



**National
Transportation
Safety Board**

Approach and Go-around Safety: The good, the bad, and the ugly

Robert L. Sumwalt, III

RAA Approach and Go-Around Safety Seminar

THE GOOD



NTSB

The Good



The overwhelming majority of approaches and landings are conducted safely.



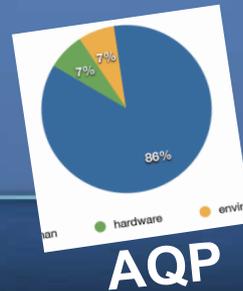
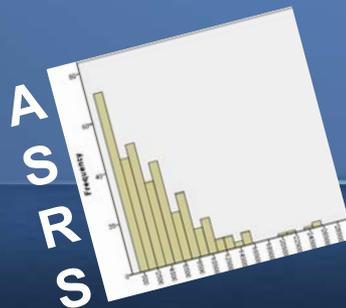
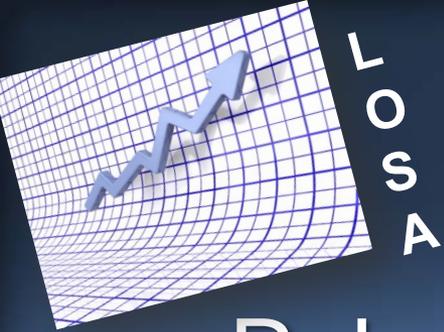
THE BAD



NTSB

The Bad

- Robust data monitoring programs indicate an unacceptable number of unstabilized approaches are being continued to landings.





THE UGLY

A decade of accidents involving unstabilized approaches



NTSB

The Ugly



The Ugly



NTSB

The Ugly



NTSB

The Ugly



NTSB

The Ugly

- ½ mile from displaced threshold = 194 kts GS
- 2150 FPM
- GPWS warnings
- Touched down with appx. 2970' remaining



“Contributing to the accident were the failure of either pilot to call for a go-around and the flight crew's poor crew resource management and lack of professionalism.”



The Ugly



NTSB

A TALE OF TWO CITIES

CLT: Piedmont Airlines flight 467, October 1986

GSO: Piedmont Airlines flight 20, October 1973



NTSB

CLT



NTSB

Railroad Accident?



Piedmont flight 467

N752N, October 25, 1986

- Not configured until 500' AGL
 - ILS approach, 400 overcast, 2 miles, light rain, fog
- 200' AGL, “Whoop whoop, pull up”
- Crossed threshold at 165 kts ($V_{ref} = 131$)
- Touched down 3200 feet from threshold at 147 kts (4645' remaining)
- Departed runway end at appx. 72 kts.



According to NTSB

- “The evidence indicates that the captain and the first officer were aware that the approach was unstable yet they continued the approach instead of executing a go-around.”



Probable Cause

“The probable cause of the accident was the captain’s failure to stabilize the approach and his failure to discontinue the approach to a landing that was conducted at an excessive speed beyond the normal touchdown point on a wet runway.”



Contributing to the Accident:

- Captain's failure to optimally use airplane decelerative devices
- Lack of effective coordination
- Poor frictional quality of last 1500 feet of runway



GSO



NTSB

Piedmont flight 20

N751N, Oct. 28, 1973

- ILS approach, visibility 1 mile, light rain, fog
- 8.5 kt tailwind component
- About 1½ dots high on GS during final portion of approach.
- Touched down 2600 feet from threshold (3780' remaining)
- Downhill sloping runway (average downhill slope = .68%)
- Departed runway end at appx. 80 kts.



Probable Cause

“The probable cause of this accident was ineffective braking action caused by dynamic hydroplaning on a rain-flooded runway.”

“Additional factors which contributed to the accident were: 1) an unstabilized downwind approach; 2) a relatively long, fast touchdown on a down-sloping runway; 3) delayed deployment of the automatic spoilers; and 4) failure of the crew to deploy the spoilers manually.”



GO-AROUNDS GONE WRONG

Be careful what you wish for



NTSB

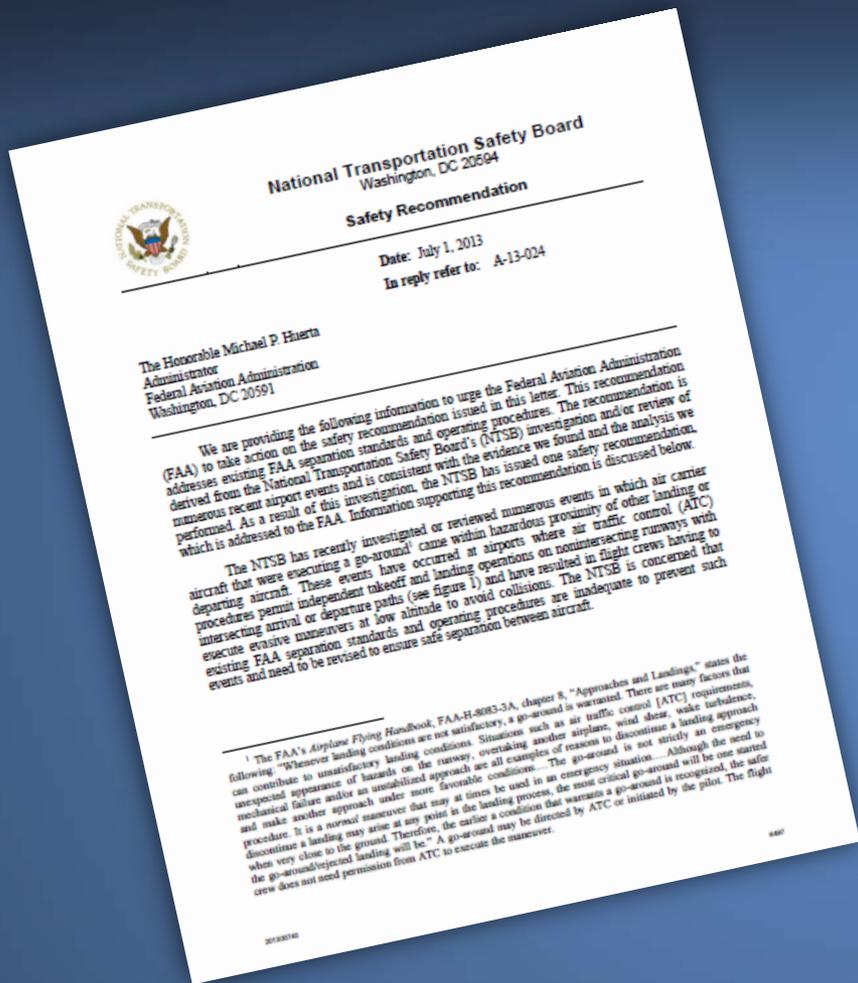
Potential Problems with Go-arounds

AIR TRAFFIC CONTROL ISSUES



NTSB

July 1, 2013 Safety Recommendation

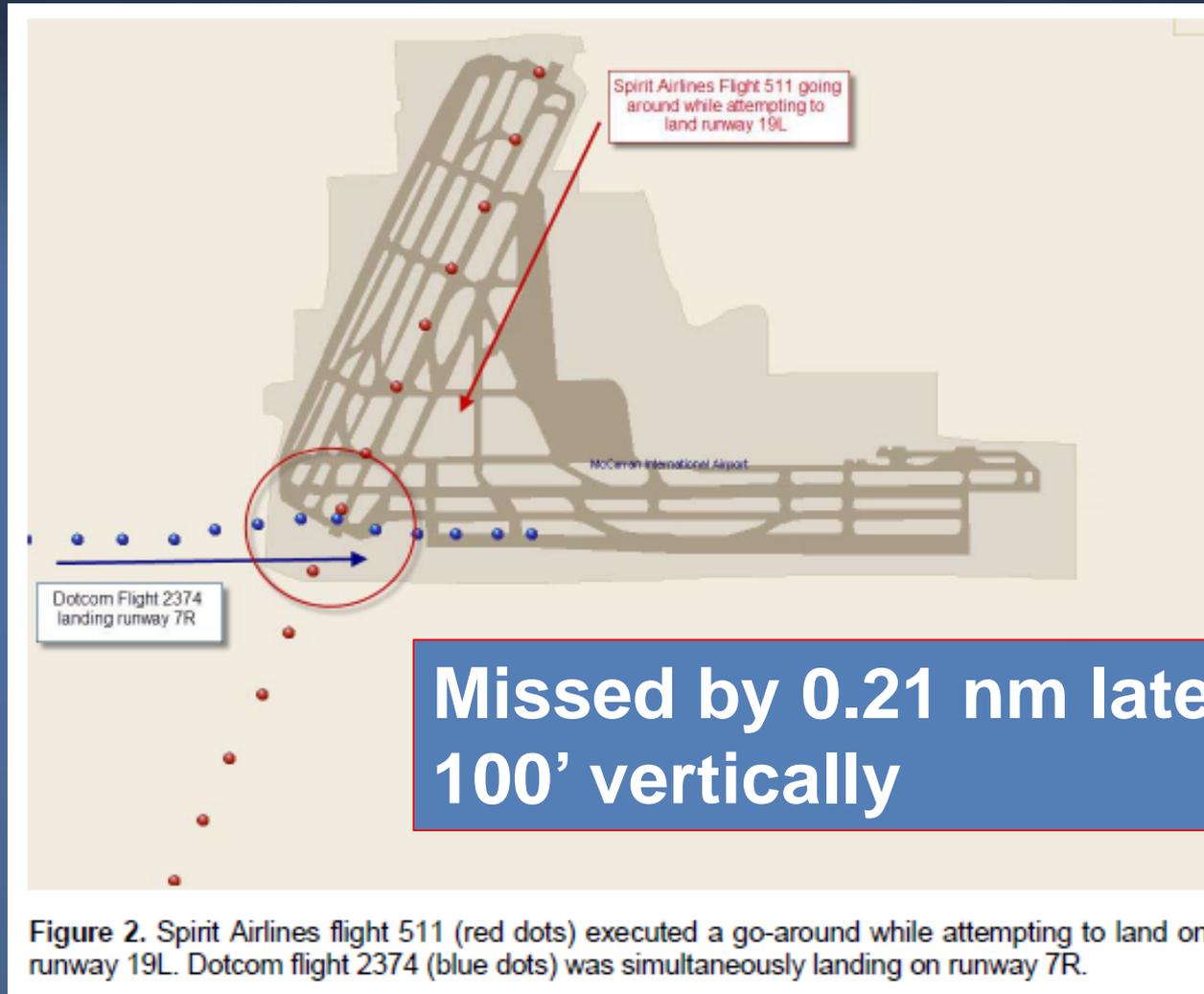


“The NTSB has recently investigated or reviewed numerous events in which air carrier aircraft that were executing a go-around came within hazardous proximity of other landing or departing aircraft...and have resulted in flight crews having to execute evasive maneuvers at low altitude to avoid collisions.”

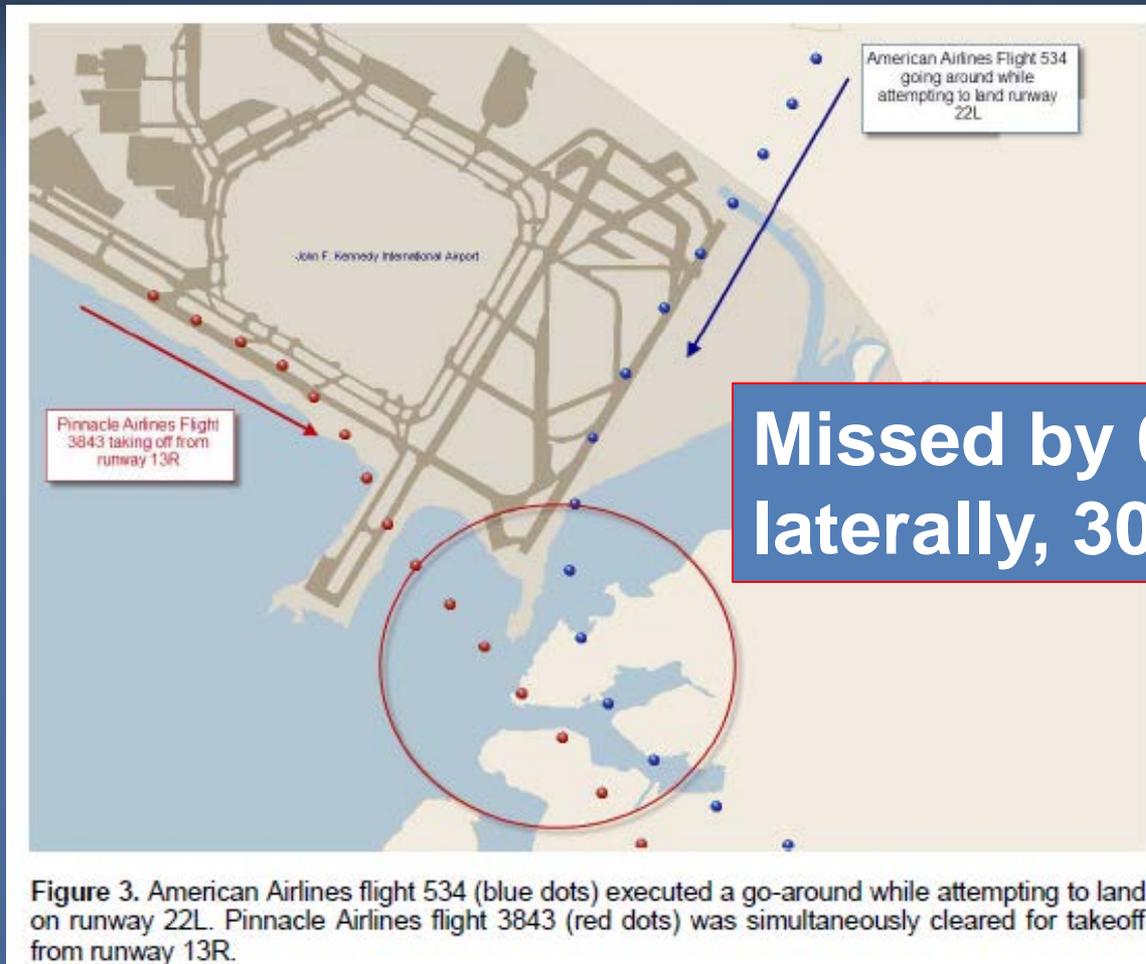


NTSB

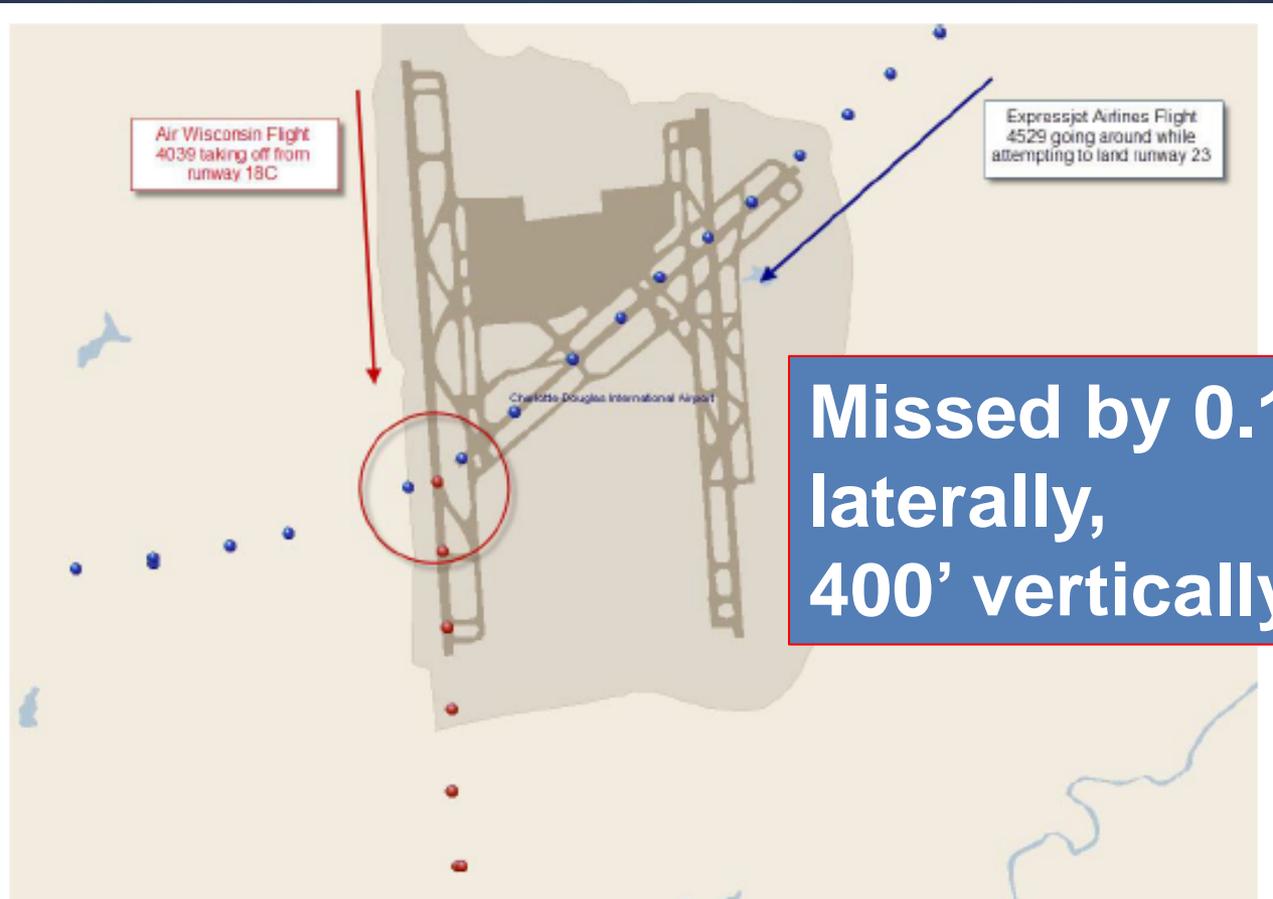
LAS – July 30, 2012



JFK – July 30, 2012



CLT – July 14, 2012



**Missed by 0.16 nm
laterally,
400' vertically**

Figure 4. Expressjet flight 4529 (blue dots) executed a go-around while attempting to land on runway 23. Air Wisconsin flight 4039 (red dots) was simultaneously cleared for takeoff from runway 18C.

LAS – April 26, 2012

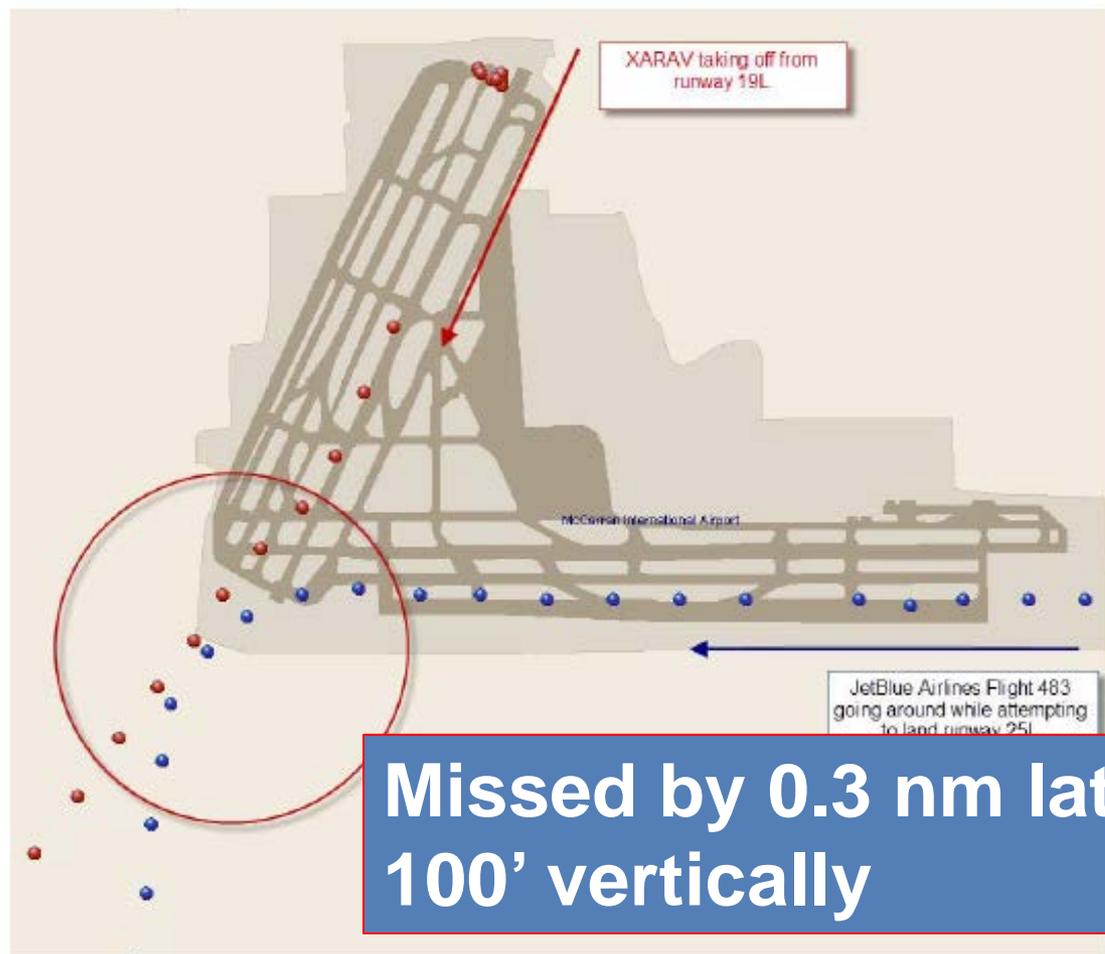


Figure 5. Jet Blue flight 483 (blue dots) executed a go-around from runway 25L. XARAV (red dots) was simultaneously departing from runway 19L.



LAS – January 27, 2006

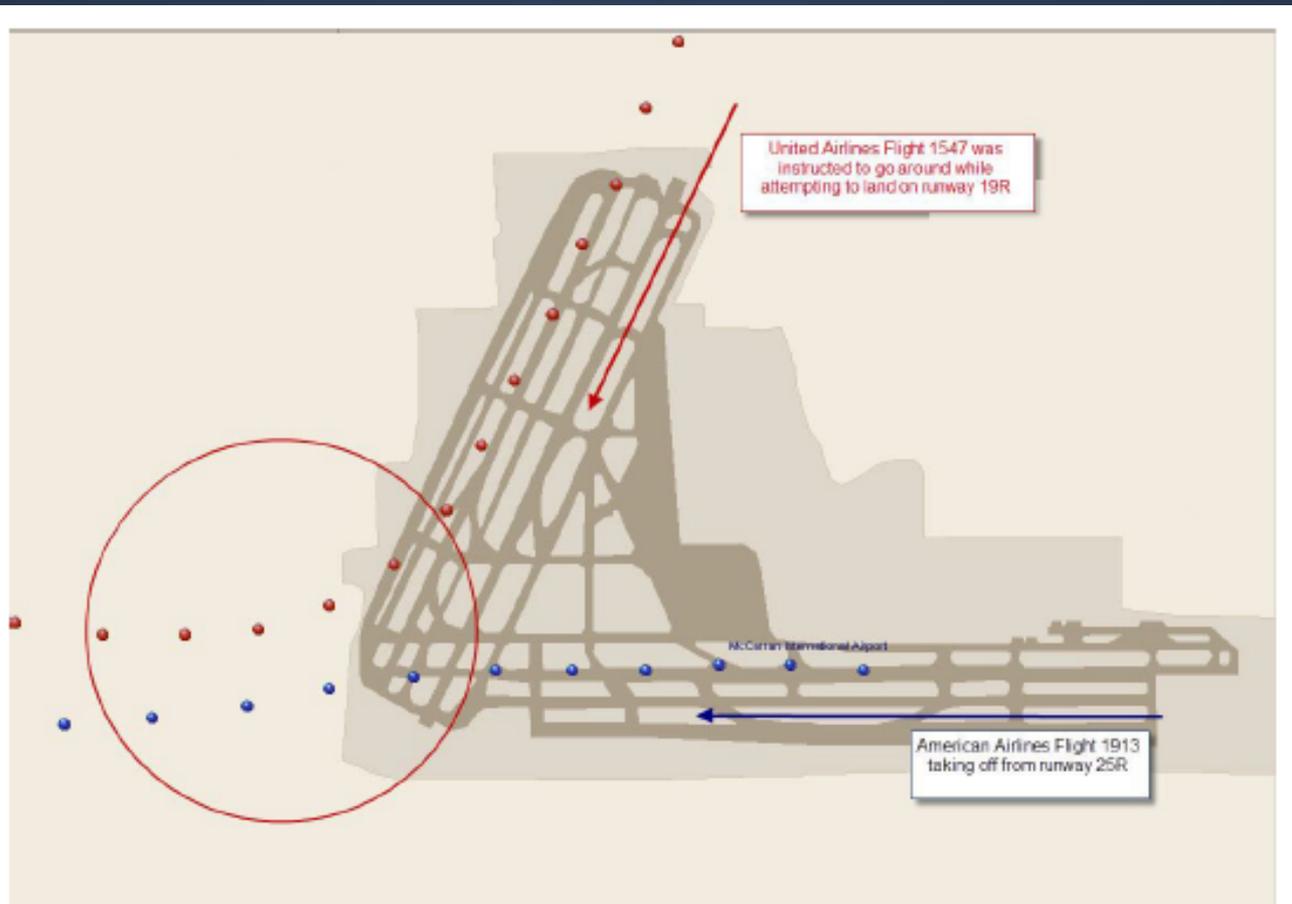


Figure 6. United Airlines flight 1547 (red dots) executed a go-around while attempting to land on runway 19R. American Airlines flight 1913 (blue dots) was simultaneously cleared for takeoff from runway 25R.

Potential Problems with Go-arounds

PILOTING ISSUES



NTSB



USAir 1016

July 2, 1994

Charlotte, North Carolina

37 fatalities





NTSB

Thompson, GA

February 20, 2013



Thompson, GA

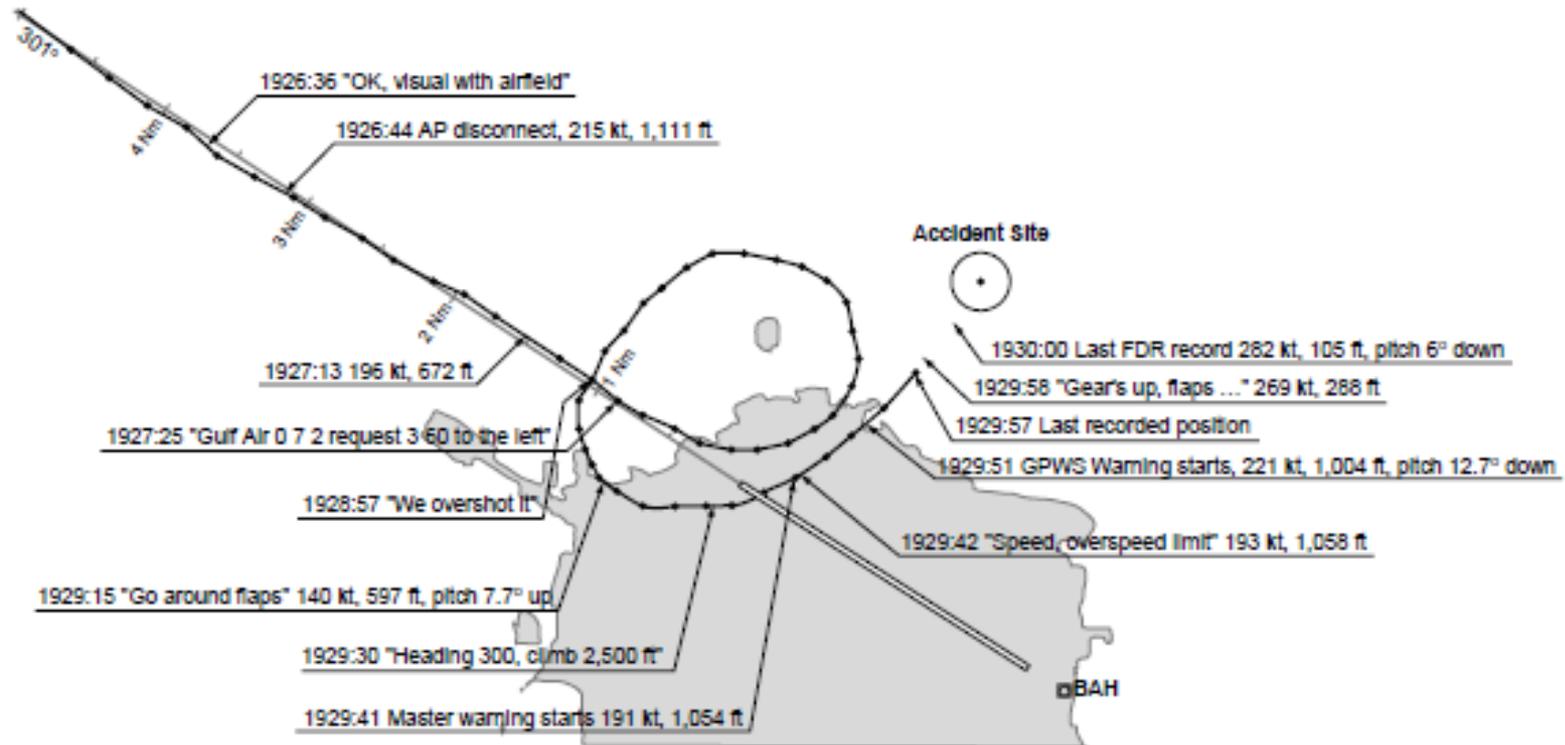
February 20, 2013

- Last radar return showed aircraft about $\frac{1}{2}$ mile from runway at appx. 250' AGL.
- “Witnesses reported that the airplane appeared to be in position to land when the pilot discontinued the approach and commenced a go-around.”
- Struck concrete utility pole $\frac{1}{4}$ mile past runway at appx. 60 feet AGL.



Gulf Air

Flight Path of Gulf Air Airbus A320 and Selected Cockpit Voice Recorder Data and Flight Data Recorder Data; Muharraq, Bahrain; Aug. 23, 2000



Note: All times are local.

Nm = Nautical miles kt = Knots ft = Feet AP = Autopilot GPWS = Ground-proximity warning system FDR = Flight data recorder
BAH = Bahrain VOR/DME (very-high-frequency omnidirectional radio/distance-measuring equipment)

Source: Bahrain Accident Investigation Board

SOLUTIONS



NTSB

A few thoughts to keep in mind

- Pilots – even good pilots – can sometimes make poor decisions regarding continuing unstabilized approaches
- Go-arounds – although considered to be the safety valve – can sometimes lead to problems of their own.
- Therefore, whatever “solutions” are contemplated, must be holistic in nature.



Holistic Solutions

- Do not just rely on the pilots to always make the proper decisions and take appropriate actions.
- Involve interventions at many different places in the system:
 - ATC
 - Avoid putting pilots in that situation in the first place
 - Appropriate use of technology





National Transportation Safety Board