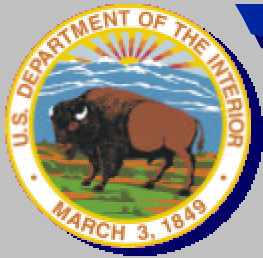


# *Aviation Accident Review*



**FY01**

**Department of the Interior  
Aviation Accident Review**



# Ground Rules

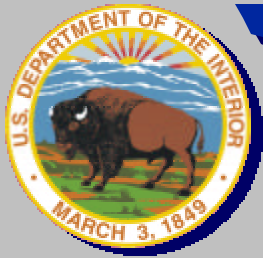


## The National Transportation Safety Board

- ◆ **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.

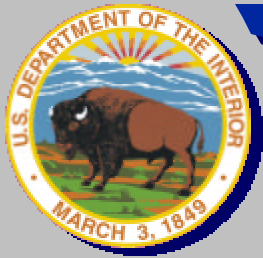


# *Ground Rules*



The National Transportation Safety Board

- ◆ Avoid discussion of “Probable Cause”, unless determined and published by the NTSB
- ◆ For accident prevention purposes only



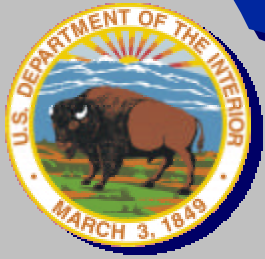
# *Ground Rules*

## *Each accident is unique*

Although the results may be very similar the causal factors leading up to an accident are never exactly alike.

Therefore, no two sets of findings, recommendations, or presentations will ever be the same.

It is imperative that you focus your attention on the underlying "root" causes for each unique accident and avoid comparing one investigation or presentation against another.



# ***“The PROCESS”***

**Accident Investigation  
involves asking three questions**

**What happened?**

**(gather facts)**

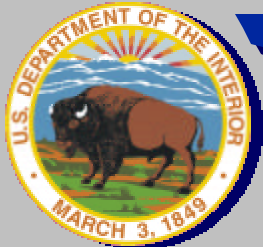
**Why did it happen?**

**(causal analysis)**

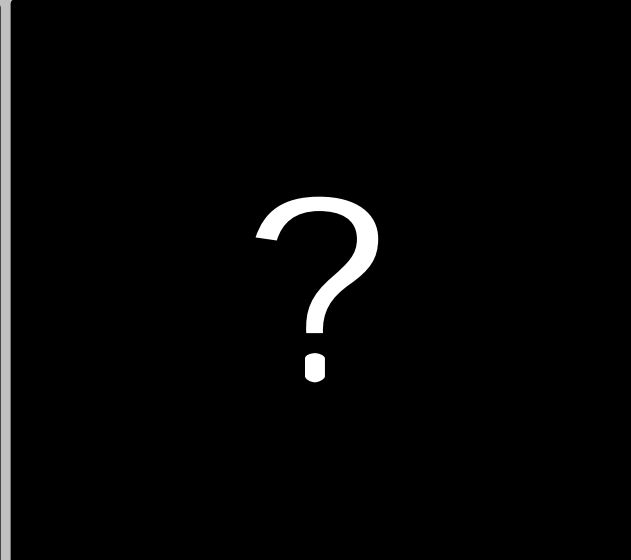
**What can we do to prevent it?**

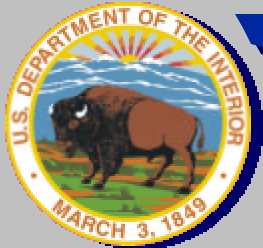
**(develop recommendations)**

***The 3W's of accident investigation***



# Aviation Accident Review





# Mesa Verde NP, CO

October 30, 2000

## Bell 206L-1

### Mission

Aerial Seeding

### Damage

Substantial

### Injuries

None

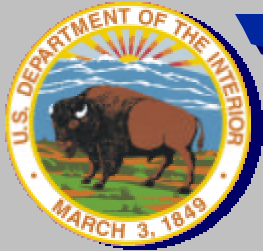
### Procurement

Fleet

### NTSB ID

DEN01LA012





# *Mesa Verde NP, CO*

*October 30, 2000*

**A Bell 206L-1 helicopter, N613, sustained substantial damage when a tail rotor blade failed during approach to a helicopter landing pad.**

**The pilot, the sole occupant, was not injured.**







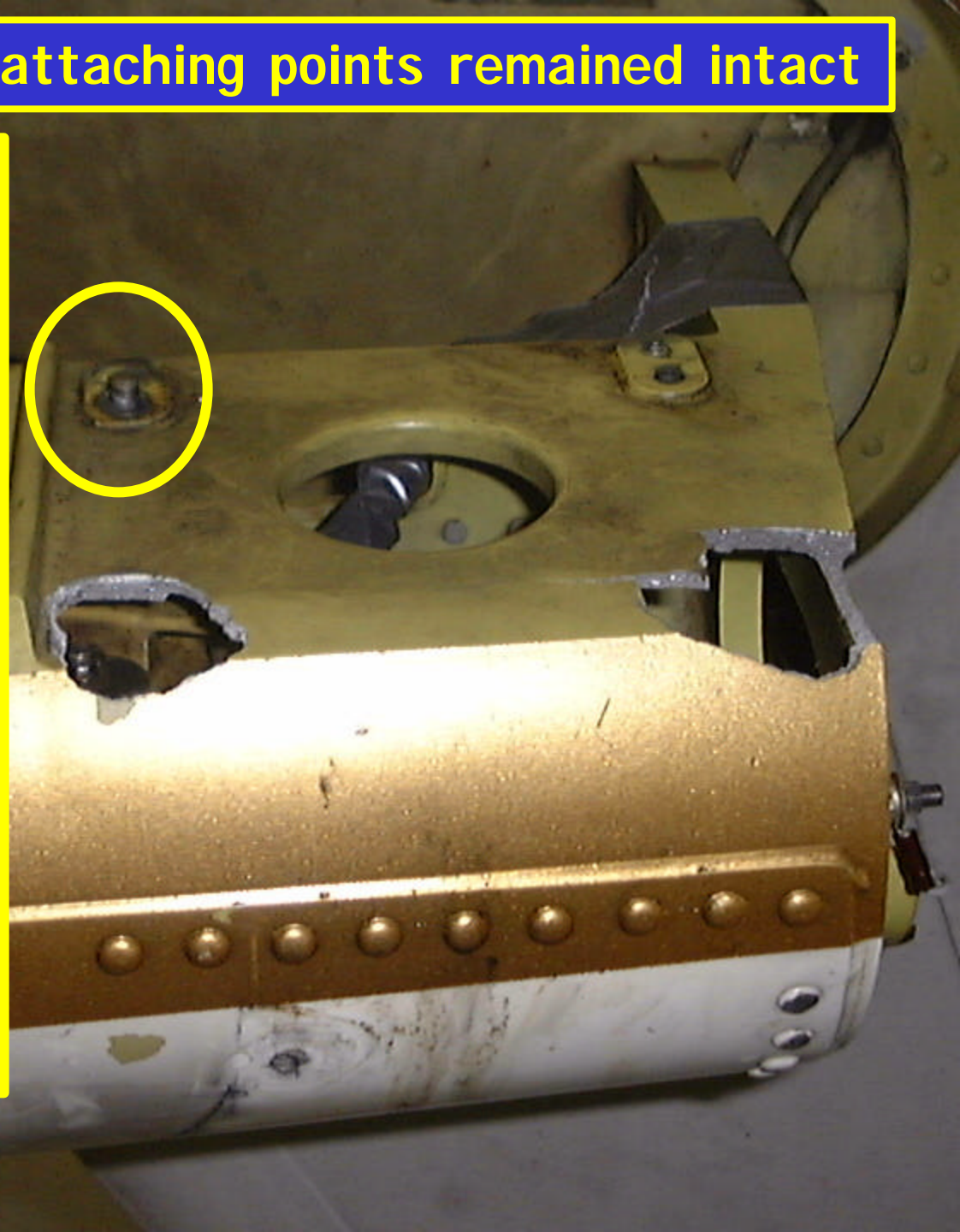
**Trailing edge de-bonded**

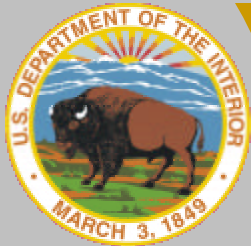
DO NOT USE  
FOR HANDLING  
HELICOPTER

45287  
N 613  
15-02-90-102  
C 2-7266

Trailing edge de-bonded

Only 1 of 4 gearbox attaching points remained intact





# ***NTSB Probable Cause*** ***Mesa Verde NP, CO , October 30, 2000***



**The National Transportation Safety Board**

**The National Transportation Safety Board determined that the probable cause of this accident was ...**

## **Probable Cause**

- The manufacturer's use of improper materials, and inadequate quality control of the tail rotor blades during the manufacturing process, which resulted in fatigue failure of the blade.





# ***OAS Observations***

## ***Mesa Verde NP, CO, October 30, 2000***

### ***Issue***

**Pilot's skill and  
outstanding judgment**

### **Pilot Skill and Judgment**

- Pilot's skill enabled the immediate identification of the emergency
- Pilot's judgment resulted in the quick and appropriate response to the emergency
- Pilot's actions prevented injury to himself and other personnel on the ground and further damage to the aircraft





# ***OAS Observations***

## ***Mesa Verde NP, CO, October 30, 2000***

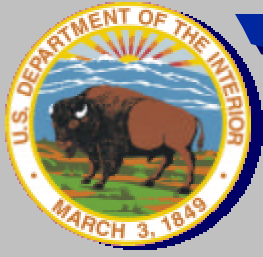
### ***Issue***

**Proper and timely response to in-flight emergencies**

### **Pilot Skill and Judgment**

- Most Conservative Response Rule:
  - In-flight emergency :
    - ✓ Acknowledge the emergency
    - ✓ Comply with the appropriate emergency procedures in the Pilot's Operating Handbook
    - ✓ Do not continue flight or mission until problem is inspected and cleared by approved maintenance personnel
  - Normal Operations :
    - ✓ Chose the course of action that minimizes risk





# Pierce, ID

December 28, 2000

## Hughes 500C

### Mission

Wildlife tracking

### Damage

Substantial

### Injuries

Two fatal

One serious

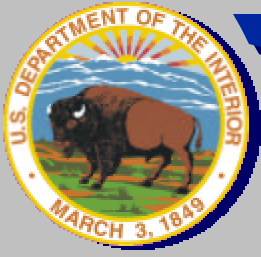
### Procurement

Rental

### NTSB ID

SEA01FA032





# Pierce, ID

December 28, 2000

## *Non-DOI Accident*

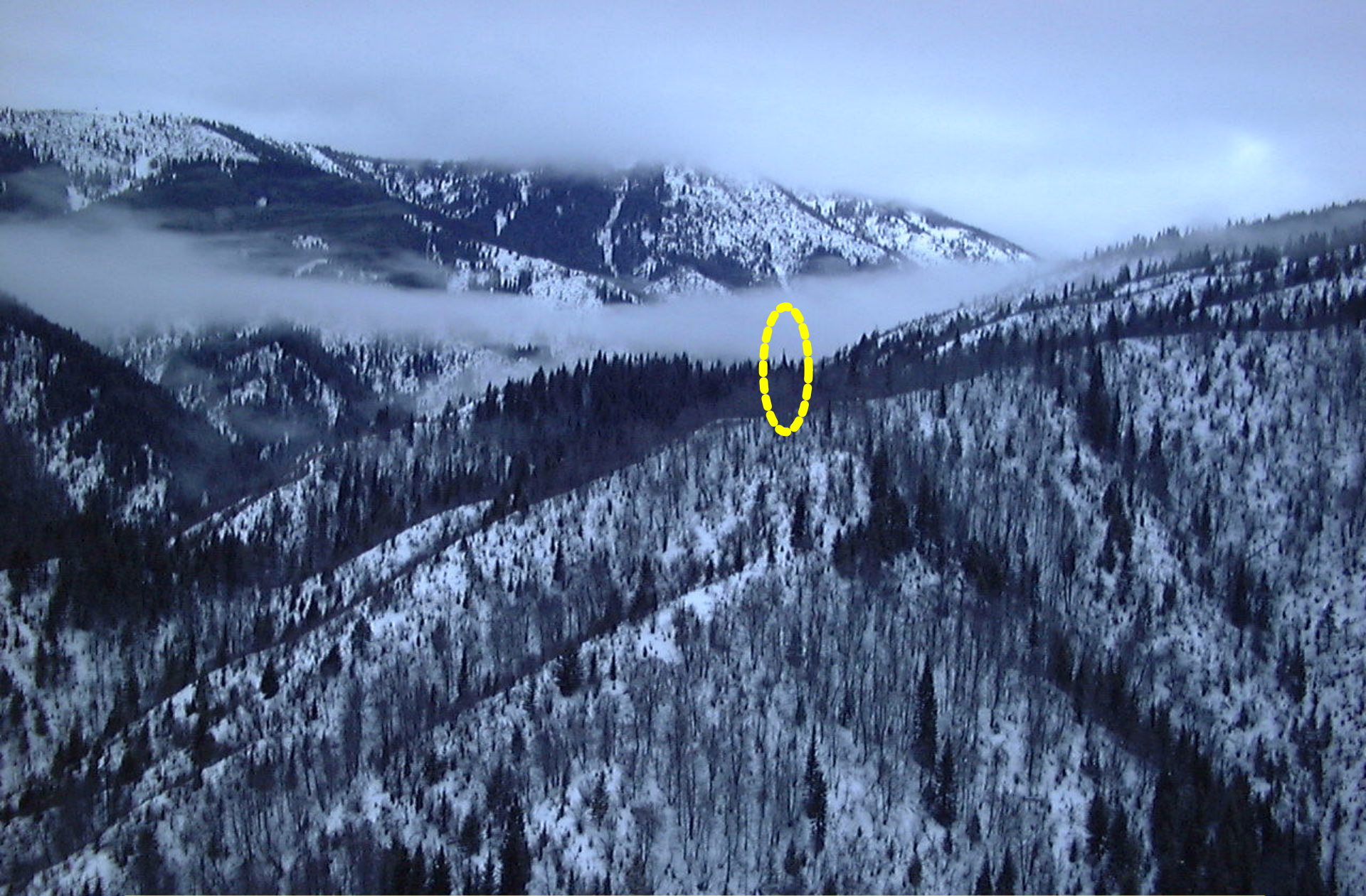
During an Idaho Fish and Game Department mission to find and track mountain lions the helicopter collided with a tree (snag) and crashed.

The pilot, sitting in the left seat was making a right, descending turn to begin a search track when the impact occurred.

The left rear seat passenger egressed the aircraft and survived for over 20 hours until rescued.







View approaching mishap site,  
can you spot the snag?



What part of the snag do you see?



Even now it is almost invisible.



**Impact knocked off the top 12 feet of the tree.**



**Plexi-glass from chin bubble**

**Aircraft impacts inverted**

**Rear passenger escapes**





Primary impact to fuselage

# 30 pounds of survival gear



If it isn't secure,  
it can hurt you...



and if you don't know how to use it,  
it can't help you

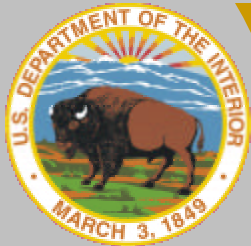




**Seatbelt failed during crash sequence**



**Check for abrasions, cleanliness, and general condition**



# ***NTSB Probable Cause*** ***Pierce, ID, December 28, 2000***



**The National Transportation Safety Board**

**The National Transportation Safety Board determined that the probable cause of this accident was ...**

## **Probable Cause**

**That while maneuvering, clearance from an object was not maintained.**

**A tree was a factor.**





# ***OAS Observations***

## ***Pierce, ID, December 28, 2000***

### **Issue**

In the terrain flight environment safely operating the aircraft must be everyone's top priority

### **Crew Resource Management**

- Are pilots responsible for tasks which divert their attention from flying ?
- Do pilots brief other crew or passengers to assist them with hazard identification (birds, other aircraft, snags, etc.)?
- Do employees understand that it's inappropriate to distract a pilot unless safety of flight is at stake?





# ***OAS Observations***

## ***Pierce, ID, December 28, 2000***

### **Issue**

Organizational policy restricted access to, and practice with, survival kits ...

except in emergency

### **Aviation Life Support Equipment**

- Do all crew and passengers know the location, contents, and use of survival equipment carried on the aircraft?
  - Emergency locator transmitter (ELT)
  - Visual signaling devices
- Are employees who are required to fly provided periodic training with survival equipment contained in aircraft survival kits?





# ***OAS Observations***

## ***Pierce, ID, December 28, 2000***

### **Issue**

Preparation, training, and composure allowed rear-seat passenger to survive

### **Aviation Life Support Equipment**

- Supervisor trained survivor on use of Personal Locator Beacon (PLB) on first day of mission
  - Aircraft ELT didn't work
  - Visual signaling didn't work
  - Personal Locator Beacon worked





# ***OAS Observations***

## ***Pierce, ID, December 28, 2000***

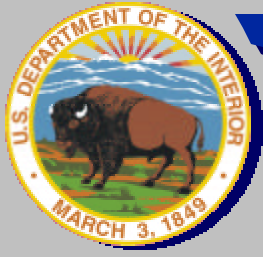
### **Issue**

Preparation, training, and composure allowed rear-seat passenger to survive

### **Aviation Life Support Equipment**

- Survivor used survival equipment in supervisor's pack effectively (and creatively)
  - Created modified snow shelter using space blanket
  - Planned use of flares to maximize effectiveness
  - Used helmet bag as hat to conserve heat
  - Burned all available items to create smoke signal





# King Salmon, AK

April 21, 2001

PA-18 Super Cub

Mission

Maintenance  
ferry

Damage

Substantial

Injuries

None

Procurement

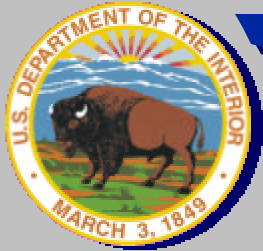
Fleet

NTSB ID

ANC01TA049







# *King Salmon, AK*

*April 21, 2001*

A tundra tire equipped PA-18, N 745, sustained substantial damage during a downwind landing at the King Salmon airport, AK.

The pilot, the sole occupant, was not injured.

Following a visual inspection the pilot elected to fly the damaged aircraft to Anchorage.

Accident notification was delayed two days.







**Do not continue flight or mission until the problem is inspected and cleared by approved maintenance personnel**

**If you break it, park it !**



# ***NTSB Probable Cause*** ***King Salmon, AK, April 21, 2001***



**The National Transportation Safety Board**

**The National Transportation Safety Board determined that the probable cause of this accident is ...**

## **Probable Cause**

**"The pilot's inadequate compensation for wind conditions, and inadequate weather evaluation resulting in a loss of directional control during the landing roll.**

**Factors in the accident were the presence of a quartering tailwind, and an inadvertent ground loop."**





# ***OAS Observations***

## ***King Salmon, AK, April 21, 2001***

### **Issue**

#### **Pilot's judgment**

#### **Pilot Judgment**

- Why did the pilot land downwind?
- Why did the pilot land using the three-point technique?
- Why did the pilot fail to have the damage checked by maintenance?
- Why did the pilot continue his flight to Anchorage?
- Why did the pilot fail to report the accident in a timely manner as required by DM?





# ***OAS Observations***

## ***King Salmon, AK, April 21, 2001***

### ***Issue***

**Flying aircraft that are not airworthy**



### **Pilot Judgment**

- Why would a pilot knowingly fly an aircraft after it was damaged?
- Would the pilot have accepted the aircraft for a mission in the same damaged condition?
- Do pilots understand what constitutes "airworthy"?



# *OAS Observations*

## *King Salmon, AK, April 21, 2001*

### Issue

Knowing your limitations and the limitations of your aircraft

### Pilot's Responsibility

- Do pilots objectively evaluate their own capabilities and include a self evaluation in the overall assessment of the mission risks?
- Did the pilot exceed the aircraft's capabilities by attempting to land downwind?





# ***OAS Observations*** ***King Salmon, AK, April 21, 2001***

## **Issue**

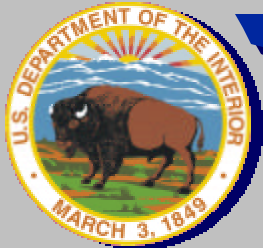
**Failure to comply with Departmental mishap reporting policy**

## **Pilot's Responsibility**

- Why did the pilot fail to comply with Departmental policy that requires immediate reporting of damage or injury to the mishap reporting hotline?
- What process can we use to ensure pilots and other employees comply with Departmental policies?







# Star, ID

May 1, 2001

DHC-6-300

Twin Otter

Mission

Smokejumper  
training

Damage

Substantial

Injuries

None

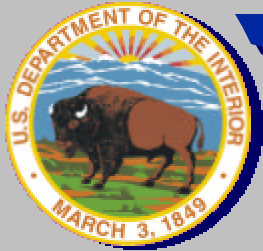
Procurement

Fleet

NTSB ID

SEA01TA083





# Star, ID

May 1, 2001

A Twin Otter, N49SJ, operated as a public use flight, was substantially damaged when the aircraft veered off the runway at Star, Idaho, and collided with the terrain.

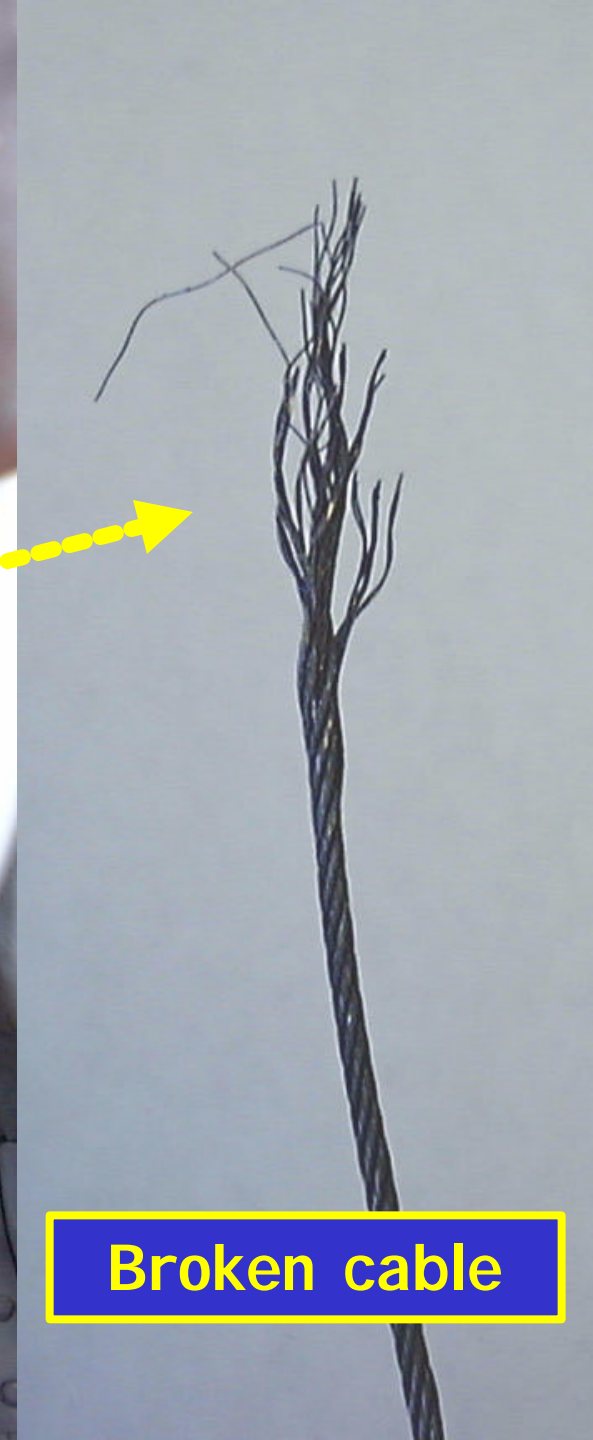
According to the NTSB metallurgical analysis of the nose steering cable revealed evidence of pre-existing metal fatigue.

Neither the pilot nor the passenger were injured.






**Steering lever resting in left turn position**



**Broken cable**



**Directional control should be maintained with rudder.  
Nosewheel steering and brakes should be used only  
at taxi speeds.**

**2.6.2 CROSSWIND LANDING.** With flap  $37.5^\circ$  crosswind landings have been demonstrated in a maximum crosswind component of 20 knots measured at 6 feet, which is equivalent to 27 knots at 50 feet. This was the maximum encountered during crosswind landing trials, and is not considered limiting. The preferred technique requires that the upwind wing be lowered during the approach with sufficient opposite rudder applied to align the aircraft with the runway. As airspeed decreases during the flare and rollout, both of these control applications must be increased. The nosewheel should be held on the ground during the ground roll, along with "into wind" aileron. Directional control should be maintained with rudder. Nosewheel steering and brakes should be used only at taxi speeds.



**Aerial view of approach path and termination**



**Aerial view of approach path and termination**



**Aerial view of approach path and termination**

**NOT TO SCALE**

**Acft stops 1190' after touchdown**

**Acft left runway 950'**

**Skid marks veer left 750'**

**Steering failed 420'**

**Touchdown to pavement 330'**

**Initial touchdown**



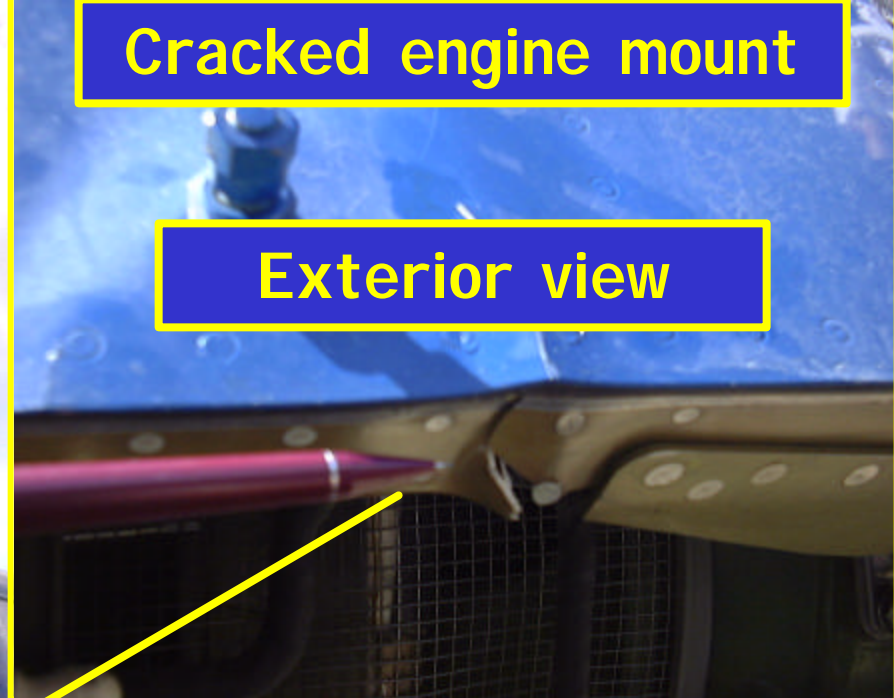




**Nose gear sheared off**

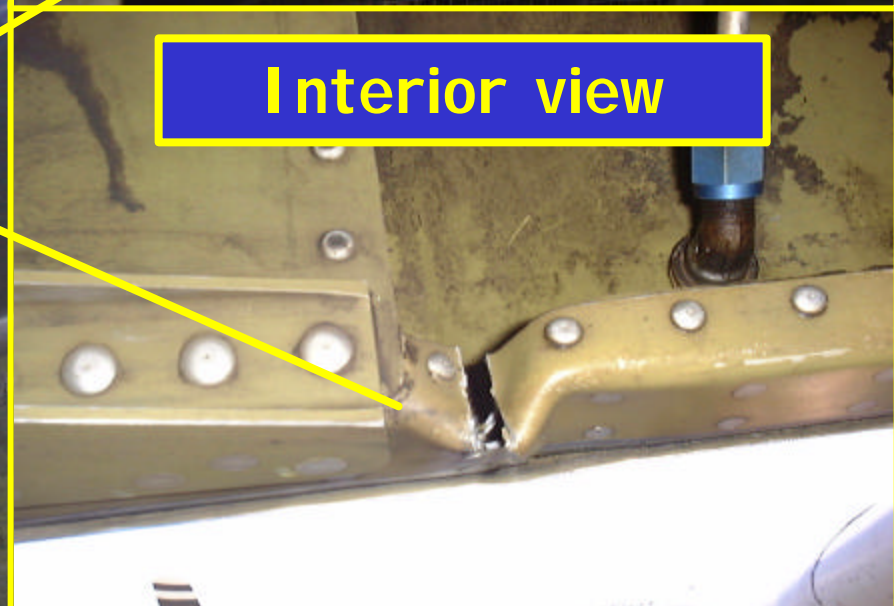


**Propeller and structural damage**



**Cracked engine mount**

**Exterior view**



**Interior view**



# ***NTSB Probable Cause*** ***Star, ID, May 1, 2001***



**The National Transportation Safety Board**

**The National Transportation Safety Board determined that the probable cause of this accident is ...**

## **Probable Cause**

**“Fatigue failure of the nose wheel steering cable during the landing roll. ”**

**“Rough/uneven terrain was a factor. ”**





# ***OAS Observations*** ***Star, ID, May 1, 2001***

## **Issue**

**Pilot decision to use the nose wheel steering at high speed during crosswind landing**

## **Pilot Judgment**

- Was the pilot aware of the guidance in the Operator's Handbook regarding use of nose wheel steering in crosswinds?
  - If yes, why did the pilot ignore the guidance?
  - If no, how can the training program be improved?
  - Is this inappropriate technique being used by other pilots?





# ***OAS Observations*** ***Star, ID, May 1, 2001***

## **Issue**

**Pre-existing metal fatigue in nosewheel steering cable**

### **Aircraft Operations**

- Did pilots or ground personnel (users or maintainers) apply excessive force to the nosewheel steering lever and over stress the cable?
- Did pilots or ground personnel (users or maintainers) attempt to use the nosewheel steering lever without hydraulic pressure?
- Was the nosewheel steering cable damaged in maintenance?
- Was the nosewheel steering cable damaged in manufacture?





# OAS Observations

## Star, ID, May 1, 2001

### Issue

Informal flight plan  
with smokejumpers  
and flight following  
with tower

### Mission Planning

- Why do pilots fail to comply with OPM 01-02 requirements for:
  - flight plans (FAA, ICAO, Bureau approved, or an OAS approved vendor program)
  - flight following
- How can DOI improve compliance with OPM 01-02 ?





# ***OAS Observations*** ***Star, ID, May 1, 2001***

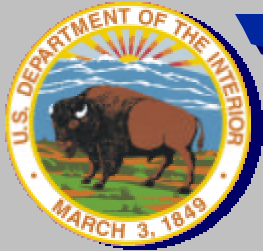
## **Issue**

**Failure to adequately report the mishap to OAS per 352DM6**

## **Mishap Reporting**

- After the call to 911 why was OAS not notified of the accident?
- Was any aviation accident response plan available or used ?
- Were the pilot and smokejumpers trained on post-mishap procedures?





**Elko, NV**  
**August 21, 2001**

**Aero Commander  
500**

**NTSB Investigation On-Going  
Preliminary Information**

Mission

Air Attack

Damage

Substantial

Injuries

None

Procurement

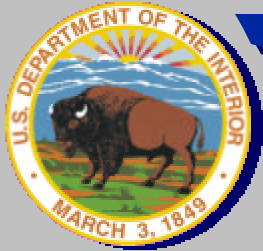
Contract

NTSB ID

LAX01TA284







# *Elko, NV*

*August 21, 2001*

**An Aero Commander 500, N975AA, operated as a public use flight, was substantially damaged when both main landing gear collapsed on landing.**

**Analysis of the landing gear is being conducted but the investigation was hampered by the premature disassembly of components by the operator.**

**Neither the pilot nor the two passengers were injured.**





**Substantial structural damage**



Indication of gear extension



Panel removed before arrival of investigators



# OAS Observations

## Elko, NV, Aug 21, 2001

### Issue

Excellent crew coordination

### Crew Resource Management

- Both Air Tactical Group Supervisors (ATGS) confirmed that the gear were down and locked.
- ATGS supervisor ensured the engines were shutdown before the occupants exited the aircraft
- ATGS supervisor coordinated with the pilot before exiting the aircraft





# ***OAS Observations*** ***Elko, NV, Aug 21, 2001***

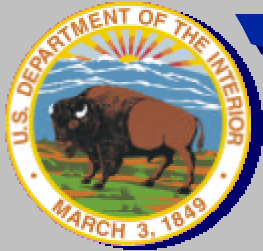
## **Issue**

After the mishap the aircraft was moved and partially disassembled prior to the arrival of investigators



## **Post Mishap Actions**

- How can we improve post accident responses?
  - Providing aircraft security
  - Prohibiting tampering with evidence
  - Taking Photographs
  - Segregating witnesses and taking initial statements



# *Aviation Accident Review*

## **Observations**

*Restraint Systems*

*Secure Loose Items*

*Situational Awareness*

*Use Available Crew and Pax*

*Know Your Survival Equipment*

*Follow Established Procedures*

*Secure Aircraft After Mishaps*

*Don't Fly (or fly in) Broken Aircraft*

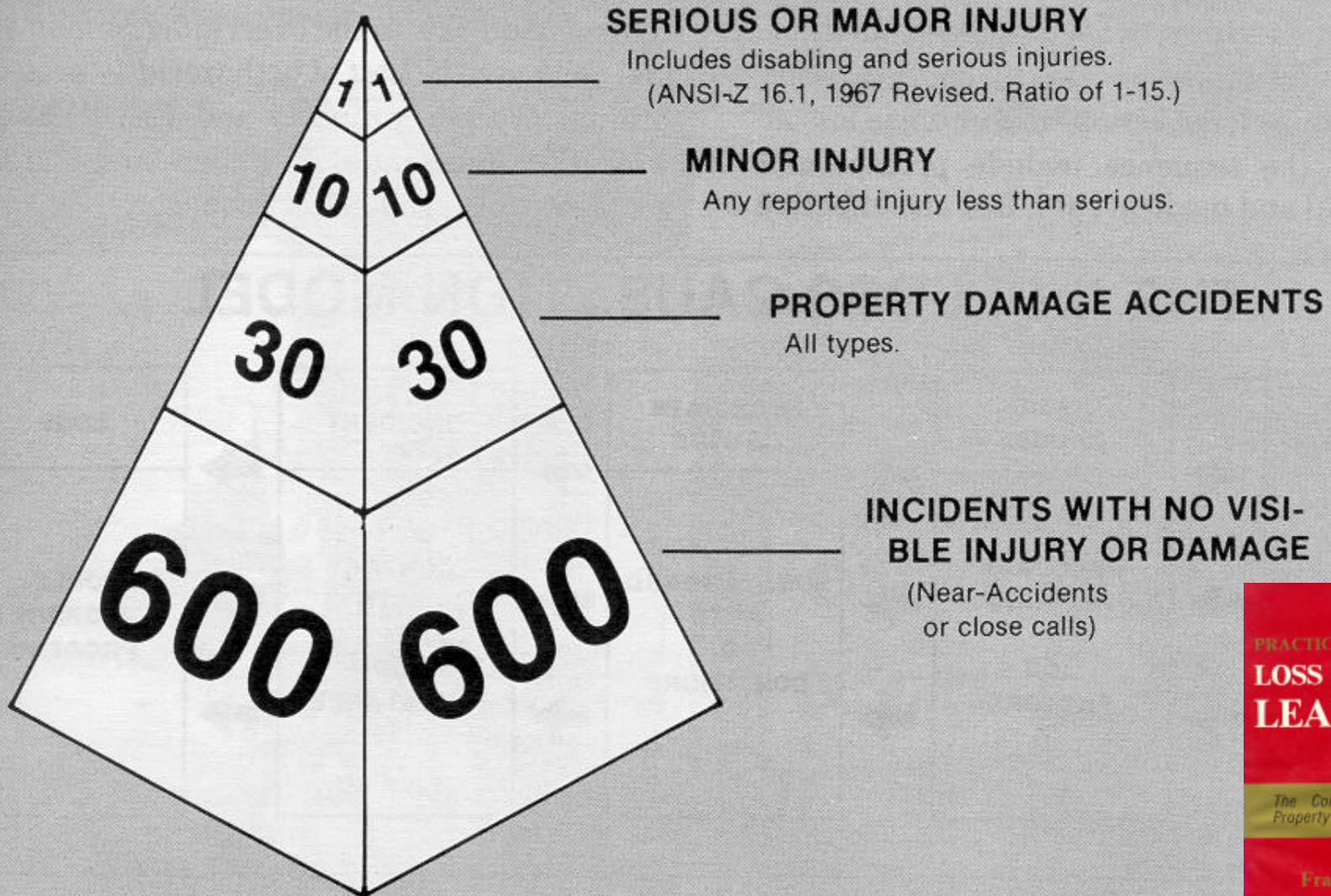
*Know Your Limitations (and your aircraft's)*

*Use your Interagency Aviation Mishap Response Plan*

**YOU ARE RESPONSIBLE FOR YOUR SAFETY**

# Frank E. Bird Jr.

## ACCIDENT RATIO STUDY

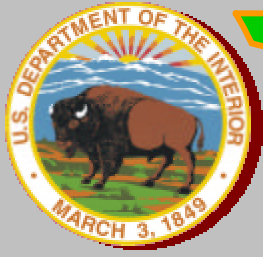


**PRACTICAL  
LOSS CONTROL  
LEADERSHIP**

*The Conservation of People,  
Property, Process, and Profits.*

Frank E. Bird, Jr.  
and  
George L. Germain



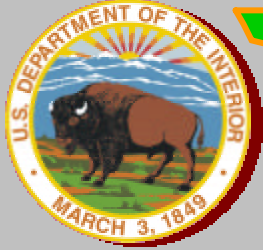


# *Hazard Reporting*

If you think it's wrong question it

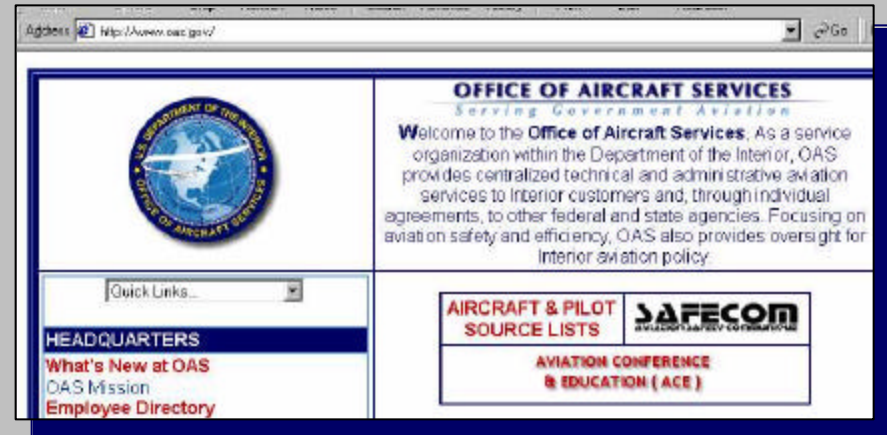


If you know it's wrong... **STOP IT !!!**



# Hazard Reporting

## Safety Communiqué - SAFECOM You can drop us a line



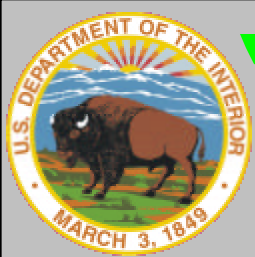
[www.aviation.fs.fed.us](http://www.aviation.fs.fed.us)

[www.oas.gov](http://www.oas.gov)

Or give us a call



**1.888.4MISHAP**



# Hazard Reporting

For hazards or heroes  
Anyone can submit  
Anonymous

## Five Steps To A Safe Flight

1. Pilot/Aircraft Data Card - Approved & Current
2. Flight Plan/Flight Following Initiated
3. PPE in Use When Required
4. Pilot Briefed on Mission & Flight Hazards
5. Crew & Passenger Briefing to Include:
  - Aircraft Hazards
  - Fire Extinguisher
  - Seat Belt & Harness
  - Fuel & Electrical Shut-off
  - ELT & Survival Kit
  - Oxygen Equipment
  - First Aid Kit
  - Emergency Egress
  - Gear & Cargo Security
  - Smoking(Not Under Seats)

FS 8700-14 (045-103) Jan 96

## Remember!

To report an aircraft accident call:

**1-888-4MISHAP (1-888-464-7427)**

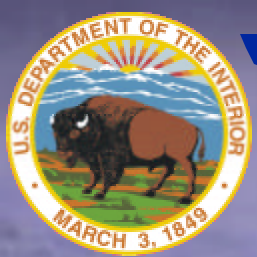
File a SAFECOM to report any condition, observance, act, maintenance problem, or circumstance which has potential to cause an aviation-related accident.

Anyone can refuse or curtail a flight when an unsafe condition may exist.

Never let undue pressure (expressed or implied) influence your judgement or decisions. Avoid mistakes, don't hurry!

# Remember...

# If you see something... say something !!!



# *Aviation Accident Review*

