

CALLBACK

From NASA's Aviation Safety Reporting System



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Adverse Weather Planning and Tactics Two Perspectives

According to the FAA *General Aviation Pilot's Guide to Preflight Planning, Weather Self-Briefings, and Weather Decision Making*¹, many pilots who hear about a weather-related accident think, "I would never have tried to fly in those conditions." But interviews with pilots who survived weather-related accidents indicate that they thought the same thing—until they found themselves in weather conditions they did not expect and could not safely handle.

This *CALLBACK* presents weather-related ASRS incident reports along with corresponding National Transportation Safety Board (NTSB) accident reports involving the same type of aircraft in similar weather conditions.

The ASRS reports offer a first-hand account of what were often narrow escapes from adverse weather conditions. The NTSB reports are second-hand accounts about pilots who were not as fortunate in their weather encounters. The ASRS incidents are often seen as precursors to the accidents reported by the NTSB.

Three of the many lessons that can be learned from the ASRS reports are: 1) review and know the procedures for dealing with adverse weather in your aircraft, 2) avoid adverse weather if possible and, 3) have an escape plan in the event of an unexpected encounter with dangerous weather.

Failure to learn the lessons presented here can lead to an ASRS incident report if you are lucky or an NTSB accident report if you are not. But, smart pilots remember the old axiom: You start with a bag full of luck and an empty bag of experience. The trick is to fill the bag of experience before you empty the bag of luck.

Event #1

Aircraft: PA-32 with weather data link capability

Situation: Entry into an area of rapidly building thunderstorms

ASRS Report #1

"I Came Close to Being a Statistic"

Even with good preflight planning and onboard weather data link capability, it took the help of ATC to successfully extricate this PA-32 Pilot from an area of fast-building thunderstorms. The all-too-close encounter highlights a critical factor about the timeliness of NEXRAD (Next-Generation Radar) weather data.

■ *While in cruise flight, it became necessary to deviate due to existing and building thunderstorms. ATC had advised me of the largest storm which I had visually.... I was also using XM downloaded NEXRAD weather information. When the NEXRAD data indicated it was safe to turn more northerly, I advised ATC that I was starting my turn.... I went IMC momentarily and when I broke out there was a large buildup at my twelve o'clock position. The main storm was still off to my right. I could see several breaks around the buildup and requested a climb to 10,000 feet in an attempt to remain visual on the buildup. I was unable to do so and encountered IMC. While IMC, I flew into a fast building area of weather that was joining up with the known cell to my right. I advised ATC of my dilemma and was very surprised to see how quickly the cell was developing. ATC vectored me through the safest part of it. I was using every method from my training—turning the autopilot off, slowing, and keeping the wings level. At one time, with climb power, I was descending at 1,500 feet per minute.*

I eventually exited the weather and looked out my right rear window to see the huge storm that was developing behind me. ATC advised that it had completely closed up. Only then did the NEXRAD download weather update to reflect the actual conditions that existed.

A meteorologist friend assisted me in downloading archived radar images that showed how fast these air mass cells/thunderstorms were developing and how I came close to being a statistic. I knew not to use the NEXRAD for storm penetration prevention, but did so in error. I am very lucky that the outcome was good.... The delay of the [NEXRAD] update with the speed of the buildup of these air mass thunderstorms resulted in an inaccurate pictorial that I was using to determine my route of flight.

NTSB Report #1

This NTSB report details how another PA-32 Pilot apparently relied on outdated NEXRAD weather information in an attempt to escape an area of rapidly developing thunderstorms.

The airplane was on a cross-country flight in level cruise at about 8,000 feet MSL when the pilot flew into an area of heavy rain showers. The pilot informed an Air

Traffic Controller that he was diverting around an area of thunderstorms. The pilot last reported that he was in “bad” weather and was going to try to get out of it. Following that transmission, radio and radar contact was lost. A witness on the ground heard a sound resembling an explosion....

The main wreckage consisted of the entire airplane except for the left wing, vertical stabilizer, rudder, and the right wing tip fuel tank. Those components were located about 200 feet north-northeast of the main wreckage. An examination of the left wing spar showed that the wing failed in positive overload. A weather study of conditions in the area at the time of the accident indicated the potential for heavy rain showers, thunderstorms, wind in excess of 45 knots, clear air turbulence, and low-level wind shear.... The pilot had a global positioning system (GPS) unit with a current subscription for Next-Generation Radar (NEXRAD).

The GPS unit owner’s manual states that NEXRAD weather data should be used for “long-range planning purposes only,” and should not be used to “penetrate hazardous weather” as the NEXRAD data is not real-time.

On June 19, 2012, the NTSB issued a Safety Alert to warn pilots using in-cockpit flight information services broadcasts (FIS-B) and satellite weather display systems that the NEXRAD “age indicator” can be misleading. The actual NEXRAD data can be as much as 20 minutes older than the age indication on the display in the cockpit. If misinterpreted, this difference in time can present potentially serious safety hazards to aircraft operating in the vicinity of fast-moving and quickly developing weather systems.

The NTSB determines the probable cause(s) of this accident to be: The pilot’s inadvertent encounter with severe weather, which resulted in the airplane’s left wing failing in positive overload. Contributing to the accident was the pilot’s reliance on outdated weather information that he received on his in-cockpit Next-Generation Radar (NEXRAD).

Event #2

Aircraft: PA-28, **Situation:** Icing conditions

ASRS Report #2

“I Just Didn’t Appreciate How Fast Ice Could Form”

The Pilot who submitted this ASRS report planned to avoid icing and flew a PA-28 that was equipped with dual GPS, satellite weather, and electronic approach plates. What the Pilot did not include in his planning was an understanding of how rapidly ice can build up and how, without adequate training, complex equipment can become a distraction.

■ I checked the weather via the internet prior to departing... filed an IFR flight plan, and checked in with Center a few minutes into the flight.... At about 2,800 feet, I entered cloud bases. My autopilot wasn’t holding heading and I was distracted with this problem. About this time I noticed ice was rapidly forming on the temperature probe. I [told] ATC about my flight conditions and explained that I better land. ATC helped me select an airport and gave me a vector.

I had only been in icing conditions a couple minutes and was alarmed at the rate the ice was forming. I have never had much experience with ice, always successfully avoiding it.

Now I was getting set up on an unplanned approach, dealing with rapid ice formation, wanting to use the autopilot to decrease workload but wary of it. ATC advised me that I should climb to avoid a tower. I was aware of the tower because it was depicted clearly on my terrain database. Now I was getting a strong vibration from the prop; it was accumulating ice. ATC advised that I needed to climb for the tower, but I asked if I couldn’t stay lower. The Controller gave me 3,200 feet and a vector of 180 degrees to avoid the tower.... I was unnerved by all of this and was very happy to have ATC’s help with setting up for the approach....

One other distraction was that with my dual GPS, satellite weather, and electronic approach plates, it messed up my scan and made it almost harder. I was very glad to have a paper approach plate. The one thing I did right is that I immediately realized my error and asked for ATC’s help to land as soon as possible. I just didn’t appreciate how fast ice could form and while part of my flight planning was to keep me out of ice by staying under the clouds, I didn’t have enough margin for error or unexpected weather. I need more hood time with an instructor, training with my electronics and how to use them.... In most situations you are trying to use all the information available, but if you haven’t trained your scan to include these devices they can be distracting. I’ve learned an important lesson.

NTSB Report #2

In its report on a PA-28 involved in an accident, the NTSB cited icing conditions and improper in-flight planning as probable causes.

An instrument flight plan was filed by the pilot, inflight, with Denver Air Route Traffic Control Center (ARTCC). The airplane was handed off to the Kansas City ARTCC. No radio contact was established between the airplane and Kansas City ARTCC. Denver ARTCC’s last reported radar contact with the airplane was at 4,500 feet MSL.... Denver ARTCC heard someone say, “We’re going down.” The airplane was located by...Sheriff’s deputies.... Weather stations...were reporting overcast ceiling, visibility from 1/2 to 3 miles with light rain, and temperatures and dew points at 32 degrees F. An examination of the wreckage revealed no anomalies. The NTSB determines the probable cause(s) of this accident to be: Inadvertent stall. Factors relating to this accident were the pilot’s inadvertent flight into known adverse weather conditions, the icing conditions, and improper in-flight planning by the pilot.

Event #3

Aircraft: C182, **Situation:** Carburetor icing

ASRS Report #3

“The Engine Stopped Running”

A C182 Pilot learned that severe carburetor ice can form even though no airframe icing is seen. The Pilot was lucky to break out of the clouds and restart the engine.

■ We were at 12,000 feet on an instrument flight plan in communication with Approach. The Controller directed us to descend and maintain 9,000 feet. Flight conditions were IMC, -4 degrees C, and no airframe icing was being encountered. We reduced throttle in order to descend and within a few seconds of reducing throttle, the engine stopped running. After completing the Engine Failure Checklist, with no success, we declared an emergency with Approach.... We continued on our present heading with the intent of making an emergency landing at a nearby CTAF airport.... Upon further discussion with the Controller, however, we elected to head for a nearby Class D airport.... As we descended (still in IMC) we were able to restart the engine.... We continued to descend towards the airport and broke out of the clouds into VMC at approximately 4,800 feet....

It is clear that this engine failure incident was caused by severe carburetor ice— just below the freezing level, in clouds, with visible ice crystals. Although the ice crystals were not of the type that created airframe ice (no airframe ice was reported in our area), it was ideal for causing carburetor ice, which built up more rapidly than we were able to clear using carburetor heat.

NTSB Report #3

An NTSB report recounts how another C182 Pilot experienced carburetor icing, but was unable to restart the engine and wound up losing his airplane in a tree.

The pilot received a weather briefing from FSS the evening before departure and a friend at the destination told him that the area had been free of fog for the last several days. Upon

descent to 1,500 feet at the destination, he could not spot the airport due to a fog layer. He decided to divert to his alternate. After turning toward the alternate airport, the engine began to run roughly. The pilot was unable to remedy the power loss by applying carburetor heat, switching fuel tanks, leaning the mixture, and checking the magnetos in the both position. As he turned back toward his original destination airport, the engine continued to run rough and he was unable to arrest the airplane's descent. He was just above the fog layer, saw the runway through the fog, and turned back to the runway. During the turn, he went into the fog and the airplane collided with treetops and lodged in branches. The occupants noticed fire in the floorboard area, exited through the pilot's door, and jumped to the ground. The fuselage was consumed by fire....

The NTSB determines the probable cause(s) of this accident to be: A loss of engine power due to carburetor icing and the pilot's failure to use carburetor heat in conditions conducive to icing.

¹ http://www.faa.gov/pilots/safety/media/ga_weather_decision_making.pdf

Additional information related to General Aviation weather tactics and planning can be found at:

- http://www.nts.gov/doclib/safetyalerts/SA_017.pdf
- <http://libraryonline.erau.edu/online-full-text/ntsb/safety-studies/SS05-01.pdf>
- <http://www.aopa.org/pilot/features/wx0001.html>
- http://asrs.arc.nasa.gov/docs/rs/63_ASRS_GA_WeatherEncounters.pdf
- <http://asrs.arc.nasa.gov/docs/rpsts/icing.pdf>
- <http://asrs.arc.nasa.gov/docs/rpsts/wx.pdf>

ASRS Alerts Issued in September 2012	
Subject of Alert	No. of Alerts
Aircraft or Aircraft Equipment	7
Airport Facility or Procedure	4
ATC Equipment or Procedure	4
TOTAL	15

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September 2012 Report Intake	
Air Carrier/Air Taxi Pilots	3510
General Aviation Pilots	1045
Controllers	683
Cabin	224
Mechanics	165
Dispatcher	82
Military/Other	17
TOTAL	5726