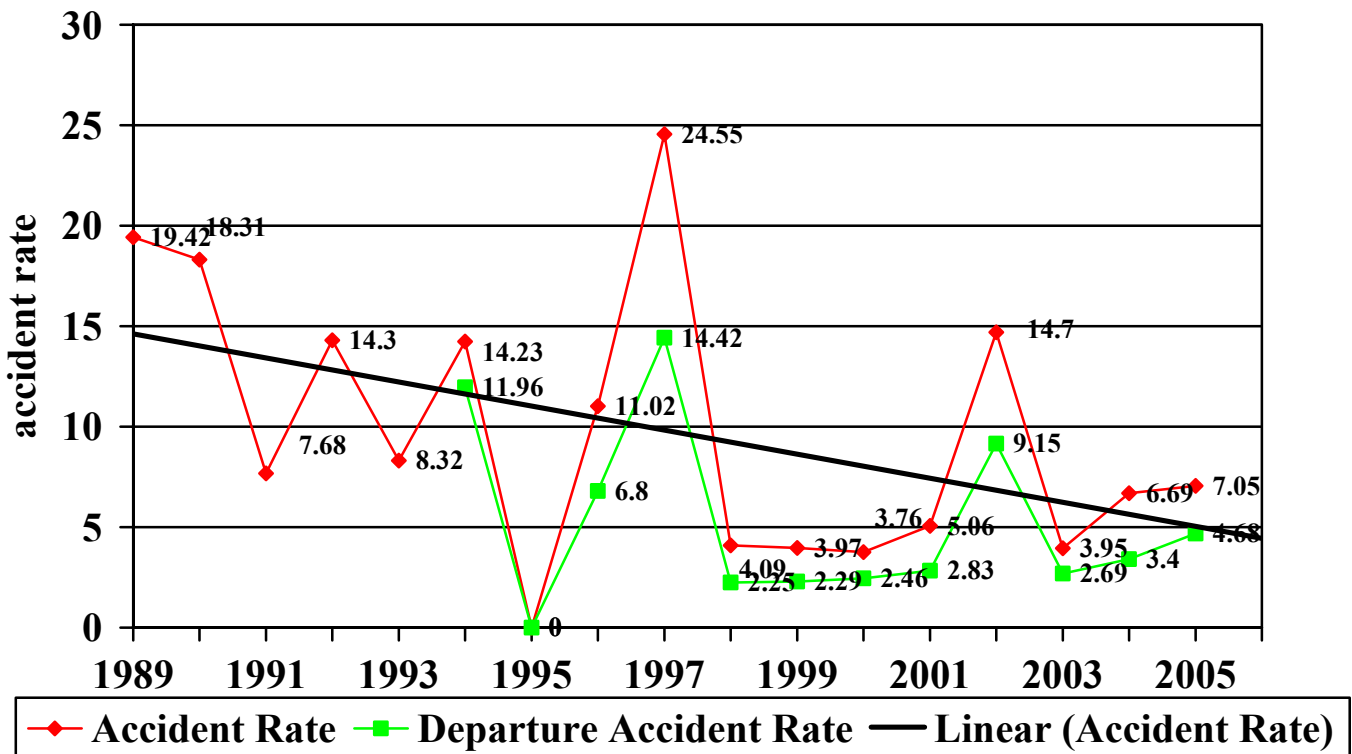


Helicopter 10-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities	Fatality Rate
2005	28,362	2	7.05	1	3.52	3	10.57
2004	29,885	2	6.69	1	3.34	1	3.34
2003	50,662	2	3.95	1	1.97	2	3.95
2002	54,427	8	14.70	1	1.84	1	1.84
2001	39,497	2	5.06	0	0.00	0	0.00
2000	53,145	2	3.76	0	0.00	0	0.00
1999	25,174	1	3.97	0	0.00	0	0.00
1998	24,423	1	4.09	1	4.09	2	8.19
1997	16,295	4	24.55	1	6.14	2	12.27
1996	36,307	4	11.02	0	0.00	0	0.00
Total	358,177	28		6		11	
Average	35,818	2.8	7.81	0.60	1.67	1.1	3.07

Helicopters Hours Flown and Number of Departures



Helicopter Accident Rates 1989 to 2004



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.

There were a total of 924 SAFECOM's submitted to the Interagency SAFECOM internet database of which included about 20 duplicates, leaving a total around 880. These include Forest Service, all DOI bureaus, States, Military and other. There were 517 Forest Service, 330 DOI, 55 State, 1 Military and 3 Other SAFECOM's.

The following charts trend the Forest Service SAFECOM data submitted to the Interagency SAFECOM Internet database at <http://www.safecom.gov/>. The average number of Forest Service SAFECOM's submitted is 677 per year. In FY 2005 the number of Forest Service SAFECOM's submitted was significantly lower at 527, of which 11 were duplicates, giving us a total of 516.

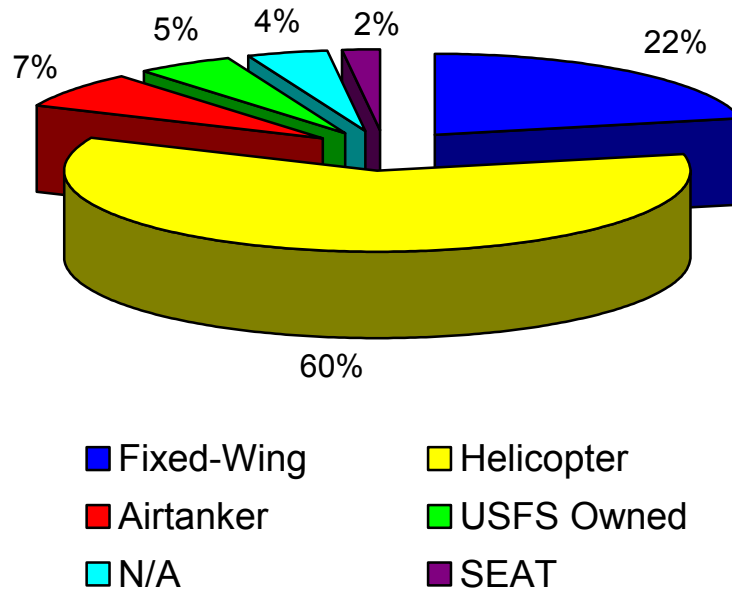
The most reported SAFECOM's were engine, electrical, chip light, communications, policy deviation, precautionary landing and dropped load. In an analysis of the past five years these continue to be the most reported, with the exception of the number of precautionary landings reported this year

Yearly Forest Service SAFECOM Totals	
YEAR	Number of SAFECOM's
2005	516
2004	494
2003	887
2002	962
2001	773
2000	949
1999	640
1998	546
1997	366
1996	633
Total	6,766
10 YR Average	677

Forest Service FY 2005 SAFECOM's by Aircraft Type

Aircraft Type	Number
Fixed Wing	112
Helicopter	309
Airtanker	38
N/A	21
SEAT	10
USFS Owned	26
Total	516

Percent of SafeCom's by Aircraft Type

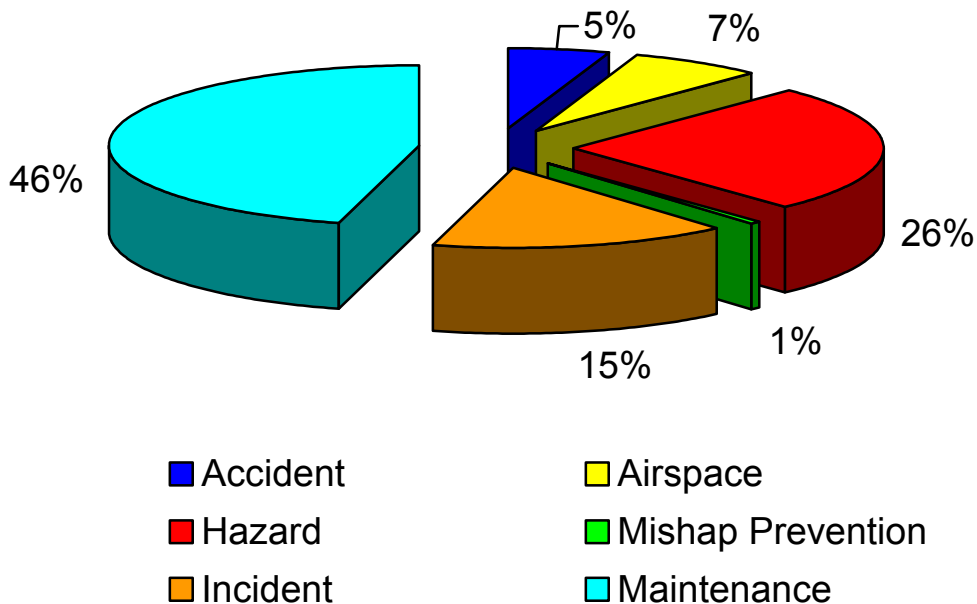


Forest Service FY 2005 SAFECOM's by Category

With the combining of the FS and DOI SAFECOM databases came some additional changes. There were three new main categories added and several more sub categories. The numbers of SAFECOM's by category will be more than the total number of SAFECOM's reported as each SAFECOM can now have more than one category assigned to it.

Category	Number
Accident	3
Airspace	44
Hazard	158
Incident	95
Maintenance	282
Mishap Prevention	4
Total	586

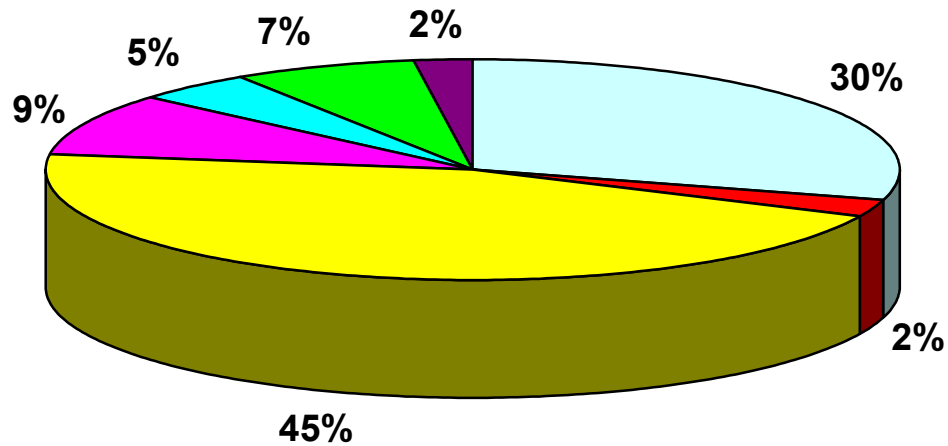
Percent of SafeCom's by Category



Forest Service FY 2005 Airspace SAFECOM's by sub-category

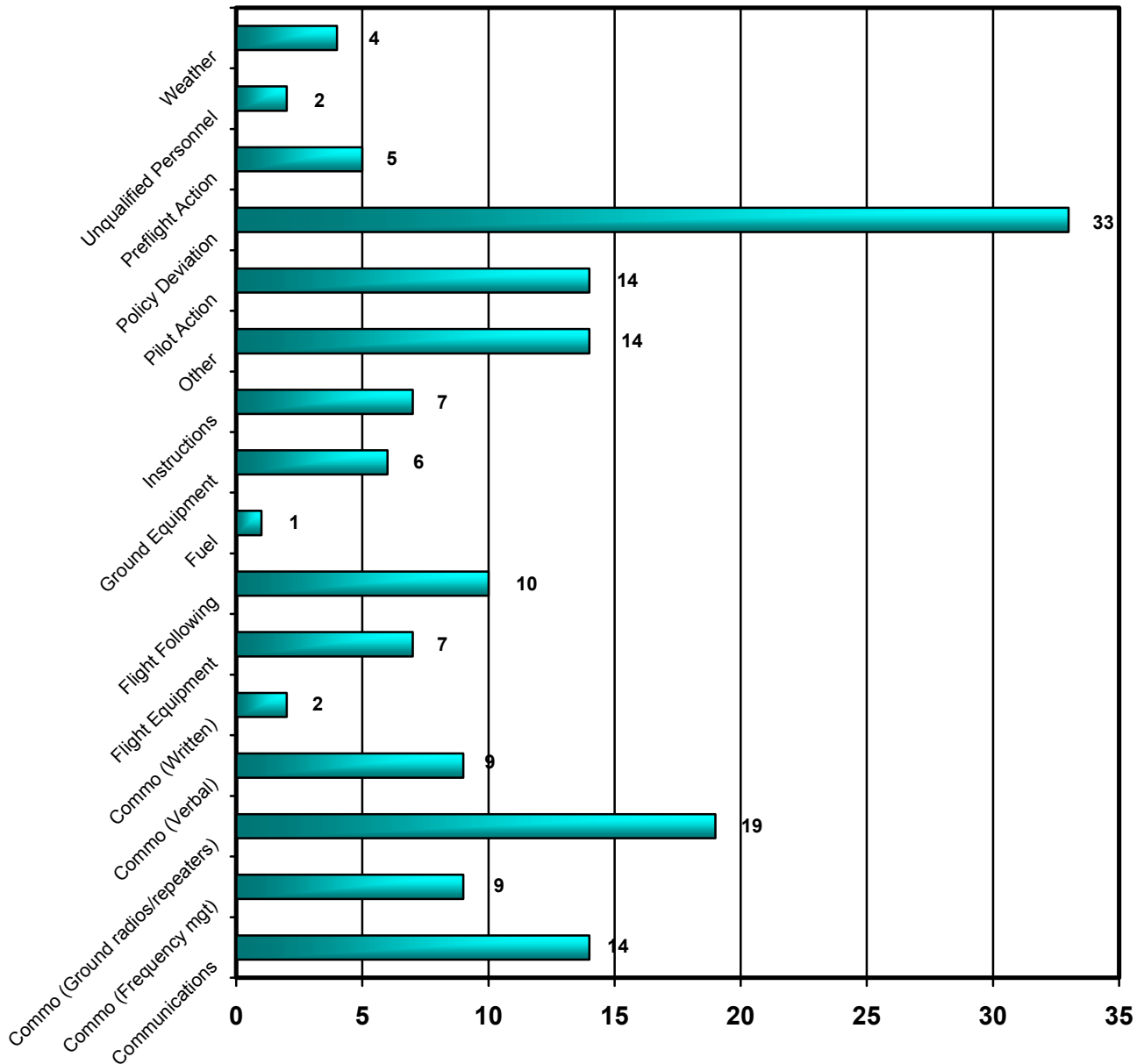
Category	Number
Conflict	13
Congestion	1
Intrusion	20
Near Mid-Air	4
Other	2
Procedures	3
Route Deviation	1
Total	44

Percent of Airspace SAFECOM's



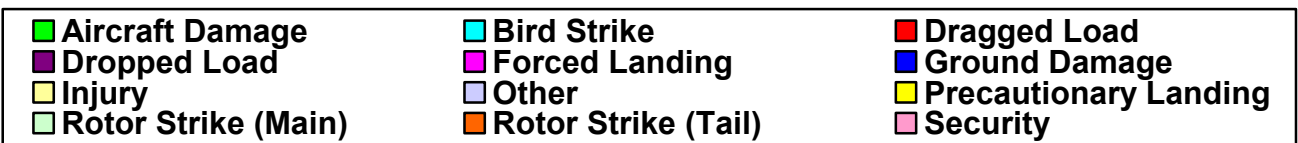
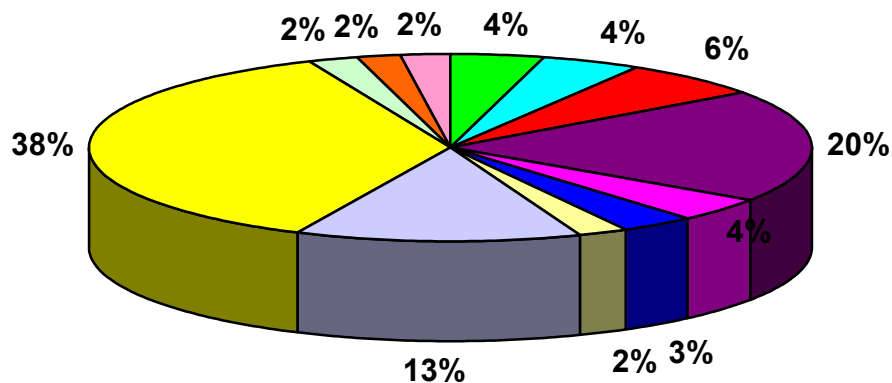
Forest Service FY 2005 Hazard SAFECOM's by sub-category

There were a total of 158 Hazard SAFECOM's submitted for 2005



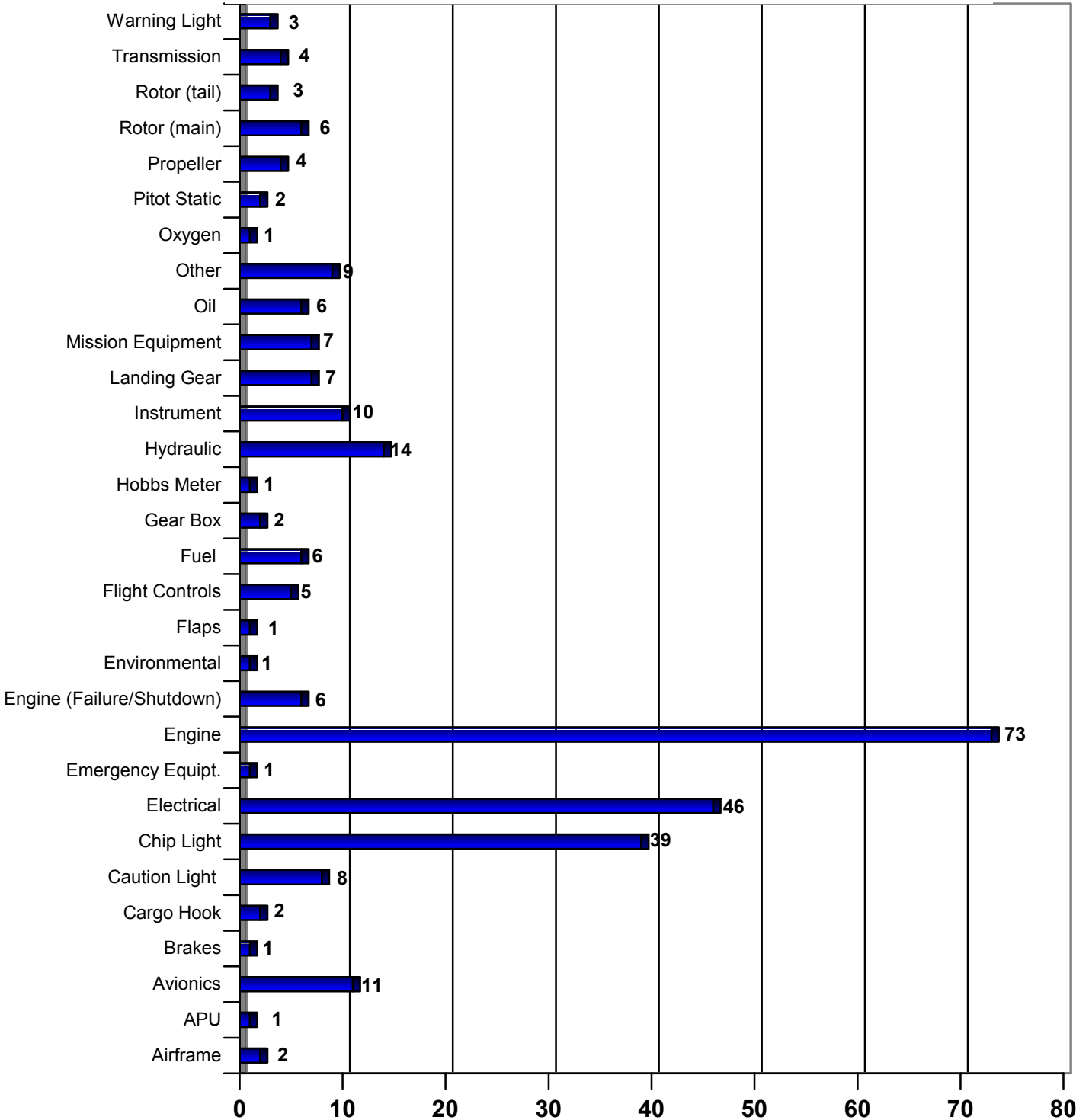
Forest Service FY 2005 Incident SAFECOM's by sub-category

Category	Number
Aircraft Damage	4
Bird Strike	4
Dragged Load	4
Dragged Load (Human Factor)	2
Dropped Load	10
Dropped Load (Human Factor)	8
Dropped Load (Mechanical)	2
Forced Landing (Engine)	3
Forced Landing (Fuel)	1
Ground Damage	3
Injury	2
Other	12
Precautionary Landing	6
Precautionary Landing (Crew)	1
Precautionary Landing (Mechanical)	27
Rotor Strike (Main)	2
Rotor Strike (Tail)	2
Security	2
Total	95



Forest Service FY 2005 Maintenance SAFECOM's by sub-category

There were a total of 282 Maintenance SAFECOM's submitted for 2005



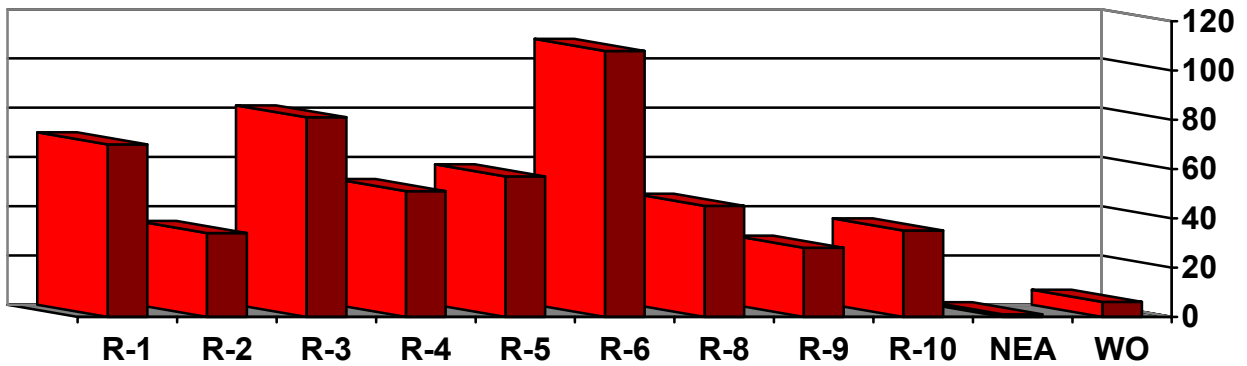
Forest Service FY 2005 Mishap Prevention SAFECOM's by sub-category

There were two SAFECOM's submitted that were categorized as Mishap Prevention and personnel involved in both of the situations received AIRWARDS.

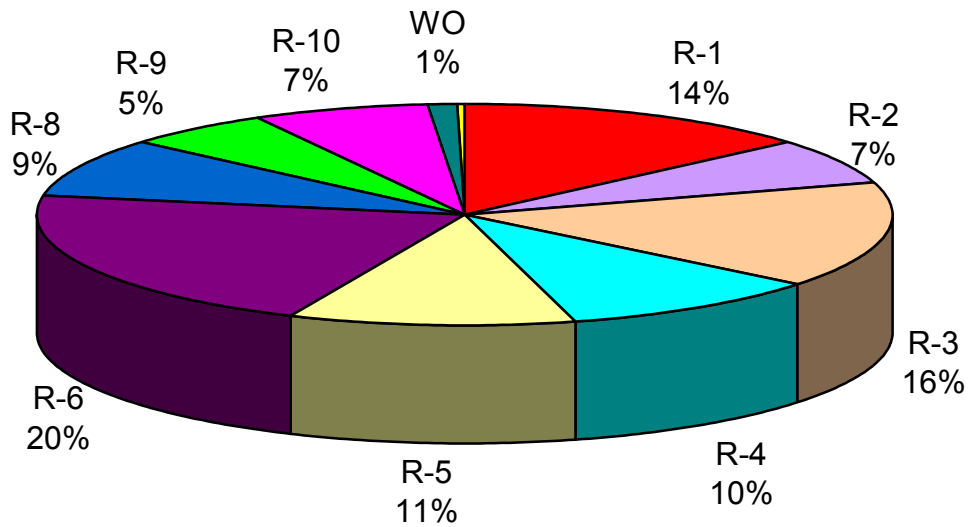
Category	Number
Kudos	4
Total	4

FY 2005 SAFECOM's by Region

The chart below shows the number of Forest Service SAFECOM's by region reported in FY 2005.



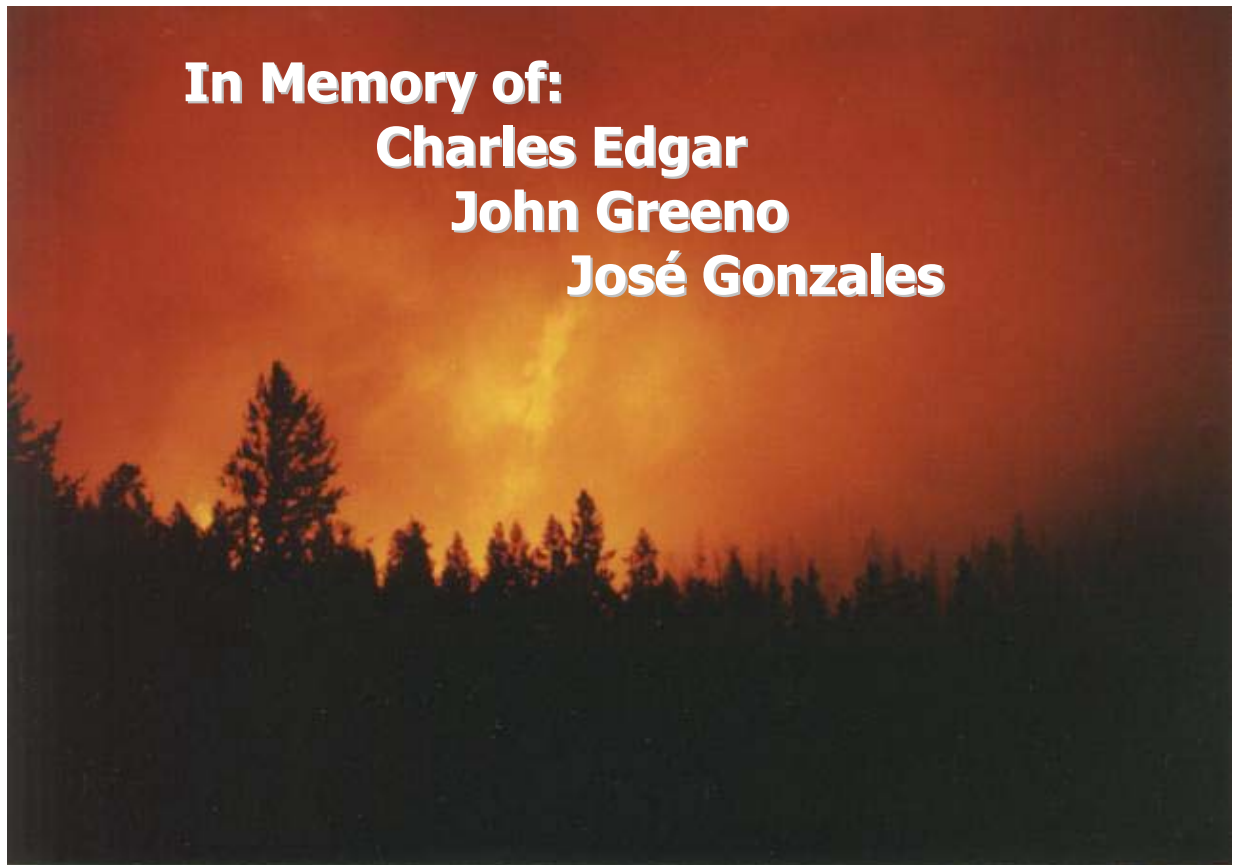
Percent of Safecom's by Region



FY 2005 SAFECOM's by Aircraft Type and Region							
Region	Fixed-Wing	Helicopter	Airtanker	SEAT	USFS Owned	N/A	Total
Region 1	17	44	3	1	4	1	70
Region 2	4	15	6	4	2	3	34
Region 3	13	48	15	3	1	1	81
Region 4	16	26	2	0	5	2	51
Region 5	9	42	3	0	0	3	57
Region 6	21	67	6	2	5	7	108
Region 8	5	36	0	0	4	0	45
Region 9	5	18	1	0	2	2	28
Region 10	20	13	0	0	2	0	35
NEA	1	0	0	0	0	0	1
WO	1	0	2	0	1	2	6
Total	112	309	38	10	26	21	516

FY 2005 SAFECOM's by Category and Region							
Region	Accident	Airspace	Hazard	Incident	Maintenance.	Mishap Prevent	Total
1	0	6	30	13	42	0	91
2	1	2	10	4	9	1	27
3	0	6	19	23	67	0	115
4	1	11	23	7	13	0	55
5	0	3	16	9	33	0	61
6	0	13	30	19	59	2	123
8	1	0	8	7	29	0	45
9	0	2	9	6	9	1	27
10	0	0	10	6	18	0	34
NEA	0	0	0	0	1	0	1
WO	0	1	3	1	2	0	7
Total	3	44	158	95	282	4	586

FY 2005 Forest Service Mishaps



NTSB regulation 831.13 Flow and dissemination of accident or incident information generally states that “Parties to the investigation may relay to their respective organizations information necessary for purposes of prevention or remedial action.

The NTSB has not finalized or determined probable cause for any of the accidents at this time. This is preliminary information, subject to change, and may contain errors. Any errors in this report will be corrected when the final report has been completed

NTSB Identification: DFW05FA086
Accident occurred March 10, 2005 in Shelbyville, TX
Aircraft: Bell 206 BIII
Fatalities: 3
Operational Control Region 8, Sabine NF



On March 10, 2005, approximately 1354 central standard time, a Bell 206B-III helicopter, N85BH, registered to Brainerd Helicopter Service, Inc, sustained substantial damage when it impacted heavily wooded terrain in the Sabine National Forest near Shelbyville, Texas. The airline transport rated pilot and two USDA Forest Service crewmembers sustained fatal injuries. Visual meteorological conditions prevailed, and the flight/mission was being monitored and conducted in accordance with USFS aviation policies for public use aircraft in fire management operations. The flight departed at 1347 from a field helicopter pad (H1), located approximately 7 miles southeast of the accident site.

On the morning of the accident, the helicopter was assigned to support a prescribed fire within heavily wooded terrain with 50-60 foot high trees near Shelbyville, TX. The prescribed fire was supported by the application of aerial ignition spheres utilizing a cabin mounted plastic sphere dispenser (PSD) machine. PSD missions are typically flown at 50-150 feet above the top of vegetation at airspeeds from 20-40 knots. The helicopter was pre-positioned and a mission brief was conducted at Angelina County Airport, Lufkin, Texas. At 0900, after the mission brief, the helicopter and re-fueling truck re-positioned to H1 (coordinates North 31 degrees 42.110 minutes West 93 degrees 52.540 minutes) and were met by support equipment and personnel from the Sabine National Forest to conduct a prescribed fire mission.

After 45 minutes of aerial ignition work, the PSD machine experienced a sphere jam, and the helicopter returned to H1 to resolve the problem. The helicopter shut down at H1 while the PSD machine problem was resolved.

The helicopter then departed H1 at 1347 to resume the mission. According to dispatch records, at 1352, the mission ignition specialist onboard the aircraft reported by radio that the helicopter was commencing firing operations. At 1354, a radio distress call was heard on the assigned Forest Service tactical frequency by ground personnel. According to USFS personnel, the voice making the distress call appeared to be that of the ignition specialist, not the pilot. The call was, "Mayday, Mayday, Mayday, we are going down." No further communications were heard from the helicopter.

At 1417, the helicopter wreckage was found at coordinates North 31 degrees 45.425 minutes West 94 degrees 00.244 minutes. Immediate rescue operations commenced.

The nearest automated weather observing system at the A.L. Mangham Junior Regional Airport, near Nacogdoches, Texas, located approximately 30 miles southwest of the accident site, reported wind from 250 degrees at 5 knots, 10 statute miles visibility, a clear sky, temperature 22 degrees Celsius, dew point 3 degrees Celsius, and a barometric pressure setting of 29.92 inches of Mercury.

The NTSB has not determined probable cause at this time.

Forest Service Accident Review Board Action Plan

Recommendation 1: Include in FS agency policy, relative to pilot approval (carding), a requirement that agency pilot inspectors review/verify pilot time for those pilots that have never been approved by the agency (Initial approvals). Subsequent approvals would not require this review for total time.

- A. Modify all Forest Service aircraft contracts to require contractors, submitting pilots for initial approval, provide verification of pilot flight time through employment history to include contact information in a standardized format.
- B. Review contract language to ensure appropriate remedies where pilot qualifications are incorrectly reported.

- C. Modify FSM 5700 and FSH 5709.16 to require pilot inspectors to verify pilot time for all initial pilot cards, utilizing verification records provided by contractor.
- D. Ensure all pilot inspectors are briefed regarding the changes at annual pilot inspector workshops.
- E. Make recommendation to DOI, Aviation Mgmt Directorate regarding above changes to incorporate into OPM 21.

Recommendation 2: Recommend to Interagency committee to include a requirement in the Interagency Aerial Ignition Guide pre-mission briefing that addresses PSD flight profile “watch out” situations including but not limited to loss of tail rotor effectiveness (LTE), Settling with Power, etc.

Recommendation 3: Require pilots being evaluated for an Initial pilot approval (carding) demonstrate to the Inspector Pilot their skill in low level, low airspeed maneuvering in a PSD flight profile during flight evaluation.

- A. Modify Interagency Helicopter Practical Test Standards document to incorporate requirement.
- B. Ensure all pilot inspectors are briefed regarding the changes at annual pilot inspector workshops.

NTSB Identification: **DN05TA113**
Accident occurred July 19, 2005 in Loveland, CO
Aircraft: Hughes 369FF, registration: N530TJ
Injuries: 1 Minor.
Operational Control: Arapaho-Roosevelt NF



On July 19, 2005, approximately 1515 mountain daylight time, a Hughes 369FF single-engine helicopter, N530TJ, was destroyed when it impacted trees and terrain following a loss of control while hovering approximately 20 miles west of Loveland, Colorado. The commercial pilot, who was the sole occupant, sustained minor injuries. The helicopter was operated by the United States Department of Agriculture (USDA) Forest Service Rocky Mountain Region (Region 2) for public use firefighting missions, and registered to Utility Aviation Inc., Fort Collins, Colorado. Visual meteorological conditions prevailed, and a flight plan was not filed. The flight originated from a staging area west of Loveland at 1504.

The helicopter was being used to support firefighting operations in the area and was attempting to deliver supplies via external load. The helicopter was equipped with a 100-foot long line and a 20-foot choker, the external load weighed 615 pounds, and the helicopter weighed a total of 3,000 pounds.

Prior to the approach, the pilot over flew the intended landing location and was informed that the winds were from the west approximately 7 knots. The pilot performed a hover check approximately 1/2 mile east of the intended landing zone (LZ) over a valley. The pilot moved the helicopter west to the LZ at a speed just above effective transitional lift and came to a hover with the load approximately 30-40 feet over the landing spot. The pilot checked the engine and operating instruments and all systems indicated normal. "No unusual noises or vibrations."

The pilot began looking down and outside the helicopter when he felt a yaw to the right. The pilot noticed that he was "depressing the left [pedal] more as he pushed on the left to stop a right turn." The helicopter then made an "uncommanded turn to the right and began spinning right." The helicopter made two to three rotations to the right; the pilot jettisoned the cargo portion of the long line and lowered the collective. "As the aircraft stabilized in a glide, [pilot] attempted to regain control of the descent by adding power/pitch to the main rotor. When [pilot] did this, the aircraft immediately started spinning again, two quick rotations." The pilot lowered the collective and began a glide into the trees. Subsequently, the helicopter impacted trees and terrain and came to rest on its left side. The accident site was located at an elevation of 7,700 feet on a 10-20 degree slope.

According to a witness, who was assisting near the LZ, the surface winds were light at the time; however, it had been a "pretty windy day." As the helicopter approached the LZ, "everything was normal when he did a 180-degree turn. The load was fairly stable below him and the ship did a quick 180. Paused briefly, did another (180), completed to the 360, and then kept slowly spinning...The flight pattern started getting a little more erratic, as far as the load of his, the sling was kind of penduluming...swinging." The witness then observed the helicopter release the external load. The witness lost sight of the helicopter behind a tree and heard the impact. The witness responded to the accident site and the engine was still running. Shortly after that, "the engine cut."

The temperature was 32 degrees Celsius and a calculated density altitude of 11,465 feet at the time of the accident.

During a telephone interview conducted by the NTSB IIC, the pilot reported he had accumulated 1,600 total rotorcraft hours, and 65 hours in the accident helicopter. The pilot had accumulated approximately 150 total hours in external load operations, with approximately 8 total hours in the accident helicopter. In addition, the pilot had approximately 10 years experience in single-engine air tankers.

The helicopter was examined at the accident site by the Federal Aviation Administration and the USFS. The helicopter was recovered and transported to a facility in Greeley, Colorado, for further examination.

On August 16, 2005, the NTSB investigator-in-charge, a representative of Boeing, and a representative of the USFS examined the helicopter. Examination of the airframe revealed the fuselage was crushed and deformed. The tail boom was fractured into several fragments. Damage to the tail boom was consistent with impact forces and main rotor blade strikes. The main rotor hub assembly and components were destroyed and consistent with sudden stoppage. All five main rotor blades were separated from the rotor head and exhibited fractured and bent spars, skin delamination, cuts and gouges.

The main transmission rotated when the main rotor system was turned by hand. Continuity was established to the tail rotor output pinion and the engine input quill when the transmission was rotated. The tail rotor drive shaft was fractured into multiple segments which corresponded to the fractures in the tail boom structure. The tail rotor gearbox was fractured across the case elbow. The tail rotor gearbox output quill rotated when turned by hand. One tail rotor blade was fractured into three sections with one fracture at the pitch change arm, one at the root fitting, and one approximately 10 inches from the blade end. The other tail rotor blade was fractured at a point just past the blade doubler.

The longitudinal and lateral cyclic flight controls and collective flight controls exhibited continuity from the controls to the upper flight controls. The upper flight controls were damaged; however, movement of the controls operated the flight control links. Anti-torque flight control continuity was established from the foot pedals to the separated control rod located at the aft fuselage station 100. The tail rotor control rods and bell cranks were bent and fractured in numerous locations.

Examination of the engine revealed damage consistent with the impact to the exhaust and combustion sections. Continuity was established to N1 and N2 control linkage from the throttle and collective to the fuel control and power governor. No anomalies that would have precluded operation were noted with the airframe systems and engine.

A review of the external load manifest for the accident flight revealed the load consisted of long line, swivel, lead line, net, remote hook, 14 bladder bags of water, and hose. The USFS "manifest preparer" calculated the load to be 632 pounds (lbs). After the accident, a review of the actual weights and equipment on the external load revealed the USFS manifest preparer miscalculated the load. The total for the external load at the time of the accident was 732 lbs. The pilot was not aware of the miscalculation at the time of the accident.

Prior to any external load flight, the pilot was responsible to complete a USFS FS-5700-17, Interagency Load Calculation, form. On July 18, 2005, the pilot completed the form based on the following: departure pressure altitude 5,000 feet; departure temperature 25 degrees Celsius; destination pressure altitude 9,000 feet; destination temperature 30 degrees Celsius; and helicopter operating weight 2,515 lbs. A review of that form revealed the pilot incorrectly completed the form in several areas; performance reference, gross weight, adjusted weight, selected weight, operating weight and allowable payload. The pilot's non-jettisonable allowable payload was calculated to be 465 lbs for hover in and out-of-ground effect (IGE and OGE), and a jettisonable allowable payload of 1,235 lbs for OGE. The improperly completed form was signed off by the pilot and USFS Helicopter Manager. A recalculation was performed by a USFS Helicopter Inspector Pilot after the accident. The recalculation revealed the non-jettisonable IGE and OGE allowable payloads were 569 lbs and 259 lbs respectively, and the jettisonable OGE allowable payload was 379 lbs.

On the day of the accident, the pilot completed another Interagency Load Calculation form based on the following: departure pressure altitude 9,500 feet, departure temperature 35 degrees Celsius; and helicopter operating weight of 2,454 lbs. A review of that form revealed the pilot incorrectly completed the form in several areas; adjusted weight, selected weight, and allowable payload. Based on the conditions listed by the pilot, the pilot's calculated jettisonable OGE allowable payload was 646 lbs. The improperly completed form was signed off by the pilot and the USFS Helicopter Manager. According to the USFS Helicopter Inspector Pilot who reviewed the form after the accident, the allowable payload calculations could not be performed because the pressure altitude and temperature values exceeded the manufacturer's performance limitations for the helicopter.

According to the USFS, at the time of the accident, the gross weight of the helicopter was 3,072 lbs, based on an aircraft weight of 1,860 lbs; pilot 200 lbs; fuel 280 lbs; and an external load of 732 lbs. The reported actual environmental conditions were pressure altitude 8,000 feet, and temperature 32 degrees Celsius. In accordance with the Rotorcraft Flight Manual, CSP-FF-1, dated August 14, 1998, with revision 5, dated October 3, 2003, Page 8-4, Figure 8-3, Hover Ceiling, Out of Ground Effect, Engine Air Particle Separator Inlet with Mist Eliminator, indicated that the maximum gross weight for OGE was 2,940 pounds.

According to the Federal Aviation Administration's Rotorcraft Flying Handbook, FAA-H-8083-21, Chapter 11, LTE at Altitude, "At higher altitudes, where the air is thinner, tail rotor thrust and efficiency is reduced. When operating at high altitudes and high gross weight, especially while hovering, the tail rotor thrust may not be sufficient to maintain directional control and LTE can occur. In this case, the hovering ceiling is limited by tail rotor thrust and not necessarily power available. In these conditions gross weights need to be reduced and/or operations need to be limited to lower density altitudes."

The National Transportation Safety Board determines the probable cause(s) of this accident as follows:

The pilot's failure to maintain aircraft control due to delayed remedial action during the encounter with the loss of tail rotor effectiveness. Contributing factors were the pilot's inadequate preflight performance planning, and the inadequate supervision by the US Forest Service personnel.

Forest Service Accident Review Board Action Plan

Action Item #1: Standardize requirements for pilot inspections, training, longline experience, and overall proficiency to meet interagency standards when carded for interagency fire use. Such standards should include:

1. Require a minimum of two hours of annual longline training certified by the chief pilot of the company and verified by a representative of the agency conducting the carding process.

2. Flight hours in type of aircraft may only be reduced by 50% if pilots attend a manufacturer approved factory school.
3. Through contracts, require that pilots to keep track of their longline experience.

Action Item #2: Develop and implement training for helicopter crew members in accordance with standardized call-when-needed (CWN) and exclusive use contract language requirements.

Action Item #3: The Forest Service will instruct its Helicopter Inspector Pilots to conduct quality inspections by following all current pilot inspection procedures especially during the certification of new pilots who will be operating under CWN contracts.

Action Item #4: Work with cooperating agencies in developing policy and procedures for Dispatch Centers to ensure that radio communication transmissions generated during incidents and accidents are recorded and retained.

NTSB Identification: LAX05GA243
Accident occurred July 21, 2005 in Las Vegas, NV
Aircraft: Aero Commander 680 FL, registration: N7UP
Injuries: 2 Serious, 1 Minor.
Operational Control: R-4 Humboldt-Toiyabe NF



On July 21, 2005, about 1707 Pacific daylight time, an Aero Commander 680 FL, N7UP, impacted terrain during takeoff at North Las Vegas Airport (VGT), Las Vegas, Nevada. Commander Northwest LTD was operating the airplane under contract for the US Forest Service under the provisions of 14 CFR Part 91 as a public-use aircraft. The airline transport pilot and one passenger sustained serious injuries; the second passenger sustained minor injuries. The airplane was destroyed. The local fire reconnaissance flight departed VGT at 1707. Visual meteorological conditions prevailed, and a company flight plan had been filed. The primary wreckage was at 36 degrees 12.233 minutes north latitude by 115 degrees 11.289 minutes west longitude.

During takeoff from runway 12R witnesses reported seeing the airplane airborne but not climbing. The airplane continued down the runway in a nose up attitude and remained in ground effect until impacting terrain about 600 feet southeast from the departure end of runway 12R. The airplane impacted in a 30-degree nose down attitude. During the accident sequence the airplane rotated about 270 degrees around the vertical axis. The cockpit section of the airplane was destroyed during the accident sequence.

Tower records indicate that the accident occurred at 1707. The Las Vegas fire department records indicate that they received notification of the accident at 1708. The first fire department vehicle arrived on scene at 1715.

The density altitude was calculated at 5,878 feet mean sea level. The pressure altitude was calculated as 2,361 feet.

The first identified point of contact (FIPC) was a ground scar. The debris path was along a magnetic bearing of 104 degrees. The fuselage came to rest on a heading of 215 degrees magnetic.

The representative from Aero Commander identified the airplane wreckage at the beginning of the debris field as forward fuselage and cockpit structure components. Pieces of the left wing tip were found in the middle of the debris field.

The flaps were measured in the 30-degree position; the flap actuator was measured at 1 15/16 inches, which the manufacturer stated corresponded to a 30-degree position. The flap indicator was damaged in the impact sequence but indicated the flaps were in the 30-degree position.

The NTSB has not determined probable cause at this time.

Forest Service Accident Review Board Action Plan

The ARB submitted a letter to the USFS Director, Office of Safety and Occupational Health and the Director, Fire and Aviation on a couple of issues that did not directly relate to the causal factor of this accident.

1. Follow-up on a study on fixed-wing performance charts that was started by the National Fixed-Wing Specialist.
2. Review the recommendation in the Interagency Standards for Fire and Fire Aviation Operations (Red Book) for Personnel Protective Equipment (PPE) for special mission use.

The Accident Investigation Team recommended that the federal agencies that utilize the North Las Vegas airport meet with airport officials and be actively involved in the development of a new/updated emergency response plan and considerations when staging aircraft at the airport. The agencies were actively pursuing this shortly after the accident.

Incidents With Potential



T462 departed Canon City, CO for the Mason Fire with 400 gals of water and foam. While enroute to the fire the pilot noticed the engine running rough, it would loose then gain power. The pilot added carb heat with no change to engine. The pilot contacted the leadplane on the fire and informed him that he was returning to the airport due to engine problems. He punched off the load over farmland and turned towards Canon City. The pilot then noticed flames coming from engine and determined he needed to land the aircraft immediately. He successfully landed the aircraft in a field and extinguished fire. The investigation team found a safety wire that had completely worn through the bolt allowing fuel to leak into the engine, which caught fire.



The aircraft was dispatched to fire #060 for retardant drops. On the third drop of the morning, the pilot powers up the aircraft to start his drop run. According to the pilot, the drop run is normal and nothing out of the ordinary. Upon completing his third drop and starting to climb out he scanned his instruments and saw the low oil pressure light come on. He immediately notified the ATGS and keeps climbing towards the middle of the valley and headed for John Day airport. His instruments were showing normal readings at this time except for the low oil pressure and engine torque had dropped to 10%. He noticed a vibration in the engine and felt a slight power drop followed quickly by an engine chip light. He knows he only has a few seconds before the engine would probably quit and reacts immediately to feather the propeller, shut off the fuel and set up for the proper glide profile to get back to the airport. The airtanker is approximately 5 miles from the airport and the pilot has been able to gain enough altitude prior to the engine stopping to complete a successful "dead stick" landing to the airport. The investigation team found that the aircraft had a catastrophic engine failure 38.2 hours after it had been overhauled.



The aircraft was on an insect and disease flight with one USFS aircrew member mapping an area east of the Helena. At approximately 11:45 the pilot noticed a sudden drop of oil pressure and immediately turned the plane toward the airport, they were about 20 mi from the airfield at this point at 10,000 MSL. Within 1 minute the oil pressure dropped below the green and continued to drop toward zero, however, the engine appeared to be running normal. As they continued toward the airport the oil temp gauge began to slightly decrease and the cylinder head temp gauge indicated a slight increase in temperature. At approximately 10 miles the oil pressure indicated zero and the engine rpm began to fluctuate, probably due to a loss of oil pressure in the prop. The pilot kept the altitude high to increase the glide distance, and looked over the emergency checklist cards. At about 5 miles they were losing RPM and the landing gear alarm began to sound since the gear was still retracted. At about 1 mile the pilot lowered the gear, simultaneously the engine began to vibrate violently and the pilot officially declared an emergency with the tower. The tower did an outstanding job of keeping traffic clear and making sure they could make a straight in landing. At about ¼ mile or less, on final, the pilot shut off the fuel and pulled back on the mixture to shut down the engine in case of fire. He landed with the power off and coasted off the active runway onto runway 34 where we met the fire truck. The pilot remained calm and performed all the steps methodically throughout the incident.