# CALLBACK

From NASA's Aviation Safety Reporting System

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The windshear saga in American aviation history reveals a complex and costly past. Windshear has existed for as long as aviators have taken to the skies and is largely responsible for several classic aviation losses. Notable U.S. aviation accidents include Eastern Flight 66 (1975), Pan American Flight 759 (1982), and Delta Flight 191 (1985).

Windshear remained unrecognized for years. It was not clearly understood until swept wing, jet aircraft encountered the phenomenon. Since 1975, windshear has been researched and studied, measured, defined, catalogued, and rightly vilified. Technology has been developed to identify and minimize the threats that it poses. Procedures have been implemented to aid pilots who experience windshear in flight and flight crews invest hours of simulator training practicing windshear escape maneuvers.

Even with progress to date, windshear continues to be a worthy adversary to aviation professionals. It requires respect and wisdom to defeat. Pilots often must make decisions regarding known or anticipated windshear, and the best practice is always avoidance.

This month, *CALLBACK* shares reported incidents that reveal some means and extremes of windshear experienced in modern aviation. Lessons to be gleaned are ripe, rich, and many.

## Teasing a Toronto Tailwind

After encountering windshear that resulted in an unstabilized approach, this A319 Captain elected to continue to a landing. He noted his awareness of the current winds and trends as well as his personal preparedness to go around as reasons for continuing the approach.

■ *After being delayed due to low ceilings in Toronto, we were finally descending…in heavy rain and moderate turbulence with clearance to 7,000 feet MSL. After a third 360 degree turn, we were…transferred to the Final Controller and proceeded inbound for the ILS RWY 05. The last several ATIS [reports] showed winds at approximately 090 to 100 [degrees] at 5 to 10 knots, and the Final Controller mentioned the same with an RVR of 6,000 plus feet for Runway 05. When cleared for the approach, we were at 3,000 feet MSL to intercept the glideslope, and I noticed the winds had picked up to a 50 knot direct tailwind. The First Officer was flying. We were assigned 160 knots and began to configure at approximately 2,000 feet AGL. At 1,500 feet the wind was a 30 knot direct tailwind and we had flaps 3. Indicated airspeed (IAS) had increased at this point [with] thrust at idle to 170-175 knots, prohibiting final flaps just yet. The First Officer did a great job aggressively trying to slow the aircraft, as we were concerned about getting a flaps 3 overspeed. As I knew from the ATIS and the Controllers (Tower now), the winds were to die off very soon to less than 10 knots. [Below] 1,000 feet we were just getting the airspeed to put in final flaps (full) and were finally stabilized and on speed between 500 to 800 feet. The winds were now at the reported 090 [degrees] at 8 knots or so [below] 500 feet. The total wind shift was approximately 90 degrees from direct tailwind to a right crosswind - losing 40 knots [of tailwind] in the space of 1,500 feet or so. The reasons I elected to continue the approach were:*

1. *[I knew] about the wind shift and decrease [in tailwind] as reported on the ATIS and from ATC.*
2. *[I saw] a positive trend in the wind.*
3. *[I was] prepared for the missed approach (at 500 feet) IF the winds and IAS stayed as they were earlier in the approach.*

*We landed uneventfully in the touchdown zone and on speed…after breaking out before minimums.*

## Up and Down into Salt Lake City

While being vectored for an approach, this light twin transport Pilot encountered a vertical windshear that dramatically demonstrated the intensity, danger, and potential traffic conflict that a challenging vertical shear can present.

■ *We had lined up for the ILS RWY 3 at Ogden, but at glideslope intercept, the weather had [deteriorated] to ¼ mile visibility and a 400 foot ceiling. We broke off the approach,… requested an approach to land at Salt Lake City, and were vectored to the ILS RWY 34L. Approximately 10 miles downwind in solid IMC [with the] autopilot and altitude hold on and about to turn base, we hit a downdraft that dropped us approximately 2,000 feet. The horizon ball was all brown, the autopilot and altitude [hold function] were ineffective,*

*the loss of control set off the master warning system due to lack of fuel (at the time we had 750 pounds per side), and the terrain warning went off. Recovery was accomplished, but with a 2,000 foot gain (assigned altitude [had been] 10,000 feet; at the floor of the incident [the altitude was] approximately 8,000 feet; at the ceiling of the incident [the altitude was] approximately 12,000 feet). I was then routed back to the west and north on vectors for sequencing back to the ILS RWY 34L at Salt Lake City that was shot with a side-step on final in VFR conditions to Runway 34R.*

## Shearing Situational Awareness

This Air Carrier Captain accomplished a successful windshear recovery while on final approach. He was surprised by the quickly changing environment and challenged by his diminished awareness as a result.

■ *We were on final for Runway 8R in Houston and encountered windshear.... Tower started calling an approach wind loss of 20 knots that increased to 25 knots at a 3 mile final. The Copilot and I were discussing what constituted a microburst alert, which was 30 knots, so we elected to continue the approach. We were in moderate turbulence and the wind was currently a right quartering tailwind which would switch to a left crosswind on the runway. I asked the Copilot to increase our target speed to plus 20, which he did, and as we approached the outer marker, we were fully configured and on speed. At approximately 1,400 feet AGL, we received a "MONITOR RADAR DISPLAY." I saw that the indication was ahead of us to the right of our course. Since we were still stable and fully configured [with the] autopilot and autothrottles on, we elected to continue.*

*Shortly we received the call, "GO AROUND, WINDSHEAR AHEAD." I initiated the go-around and asked for flaps 15 and gear up. Very shortly after this, we received the call, "WINDSHEAR, WINDSHEAR, WINDSHEAR." At that point I pushed the throttles to the stops, verified the spoilers were stowed, and selected Takeoff Go-Around (TOGA) again. The First Officer called ATC and said we were going around. I was so focused on flying the plane with regards to Radio Altimeter (RA) and trend, and verifying I was doing everything correctly, I did not hear what ATC replied back to us. Adding to the workload and task saturation was the plane on Runway 8L, which also went around, and then the two planes behind us on Runways 8L and 8R also went around.*

*The Copilot advised that ATC said to level off at 2,000 feet as we were passing through 2,000 feet with a high climb rate. I still had "WINDSHEAR" displayed on my ADI, and I told him I was not going to level off. He then had to try to talk to ATC again to get a new altitude. They gave us 3,000 feet. We were climbing rapidly, and I brought the throttles back to level off at 3,000 feet, but overshot it to approximately 3,200 feet and descended back to 3,000 feet. The landing gear horn immediately began to sound when I pulled the power back since we still had flaps 15. I made sure we were above flaps 15 retraction speed, and we completed a normal go-around at that point to clean maneuvering speed.*

*Everything happened so fast. ATC should not give a level off altitude of 2,000 feet since I now know it is possible to still be in windshear...at that altitude. If I were to fly this approach again, I would elect to abort the approach and wait for tower to stop calling a 20-25 knot loss at a 3 mile final.... We thought that since the planes ahead of us were landing, we would be able to [as well]. Obviously there is always a first flight that cannot land, and on this day, that was us.*

## The Final Authority — 14 CFR 91.3

This heavy transport Captain perceived a subtle suggestion to take off when weather that may have presented a windshear hazard was nearby. He exercised his authority with seasoned wisdom and sound judgment when he opted not to leverage the safety of his aircraft or crew.

■ *As we were taxiing west on Runway 27, we could see a radar return of a strong storm which was depicted red on our screen. The storm was directly west of the...airport and appeared to be moving east toward us. As we turned south on Taxiway N, we could only see part of the storm to our right on the radar display. When we switched frequencies to Tower, we heard that there was windshear on a two mile final for our runway. As we approached the runway, we advised Tower that we would not take off. Tower reminded us that the windshear was two miles in the opposite direction from where we would be heading. It seemed like the cell was directly over the field at that time, possibly centered a little north.... The FOM guides us not to get within 5 miles of a cell below FL200. Tower instructed us to taxi out of the way so that several other aircraft could take off while we waited a few minutes for the storm to pass.*

*I feel that Tower was more concerned about getting airplanes on their way than waiting a few minutes until it was safe. I also think [there is an] air carrier culture pressure to get the job done even if there is an increased risk.*

*When one aircraft decides it is not safe to take off, perhaps Tower should inform the following aircraft that might not have been on frequency to get the same information. Although several aircraft took off away from the storm, they faced the possibility of getting a decreasing performance windshear on takeoff.*

| ASRS Alerts Issued in May 2017 | |
|---|---|
| **Subject of Alert** | **No. of Alerts** |
| Aircraft or Aircraft Equipment | 2 |
| Airport Facility or Procedure | 1 |
| ATC Equipment or Procedure | 6 |
| **TOTAL** | **9** |

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| May 2017 Report Intake | |
|---|---|
| Air Carrier/Air Taxi Pilots | 5,625 |
| General Aviation Pilots | 1,388 |
| Controllers | 682 |
| Flight Attendants | 428 |
| Military/Other | 396 |
| Mechanics | 220 |
| Dispatchers | 174 |
| **TOTAL** | **8,913** |