



National Transportation Safety Board



Operational Issues

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Operational Issues

- Pilot's qualifications
- Pilot's decision-making
- Accident sequence
- Attitude indicator limitations

Pilot's Qualifications

- Flight time
 - 10,700 hrs total / 8,500 in helicopters
 - 388 hrs instrument / 38 in helicopters
- Most recent instrument flight
 - In an airplane, 2001
 - In a helicopter, 1986

Pilot's Qualifications

Training

- Annual AS350 B3 recurrent training at manufacturer's training center 2008-2012
- NVG training from other DPS pilots in 2003; no further NVG training
- No inadvertent IMC training since 2003

Weather and Lighting Conditions

- Forecast weather in search area
 - Ceiling 350 to 950 ft
 - Visibility 4 mi
- Low lighting conditions
 - Dark night, after sunset and before moonrise
 - Lack of ground lighting

Decision to Accept Mission

- DPS had no risk assessment process or across-the-board weather minimums
- Pilot's NVG weather minimums
 - 2003 DPS minimums: 500 ft and 2 mi
 - 2009 personal minimums: 200 ft and 5 mi
- Forecast weather was below pilot's minimums

Decision to Accept Mission

- No evidence DPS managers pressured pilot to accept missions
- Pilot motivated to accept mission by:
 - Desire to help others
 - Public recognition, reward for rescues
 - Pay structure that included significant income from on-call and overtime work

Decision to Continue Mission

- After retrieving snowmobiler, pilot decided to continue the mission
- Pilot's ability to assess weather from ground before takeoff likely limited
- Altitudes flown indicate weather deteriorated during time on the ground

Decision to Continue Mission

Possible reasons for continuing once airborne:

- Inability to identify suitable landing area
- Sense of urgency due to snowmobiler's medical condition
- High motivation to accomplish rescues
- Increased risk tolerance due to successful past high risk missions

Encounter with IMC

Rapid climb initiated about 5 minutes into flight

- Climb not necessary to clear any obstacles
- Consistent with pilot's inadvertent IMC escape plan

Loss of Control

Attitude indicator caged about 40 seconds after entering IMC with the helicopter at high pitch and roll angles, after which:

- It provided erroneous, but difficult to ignore, attitude information
- Helicopter's erratic flight path consistent with spatial disorientation and loss of control

Attitude Indicator Limitations

Attitude indicator
met $\pm 25^\circ$ pitch
indication range
requirement of
TSO-C4c



Attitude Indicator Limitations

Possible reasons for caging:

- Distrust of attitude display due to spatial disorientation
- Attitude indicator reached pitch indicating limit and stopped moving, which pilot interpreted as malfunction

Attitude Indicator Limitations

- FAA handbooks do not inform pilots about pitch indicating limits
- *Pilot's Handbook of Aeronautical Knowledge* contains unclear, misleading information about limitations
- Unknown whether knowledge of limitations would have changed pilot's actions in this accident



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