# FY03

# USDA Forest Service Aviation Accident Review

# *Introduction*

**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.**

# *Introduction*

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

**For accident prevention purposes only**

# Introduction

The NTSB has not determined probable cause at this time for any of the following accidents.

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

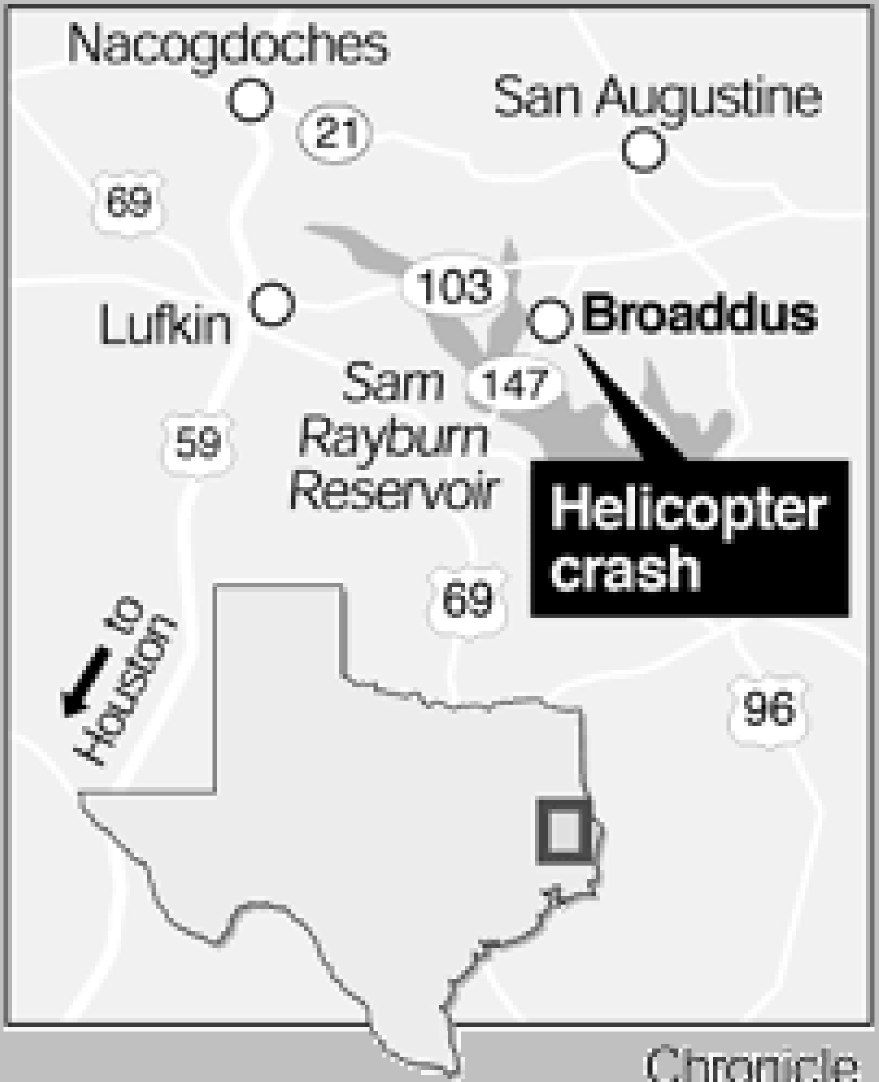
# Angelina NF, TX

NTSB Identification: **FTW03FA118**
14 CFR Part 91: General Aviation
Accident occurred Thursday, March 27, 2003 in Broadus, TX
Aircraft: Bell 407, registration: N175PA
Injuries: 2 Fatal, 3 Serious.

# N175PA (Bell 407)

## Mission

Aerial search and recovery of debris from the Space Shuttle Columbia accident, the aircraft was under a CWN contract with the USDA, Region 3.



# N175PA (Bell 407)

The pilot and 1 crewmember were fatally injured and 3 other crewmembers sustained serious injuries. Visual meteorological conditions prevailed

# N175PA (Bell 407)

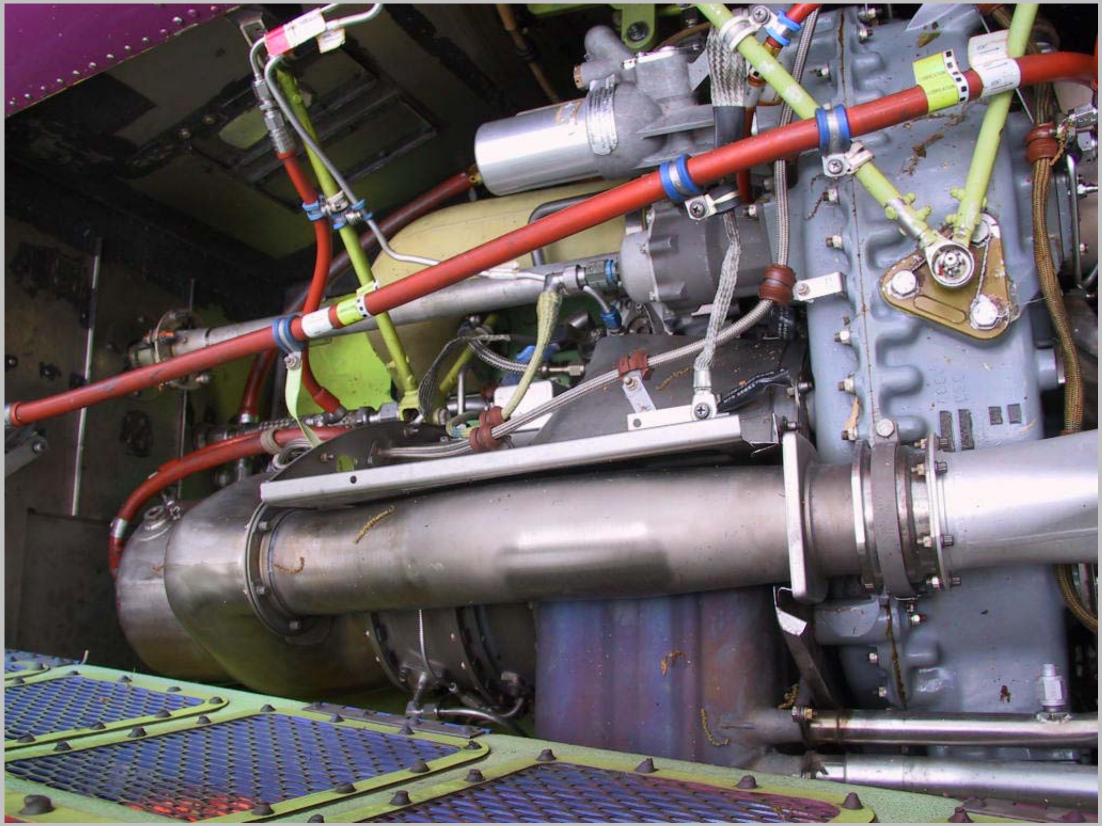
The helicopter was completing its second search mission of the day while hovering about 125 feet above the ground

# N175PA (Bell 407)

The surviving passengers reported that the helicopter lost power and descended rapidly into the 80-foot tall trees. The helicopter came to rest on its right side at the base of a 80-foot tree

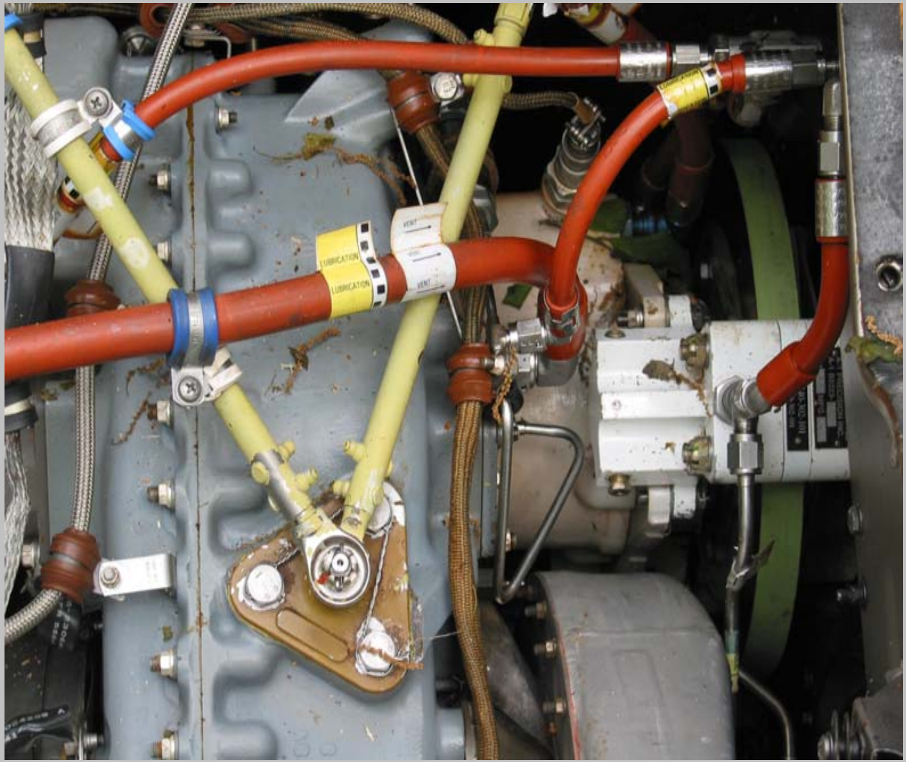
# N175PA (Bell 407)

After the wreckage was recovered, the engine was removed and set up in a test cell. The engine operated normally in the manual mode.



# N175PA (Bell 407)

During the test cell run, it was discovered that the power lever angle (PLA) indicator on the Hydro Mechanical Unit (HMU) responded erratically to normal throttle inputs when the engine was operated in the electromechanical mode.



# N175PA (Bell 407)

## United States Department of Agriculture
## Forest Service
# Aviation Safety Alert

**No. 2003-08** **May 22, 2003** 

**Subject**: Bell 407 Helicopter Stand Down

**Area of Concern:** Helicopter Operations

**Distribution:** USFS Aviation Operations

**Discussion:** Recently, Bell 407 helicopters have experienced a series of accidents resulting from power losses. One of the accidents occurred while the USDA Forest Service (FS) was supporting the NASA space shuttle recovery efforts in Texas. The FS has de

The B
reduce
Hydro
and its

The B
Bullet

Recently, Bell 407 helicopters have experienced a series of accidents resulting from power losses. One of the accidents occurred while the USDA Forest Service (FS) was supporting the NASA space shuttle recovery efforts in Texas. The FS has decided to issue an immediate stand down of exclusive use and call-when-needed contract Bell 407 helicopters

# N175PA (Bell 407)

Further testing and evaluation of the HMU revealed anomalies with the potentiometer component of the system.

**Bell Helicopter Company has reported that since compliance with the Airworthiness Directives there has not been another Fully Automated Digital Electronic Control (FADEC) related accident in the world.**

# Preliminary Findings

## HUMAN FACTORS

◊ **Mission Factors**

- **Changing Plans/tactics**
- **Change of teams/personnel**
- **Low flight hours in type**
- **Limited reaction time**

◊ **Judgment and Risk Decision**

- **Acceptance of high risk mission**
- **Violation of procedures**

◊ **Communications**

- **Inadequate mission information conveyed to flight related to management intent not to perform search profiles over trees.**

# HUMAN FACTORS (CONT)

◊ **Supervisory and Organizational**

- **Failure to provide adequate briefing for mission**
- **Failure to monitor compliance with standards**
- **Failure of standards (poorly written, highly interpretable, or conflicting)**
- **Failure to perceive or to assess correctly mission risks.**

# Gypsy Moth Project, Narrows, VA

NTSB Identification: **NYC03TA138**
14 CFR Part 91: General Aviation
Accident occurred Thursday, June 26, 2003 in Pearisburg, VA
Aircraft: Air Tractor 402A, registration: N4506L
Injuries: 1 Uninjured.

# N4506L, Air Tractor 402A

## Mission

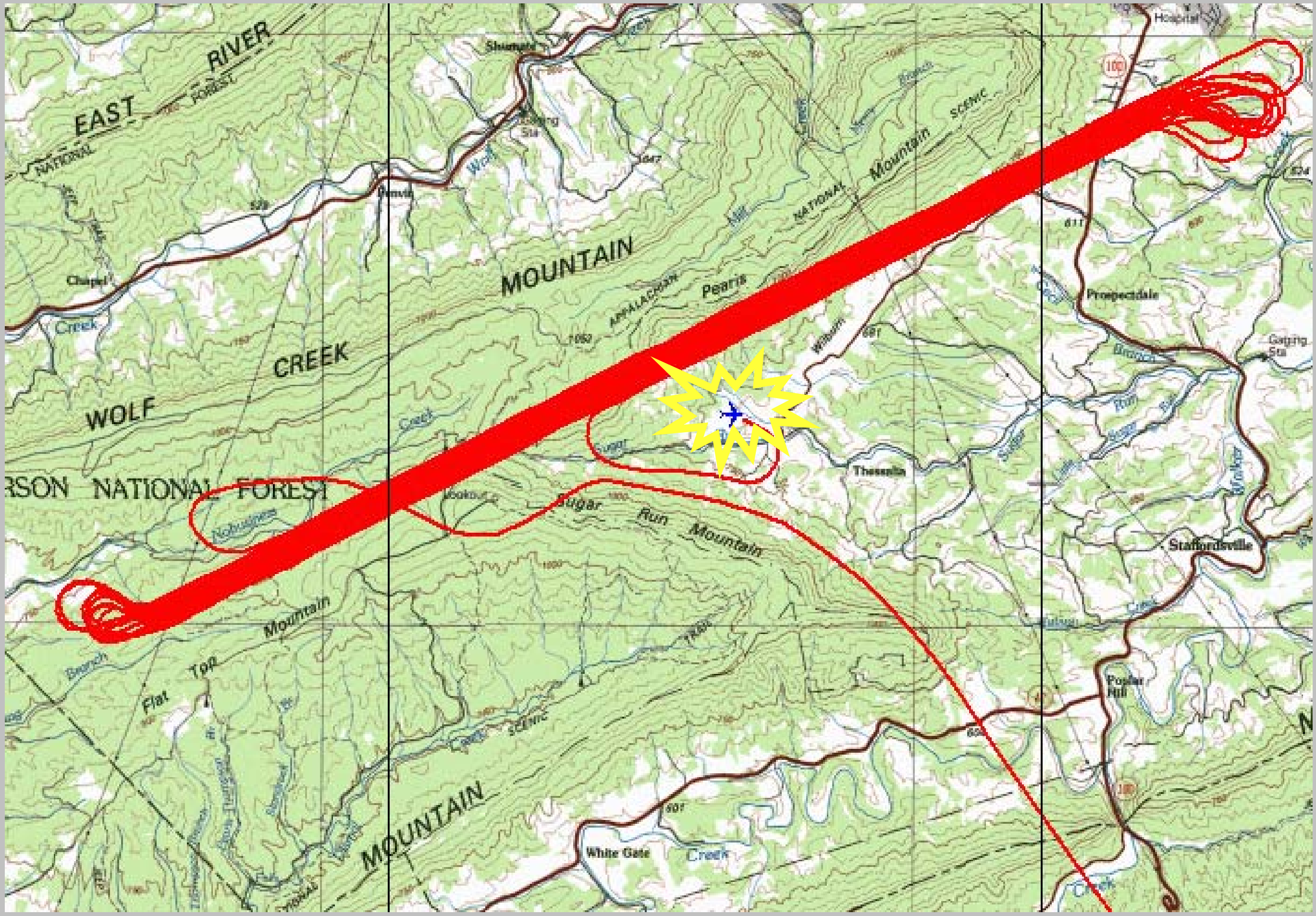
Aerial application of Pheromone flakes in support of the Gypsy Moth slow the spread strategy (STS)

# N4506L, Air Tractor 402A

The pilot was in the middle of a run when he observed orange flames and black smoke emitting from the engine exhausts. He feathered the propeller, and set up for a forced landing in a nearby open area.

# N4506L, Air Tractor 402A

GPS Flight Path from Airport to Accident site



# N4506L, Air Tractor 402A

The Air Tractor under contract to the USDA Forest Service, was substantially damaged during the forced landing

# N4506L, Air Tractor 402A

The engine was reported to have a total time of 26,775 hours, including 10,708.9 hours since last overhaul and was retained for further examination.

# N4506L, Air Tractor 402A

The tear down analysis revealed excessive damage to the compressor blades and other turbine components

# N4506L, Air Tractor 402A

# N4506L, Air Tractor 402A

Hole in Burn Can

# Preliminary Findings

## HUMAN FACTORS

◊ **Management:**

- **The contractor failed to meet the standards as set forth in the Government contract for engine maintenance.**
- **Improperly carded by the USDA Forest Service. Aircraft carded improperly with excessive engine hours since last major overhaul (over 10,000 hours) Pratt-Whitney TBO 3600 hours no exceptions or extensions for agricultural use.**

**“ Aircraft shall not be approved if any engine, component, or propeller time in service exceeds the manufacturers recommended time between overhaul. All inspection times and intervals shall comply with Section D of the Contractor’s operations Specifications.”**

# Tucson, AZ, Coronado NF

NTSB Identification: **LAX03TA229**
14 CFR Part 133: Rotorcraft Ext. Load
Accident occurred Monday, July 07, 2003 in Tucson, AZ
Aircraft: Sikorsky S-64E, registration: N6979R
Injuries: 2 Uninjured.

# Tucson, AZ, Coronado NF

## Mission

The purpose of the flight was to provide retardant/water drops for suppression of the Aspen fire.

# Tucson, AZ, Coronado NF

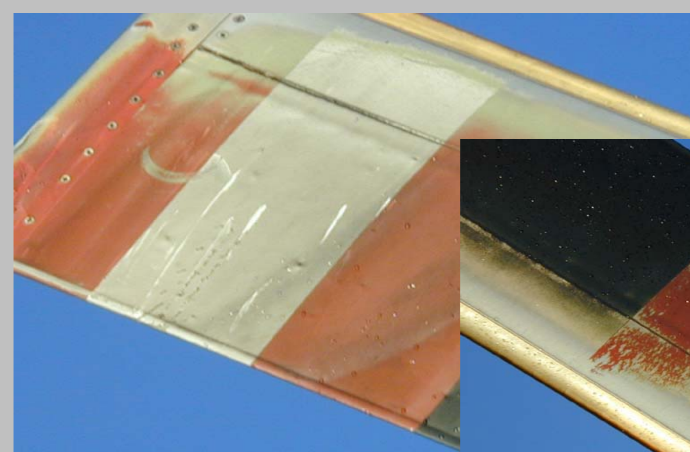
The helicopter was equipped with a 2,000 gallon fixed tank with snorkel hover fill capability, and configured to carry a maximum of three flight crewmembers.

# Tucson, AZ, Coronado NF

Maintenance personnel discovered the exhaust tube on the left engine was damaged. The helicopter was shutdown and examined

# Tucson, AZ, Coronado NF

Upon closer inspection, it was determined that "all pieces were there." Other components of the helicopter were also examined. All 4 tail rotor blades sustained damage.



# Tucson, AZ, Coronado NF

Misjudgment of aircraft clearance to trees, and loss of pilot situational awareness. The failure by both dip site personnel and pilots to assess unseen hazard of trees at dip site.

# Tucson, AZ, Coronado NF

# Preliminary Findings

## HUMAN FACTORS

◊ **Sensory and Perceptual Factors**

- Misjudgment of clearance.

- Loss of situational awareness.
  General loss of situational awareness.
  Erroneous situational assessment (misinterpretation of situation or condition).

- Conditions that affect attention and situational awareness:
  Channelization, fixation. Inadequate flight vigilance.

# HUMAN FACTORS (CONT)

◊ **Supervisory and Organizational**

- Failure to perceive or to assess mission risks correctly, with respect to: Hazards go unseen or unrecognized

# Incidents With Potential

The Forest Service experienced 9 Incidents With Potential (IWP) in FY 2003 which included:

- 2 Rotor Strikes (Bell 212 & Bell 206L3) NASA
- 1 Wire Strike (Bell 206L4) WY-BTF
- 1 Unintended Take Off (AS350B2) WA-WEF
- 1 Wing Damage, landing/go around (Dromander M18A) AZ-TNF
- 1 Near Mid-Air Collision (DC7 & BE58P)
- 3 Fuel Starvations (Piper Seneca III, Cessna 337 & Cessna 185) MT-FNF, ID-BOF & R-10

The next several slides focus on the three fuel starvation IWP's

# Flathead NF, Wedge Canyon

The Piper Seneca III flying an Air Attack Mission over the Wedge Canyon Fire began to lose power on one engine

NOT ACTUAL INCIDENT AIRCRAFT

# Flathead NF, Wedge Canyon

During the trouble-shooting of the rough-running engine, the pilot realized his fuel gauges were showing empty.

# Flathead NF, Wedge Canyon


The pilot was able to make a successful forced landing into a back-country airstrip without damage to the aircraft.

# Flathead NF, Wedge Canyon

The pilot asked the local FBO to "top off the tanks", the pilot was told by an employee of the FBO that the aircraft had been fueled The pilot believed the tanks were full but did not visually check the fuel in the tanks.

***CHECKLIST PIPER SENECA***

**PREFLIGHT**

**1 a Ignition and master Switches OFF**
**b Landing gear selector DOWN**
**c Mixture Controls IDLE CUTOFF**
**d Avionics Master Switch OFF**
**e Master switch ON**
**f Fuel quantity CHECK**
**g Gear position indicator lights CHECK**
**h If required – lights and de-ice equipment CHECK**
**i Master switch OFF**
**j Cowl flaps OPEN**
**k Wing flaps UP**
**l Trim Tabs TAKEOFF**
**m Pitot and static systems DRAIN**
**n Crossfeed drains DRAIN**
**o Crossfeed drains CLOSE**
**2 a Right wing, control surfaces, tip CHECK**
**b Snow, frost, ice on wing / control surfaces ABSENT**
**c Right fuel quantity CHECK**
**d Right fuel cap SECURE**

# Flathead NF, Wedge Canyon

*CHECKLIST PIPER SENECA (cont)*

e Left fuel tank vent free of obstructions CHECK
f Left fuel drains DRAIN
g Left leading edge INSPECT
h Pitot mast unobstructed CHECK
I Lift detector INSPECT
m Left fuel quantity CHECK
n Left fuel cap SECURE
o Snow, frost, ice on wing / control surfaces ABSENT
p Right wing, control surfaces, tip CHECK
q Antennas CHECK
r Rear cabin doors closed and locked CHECK
s Baggage Doors SECURED
t Left static source unobstructed CHECK
u Fuselage and vertical stabiliser CHECK
v Stabilisator free, trim tab neutral CHECK
w Heater and fresh air inlet CHECK

# Preliminary Findings

## HUMAN FACTORS

- **Sensory/Perceptual**
  - **Attention failure:**

    **Failed to monitor instruments**

    **Inadequate flight preparation**

- **Knowledge**
  - **Failure to perform required procedures:**

    **Failed to check fuel quantity**

- **Judgment**
  - **Violation of procedures:**

    **Failed to utilize the checklist**

# Preliminary Findings

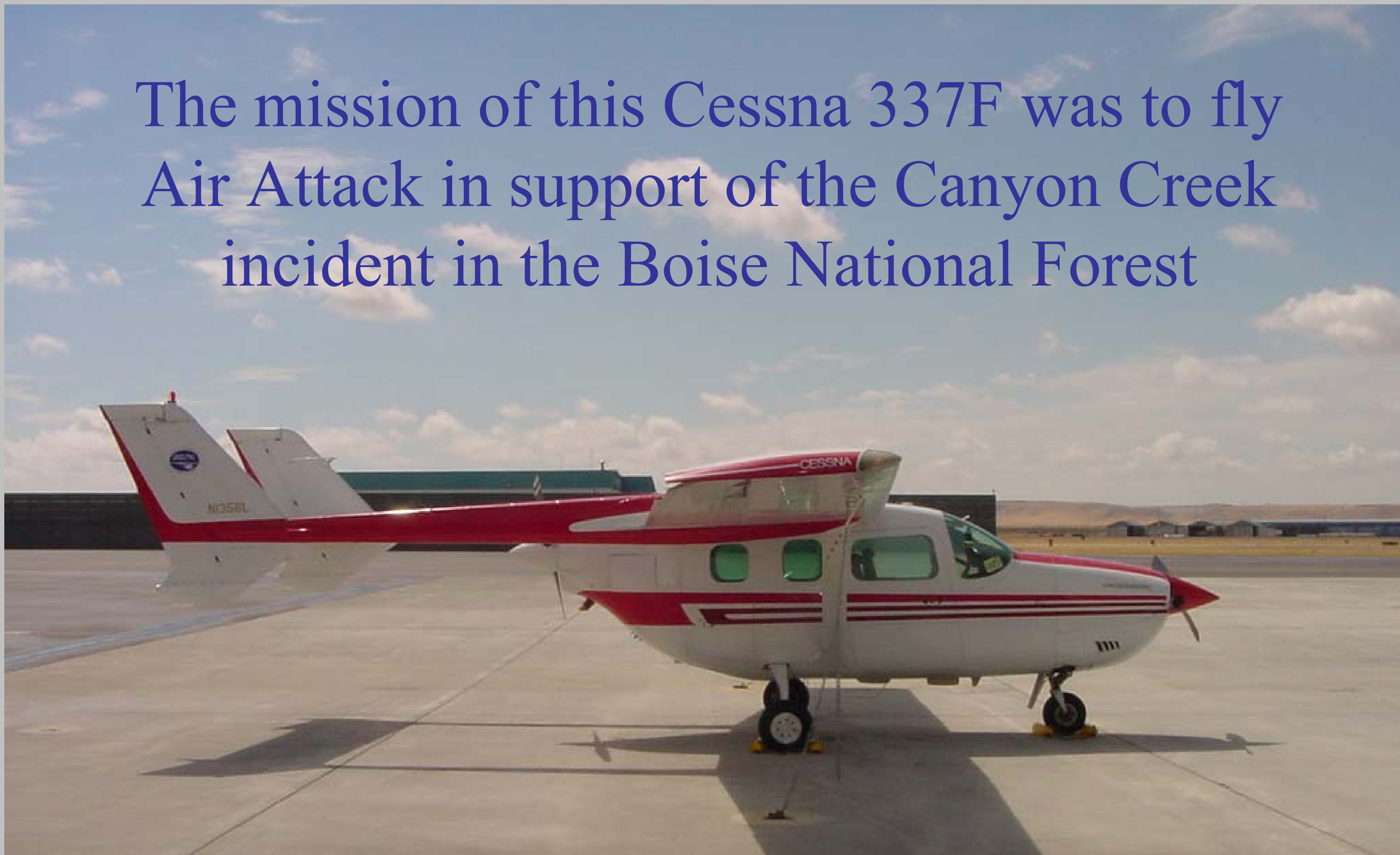
## HUMAN FACTORS

◊ **Communications and Crew Coordination**

- **Inadequate preflight**
- **Inadequate crew coordination (cross-check)**

# Boise NF, Canyon Creek

The mission of this Cessna 337F was to fly Air Attack in support of the Canyon Creek incident in the Boise National Forest



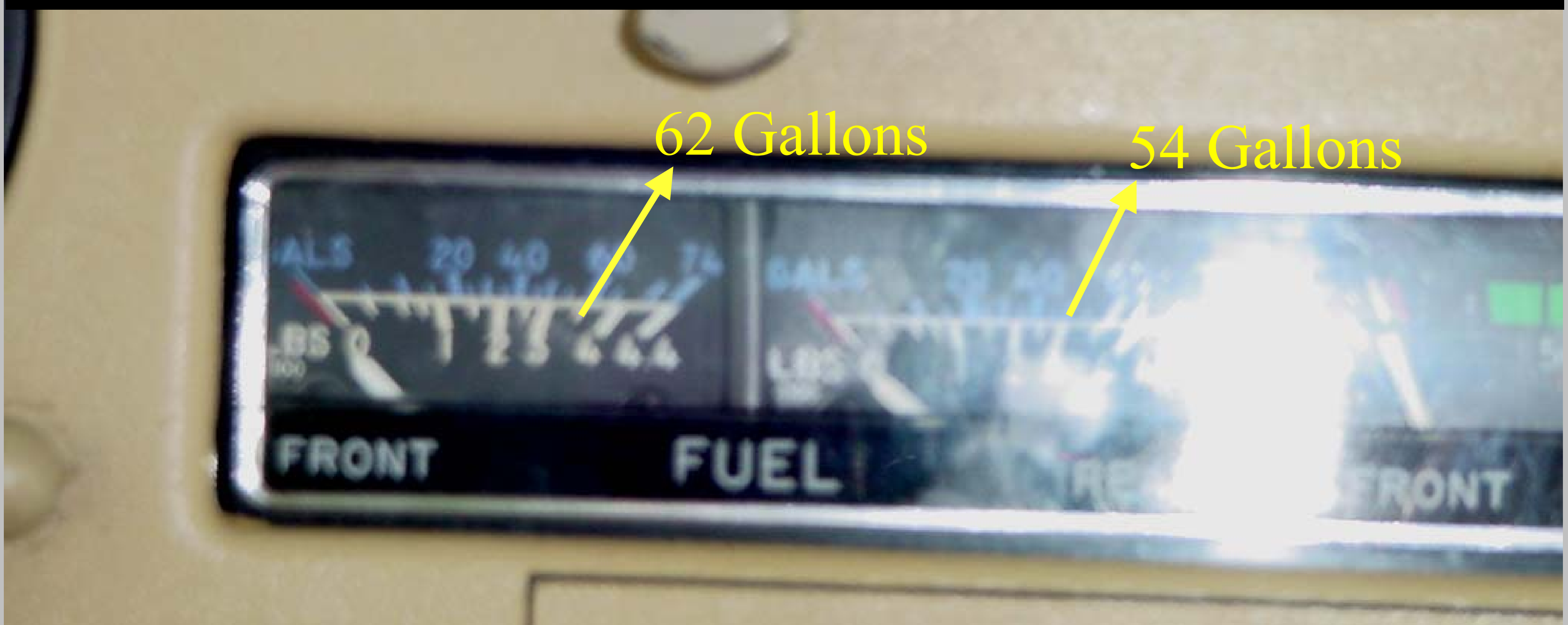
# Boise NF, Canyon Creek

After about 3 hours of flying time the aircraft departed the Canyon Creek Fire inbound to Boise Airport. Approximately 20 miles from the Boise Airport the aircraft had a front engine failure. The pilot started emergency procedures and chose to feather the prop instead of attempting a restart due to lack of information as to the cause of the failure. A safe landing was made.

# Boise NF, Canyon Creek

# Boise NF, Canyon Creek

The pilot said he checked the fuel gauges before the flight and they were accurate, but upon inspection after the incident, the following condition was observed with full tanks. (74 Gallons)



# Preliminary Findings

## HUMAN FACTORS

◊ **Sensory/Perceptual**

- **Attention failure:**

  **Failed to monitor instruments:**

  **Fuel consumption**

◊ **Knowledge**

- **Failure to perform required procedures:**

  **Failed to check fuel quantity during pre-flight**

◊ **Judgment**

- **Violation of procedures:**

  **Failed to utilize the checklist**

# Preliminary Findings

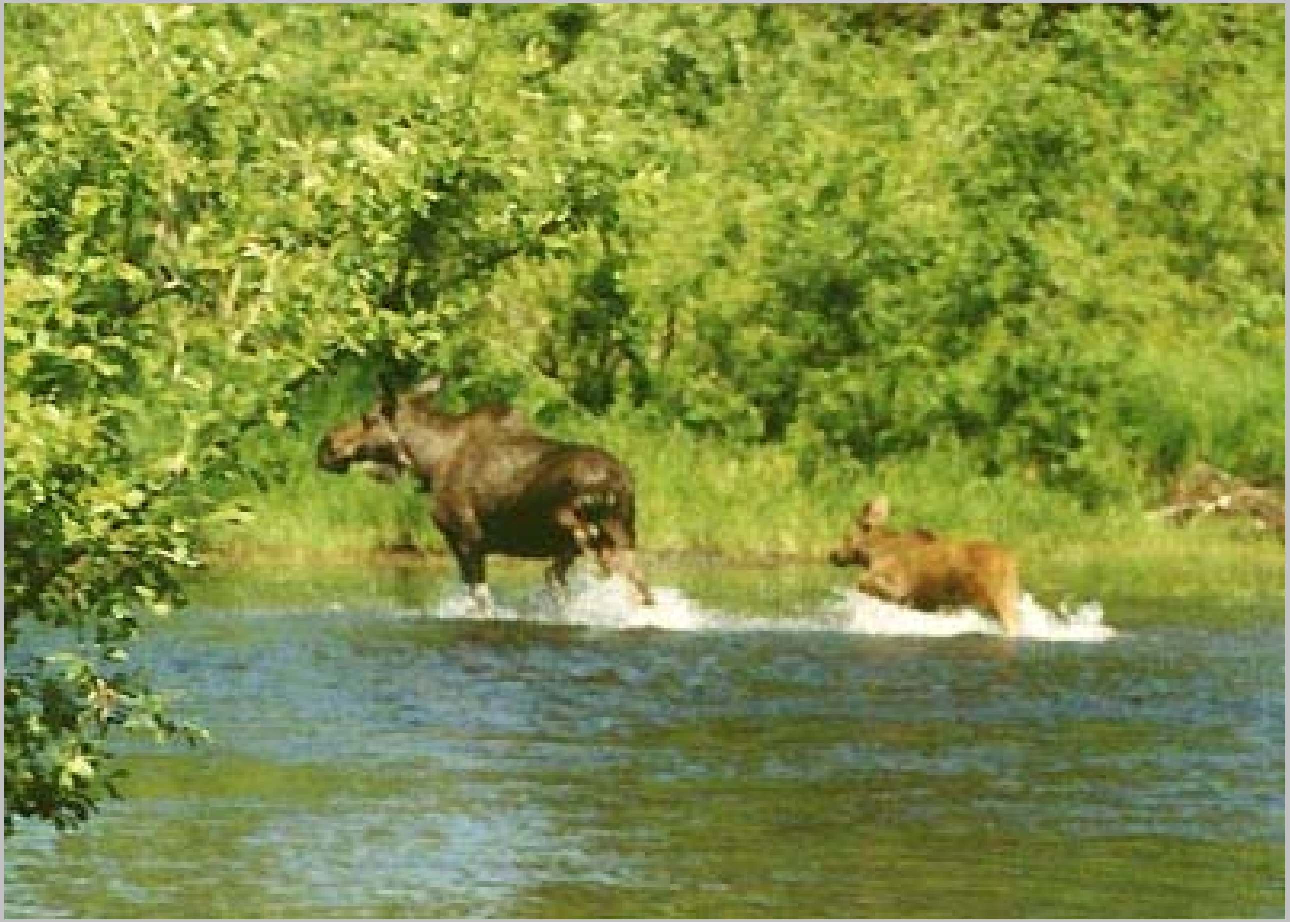
## HUMAN FACTORS

◊ **Communications and Crew Coordination**
- **Inadequate preflight**
- **Inadequate crew coordination (cross-check)**

◊ **System Operation**
- **Inability to interpret instrument indicators:**
  **Fuel gauges not calibrated**
- **Unfamiliar with fuel system:**
  **Fuel flows through a balance tube to fill the other two inboard cells**

# Tongass NF, Yakutat, AK

The Cessna 185 departed the Yakutat airport with three passengers to conduct moose telemetry survey



# Tongass NF, Yakutat, AK


The pilot serviced the aircraft with fuel that was needed for the mission himself. He put all the additional required fuel in the left wing tank.

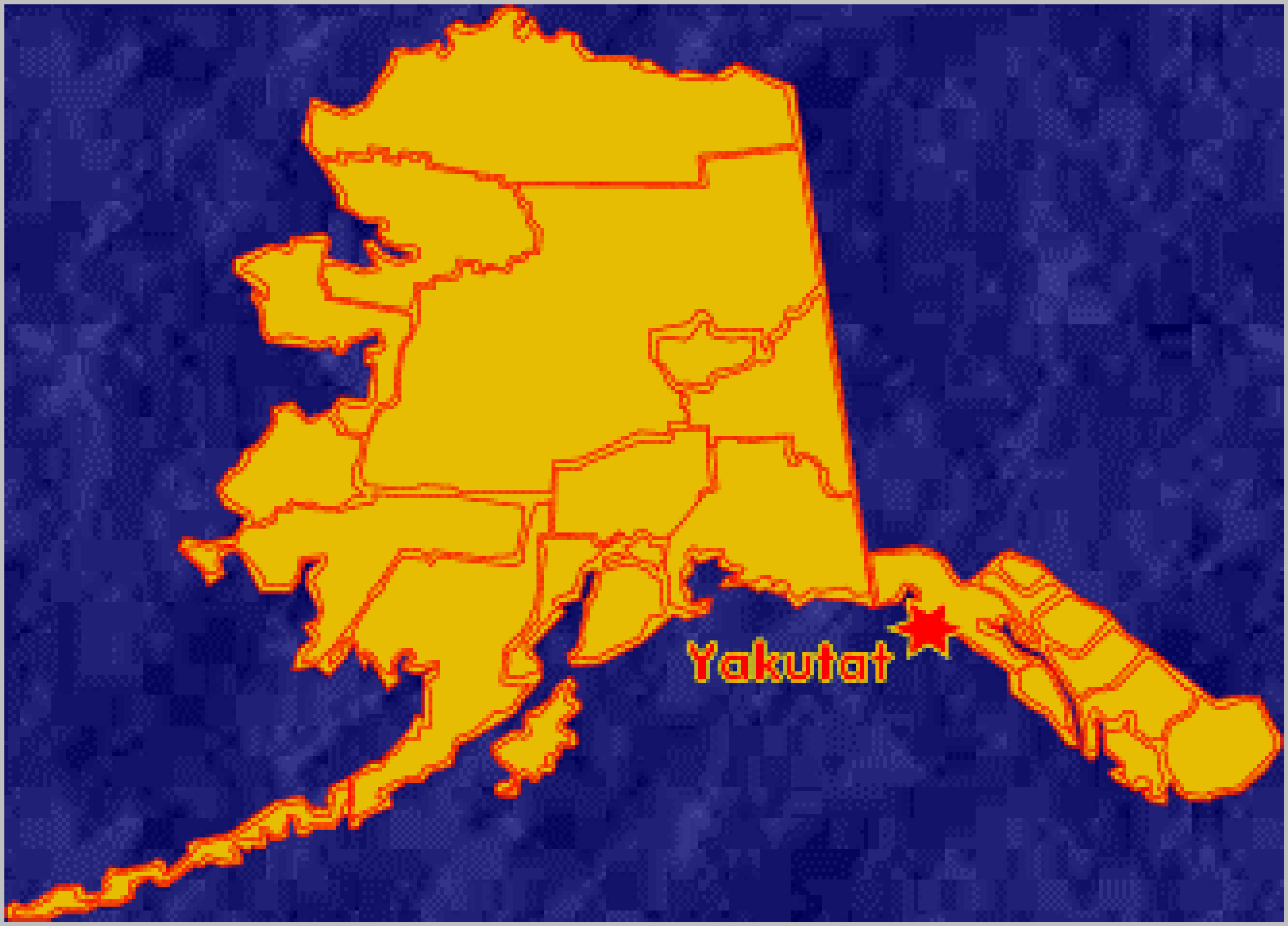
# Tongass NF, Yakutat, AK

This manner of servicing the aircraft with all the additional required fuel in just one tank was standard practice

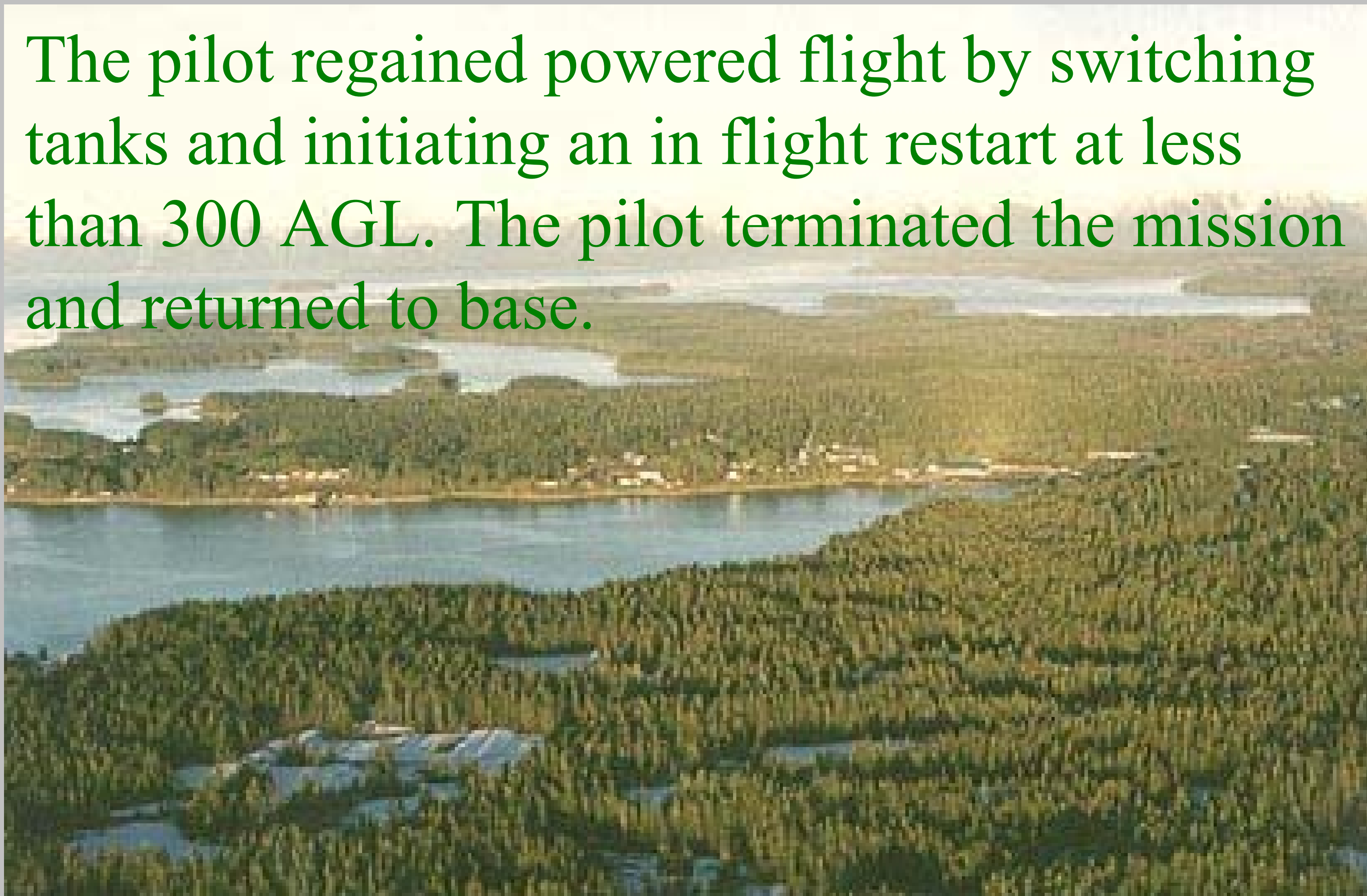
The fuel selector switch was placed to the left tank during the start up and remained there for just over two hours until in a tight turn at 1000 AGL the aircraft experienced fuel starvation and an in flight engine shut down (power loss).

# Tongass NF, Yakutat, AK

As the aircraft started to loose altitude, the pilot set up for an emergency landing on a gravel bar and proceded with a restart.



# Tongass NF, Yakutat, AK



The pilot regained powered flight by switching tanks and initiating an in flight restart at less than 300 AGL. The pilot terminated the mission and returned to base.

# *Wisdom*

**Pilots and their passengers continue to die year after year, due to stupidity or ignorance about fueling issues. Such accidents are almost always preventable.**

# *Wisdom*

**Each time we climb into the cockpit, we need to carefully evaluate the risks of any unfamiliarities with the aircraft we are to fly, paying special attention to design changes which might create situations which would be difficult to compensate for. Without that vital assessment, we can easily find ourselves in situations where there is little chance of success.**

# Suggestions to Keep the Flow Flowin'

**Be suspicious of ALL fuel.**

Do you look at the color of the fuel you put into your airplane? Do you smell the fuel to be sure what it is? Do you look at the markings of the fuel truck that is attached to the hose you're holding in your hand? Does it say what you want it to say?

**Do you inspect the airplane when you are on the wing?**

While you're up on/leaning over the wing, take a look at that gas cap seal. Does it look cracked and weathered like that tire that has been swinging in the old oak tree for the last 10 years? Is there rust around the filler neck opening? Is the area around the filler CLEAN? Does the cap fit tight? Does the latch fit snugly and pull the cap down tight?

If you have bladder tanks, do you know how old they are? Have you looked at them or had your mechanic inspect them lately? Bladders shrink and wrinkle with age (like we all do, I suppose) and tend to create all kinds of places to hide water and contaminants.

# Suggestions to Keep the Flow Flowin'

**When you're done fueling, sample it.**

Ever wonder if the ritual fuel sampling before flight is enough to eliminate water from your fuel tanks? I have a strong suspicion it's not. But that doesn't keep me from sampling each flight, it's just that I believe that we sometimes can't get all the water or contaminants out of our drains by design. Also, if you sample *immediately* after fueling, you're not likely to catch water and sediment; it takes time for contaminants to settle into the low points. But once it has had time to settle and separate, do you check it? Every time?

**If you leave the airplane outside, check for water more thoroughly than usual.**

A lot of fuel problems come from water making its way into the tanks from leaky caps. Several airplanes seem to be more susceptible to this problem than others

# Suggestions to Keep the Flow Flowin'

**Use the fuel gauge you wear on your arm—your wristwatch.**

There is NO other gauge more accurate—even the fancy electronic ones can fail or lie when you most need them. I only trust the aircraft's fuel gauge when it says I have ***less*** than my watch. If you have to get the computer out — electronic or E6B — to figure if you will have enough fuel to make it, it's probably too close. Land now. Also, when the weather is bad, fuel is wisdom. If it's ugly at the destination, start looking for more options (other than the two solid gold ones you already have...you do have at least two, don't you???)

**Don't change fuel tanks just before takeoff.**

You might have just enough to make it to 200 feet before that dry or contaminated tank leaves you hanging in the straps.

# Suggestions to Keep the Flow Flowin'

**Only switch tanks when you have enough altitude (or options)**.

Give yourself a fighting chance should the engine suddenly quit because its getting more air than gas. Think about this every time you switch tanks.

**Before you stretch your fuel, imagine how stupid you'll look landing short.**

Perhaps that mental image will prevent you from failing to reach your destination due to poor judgement regarding fuel; it's never easy to explain why you landed in a parking lot, the mountains, in the trees, or a neighborhood instead of the airport.

**Imagine what your "friends" will say about you when you run out of fuel.**

# Conclusion

The US Forest Service Aviation Safety Program is based on the philosophy that all aircraft mishaps are preventable.

Aviation safety is a core value in the Forest Service. The Forest Service has established a proactive approach to mishap prevention through policy, education and training, communications, risk management, award programs and review and evaluation.

# Conclusion

The mission of the safety program is to provide uncompromising service in all matters pertaining to interagency aviation safety. This includes protecting our employees, contractors and cooperators, preserving our resources and providing the safest possible aviation program serving those who fly in one of the most challenging aviation environments.

# QUESTIONS ?