



NTSB National Transportation Safety Board

Office of Aviation Safety

Corporate Aviation Safety Seminar

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Board Member, NTSB

April 30, 2008
Palm Harbor, Florida

2007 Accident Statistics

- 24 nonfatal accidents involving Part 121 airlines
- No fatalities occurred among Part 135 commuter operators (fewer than 10 seats).
- On-demand Part 135 operations reported 43 fatalities (*62 accidents, 14 fatal accidents*), up from the 16 fatalities that occurred in 2006.
- Overall number of general aviation accidents rose from 1,518 in 2006 to 1,631 in 2007, but the number of fatalities in 2007 was down from 703 to 491 (30 % decrease), making it the lowest annual total in more than 40 years.



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Accidents Involving Contaminated Runways



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Southwest Airlines Flight 1248

Midway Airport

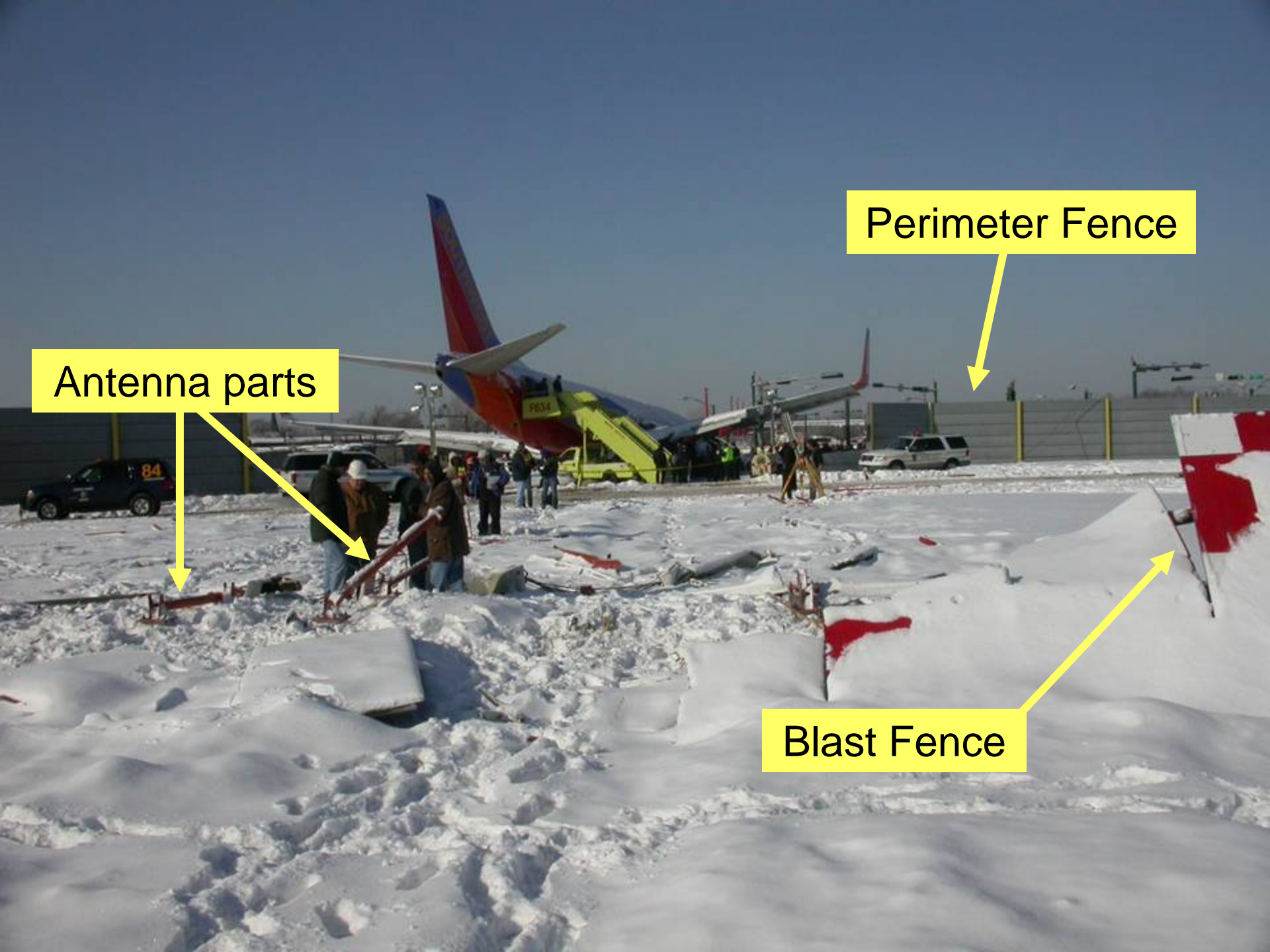
Chicago, Illinois

December 8, 2005

Accident Overview

- 7:14 pm
- Boeing 737-74H
- 1 fatality, 1 serious injury and 21 minor injuries





Antenna parts

Perimeter Fence

Blast Fence



W 55TH ST
5500 S

F634

NO
TURN
ON RED

Chicago Fire Dept.

Weather and Runway Conditions

- Worst runway braking action reported was “fair to poor”
- Tailwind of 8 knots, right quartering
- Visibility of ½ mile
- Moderate snow and freezing fog
- Temperature 28 F

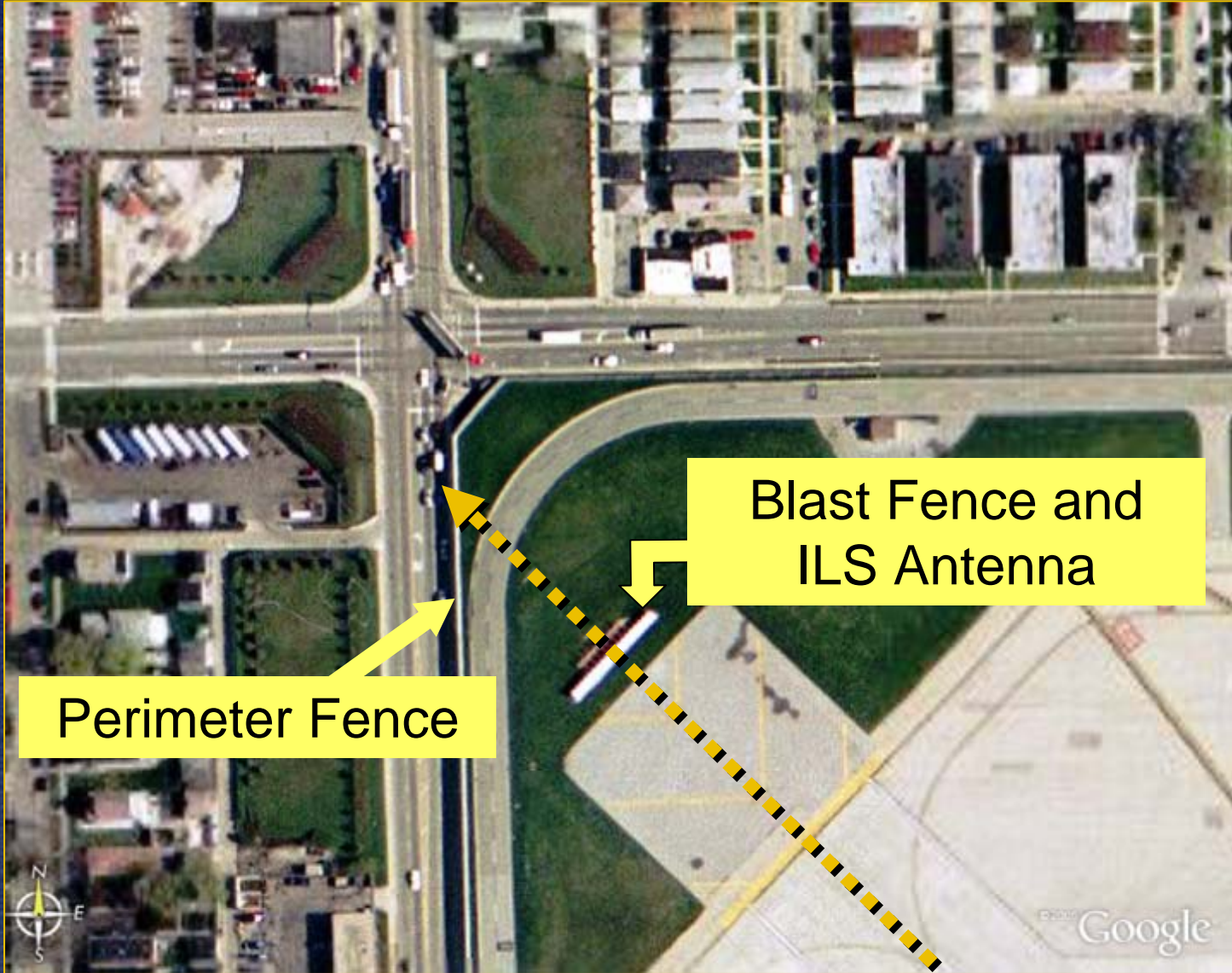
Aircraft Systems Examinations

- No preimpact anomalies
 - Antiskid system
 - Ground spoiler system
 - Wheel brake system
 - Throttle quadrant and linkage
 - Thrust reverser systems
 - Engines



Approx Touchdown Point

Displaced Threshold



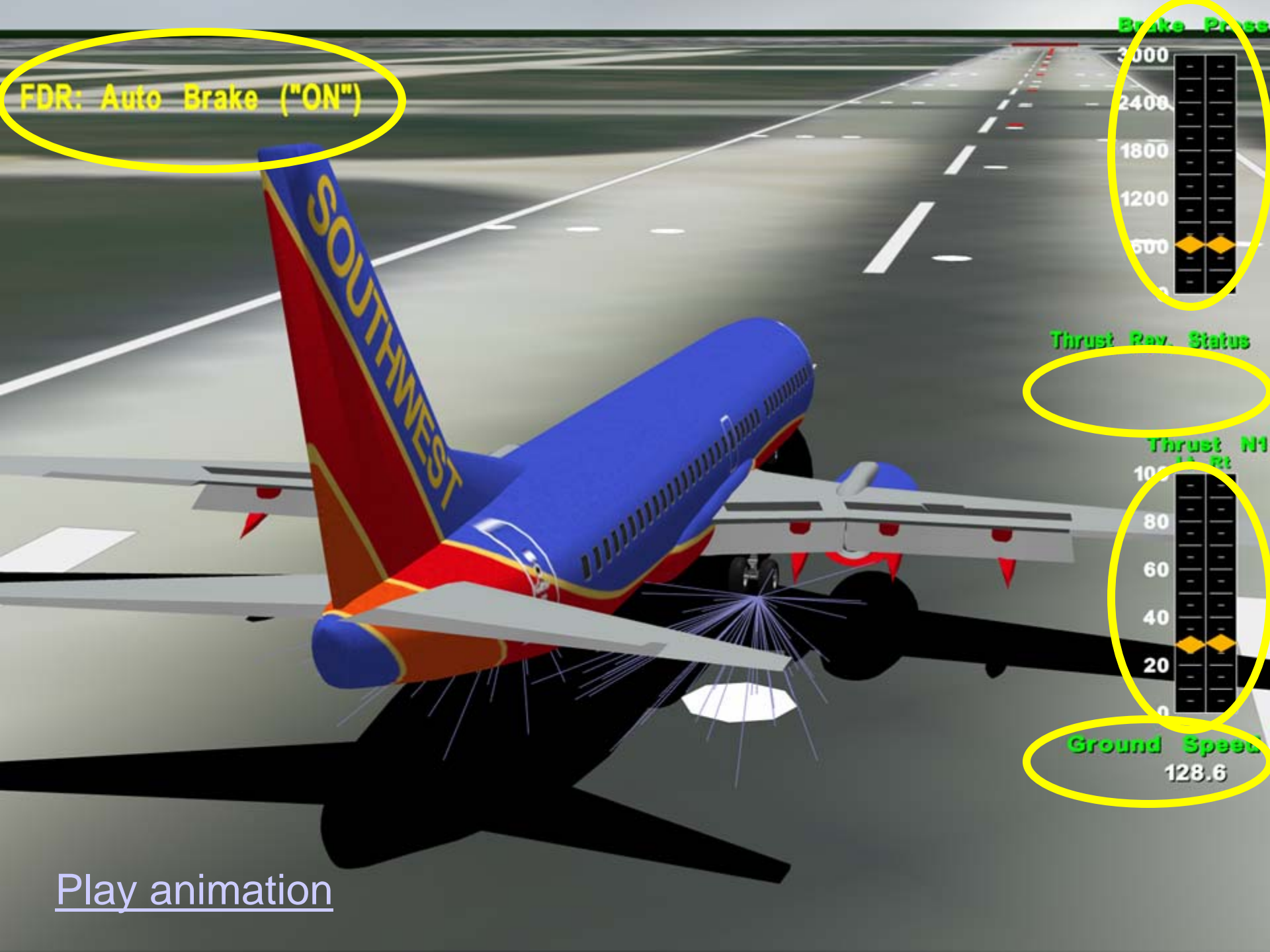
Perimeter Fence

Blast Fence and ILS Antenna



Google

Flight 1248 Animation



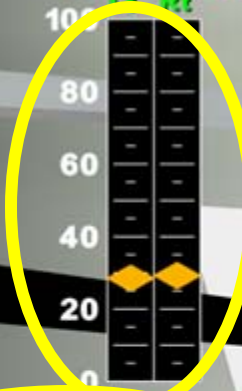
FDR: Auto Brake ("ON")



Thrust Rev. Status



Thrust N1



Ground Speed

128.6

[Play animation](#)

Probable Cause

- The NTSB determined that the probable cause of this accident was: the pilots' failure to use available reverse thrust in a timely manner to safely slow or stop the airplane after landing, which resulted in a runway overrun. This failure occurred because the pilots' first experience and lack of familiarity with the airplane's autobrake system distracted them from thrust reverser usage during the challenging landing.
- **Contributing Factors:**
These factors included Southwest Airline's...
 - 1) failure to provide its pilots with clear and consistent guidance and training regarding company policies and procedures related to arrival landing distance calculations;
 - 2) programming and design of its onboard performance computer, which did not present inherent assumptions in the program critical to pilot decision making;
 - 3) plan to implement new autobrake procedures without a familiarization period;
 - 4) failure to include a margin of safety in the arrival assessment to account for operational uncertainties.
- Additional factors included the pilots' failure to divert to another airport given reports that included poor braking action and a tailwind component greater than 5 knots; and Contributing to the severity of the accident was the absence of an engineering materials arresting system, which was needed because of the limited runway safety area beyond the departure end of runway 31C.

Recommendations

- Require operators to provide clear guidance and training to their pilots and dispatchers about their policy on surface conditions, braking action reports, and assumptions used in making landing distance calculations.
- Require operators to use a standardized methodology for arrival landing distance assessments that includes approved performance data, actual arrival conditions, a means of correlating the airplane's braking ability with runway surface conditions, using the most conservative interpretation and including a 15% safety margin.
- Require operators to conduct arrival landing distance assessments based on existing performance data, actual conditions, and incorporating a minimum safety margin of 15%. This recommendation is classified as "urgent."
- Establish a minimum standard for operators to use in correlating an airplane's braking ability to braking action reports and runway contaminant type and depth reports for surface conditions that are worse than bare and dry.



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**Shuttle America, Inc.
Delta Connection Flight 6448**

**Cleveland-Hopkins IAP
Cleveland, Ohio
February 18, 2007**

Accident Overview

- **3:06 pm pm**
- **Embraer ERJ-170**
- **3 minor passenger injuries**
- **Atlanta to Cleveland**





ALASKA AIRLINES
1000000
CHICAGO 700

Runway 28

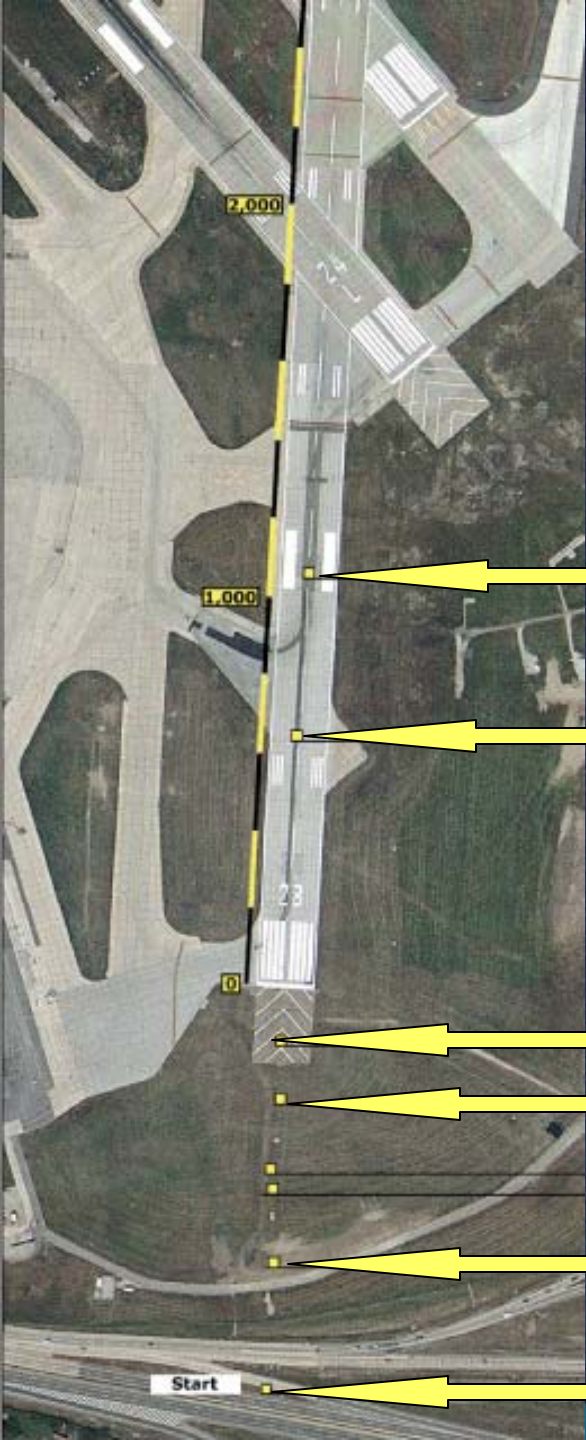
Cleveland-Hopkins IAP



Aircraft Stopped

Landing Area





10 Feet

30 Feet

40 Feet

Captain Sees Runway

F/O Sees Runway

80 Feet

NTSB





Aircraft Stopped

25% N1

Capt 90% Braking

F/O 75% Braking

63% N1

TRs Deployed

Nose Gear Touchdown

Main Gear Touchdown

NTSB



Probable Cause

- The failure of the flight crew to execute a missed approach when visual cues for the runway were not distinct and identifiable.
- Additionally, factors contributing to the accident were:
 - (1) the crew's decision to descend to the instrument landing system decision height instead of the localizer (glideslope out) minimum descent altitude;
 - (2) the first officer's long landing on a short contaminated runway and the crew's failure to use reverse thrust and braking to their maximum effectiveness;
 - (3) the captain's fatigue, which affected his ability to effectively plan for and monitor the approach and landing;
 - (4) Shuttle America's failure to administer an attendance policy that permitted flight crewmembers to call in as fatigued without fear of reprisals.

Recommendations

- Require Part 121, 135 and 91K operators to include, in their initial, upgrade, transition, and recurrent simulator training for turbojet airplanes...
 - decision-making for rejected landings below 50 feet along with a rapid reduction in visual cues
 - practice in executing this maneuver
 - practice for pilots in accomplishing maximum performance landings on contaminated runways.
- Require Part 121, 135, and 91 K operators to have a written policy emphasizing that either pilot can make a go-around callout and that the response to the callout is an immediate missed approach.
- In cooperation with pilot unions, the Regional Airline Association, and the Air Transport Association, develop a specific, standardized policy for Part 121, 135, and 91 K operators that would allow flight crewmembers to decline assignments or remove themselves from duty if they were impaired by a lack of sleep.
- Once the fatigue policy described above has been developed, require Part 121, 135, and 91 K operators to adopt this policy and provide, in writing, details of the policy to their flight crewmembers, including the administrative implications of fatigue calls.



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Cessna 550 Air Ambulance

Butler, Pennsylvania
January 24, 2007

Background Information

- One pilot seriously injured, other pilot and 2 passengers received minor injuries.
- Day IFR: Winchester, VA to Butler, PA
- Part 91 positioning flight for Part 135 EMS
- Runway 8: 4,801 ft long & 100 ft wide
- Airport manager stated that at the time, braking action fair with $\frac{1}{4}$ to $\frac{1}{2}$ -inch of fluffy loose snow



Environment

- Uncontrolled Airport
- 2 NOTAMs: *Patchy Thin Snow and Ice on Runway; Braking Action Fair*
- No ATIS, but had AWOS-3
- However, Captain estimated an inch or two of snow on runway and Copilot reported light snow falling at the time



Probable Cause

The copilot's failure to maintain the proper airspeed, and failure to obtain the proper touchdown point, and the PIC's inadequate supervision, which resulted in an overrun.

Contributing to the accident was the PIC's failure to activate the speed brake upon touchdown, and the snow-covered runway



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Cessna 560 Landing Accident

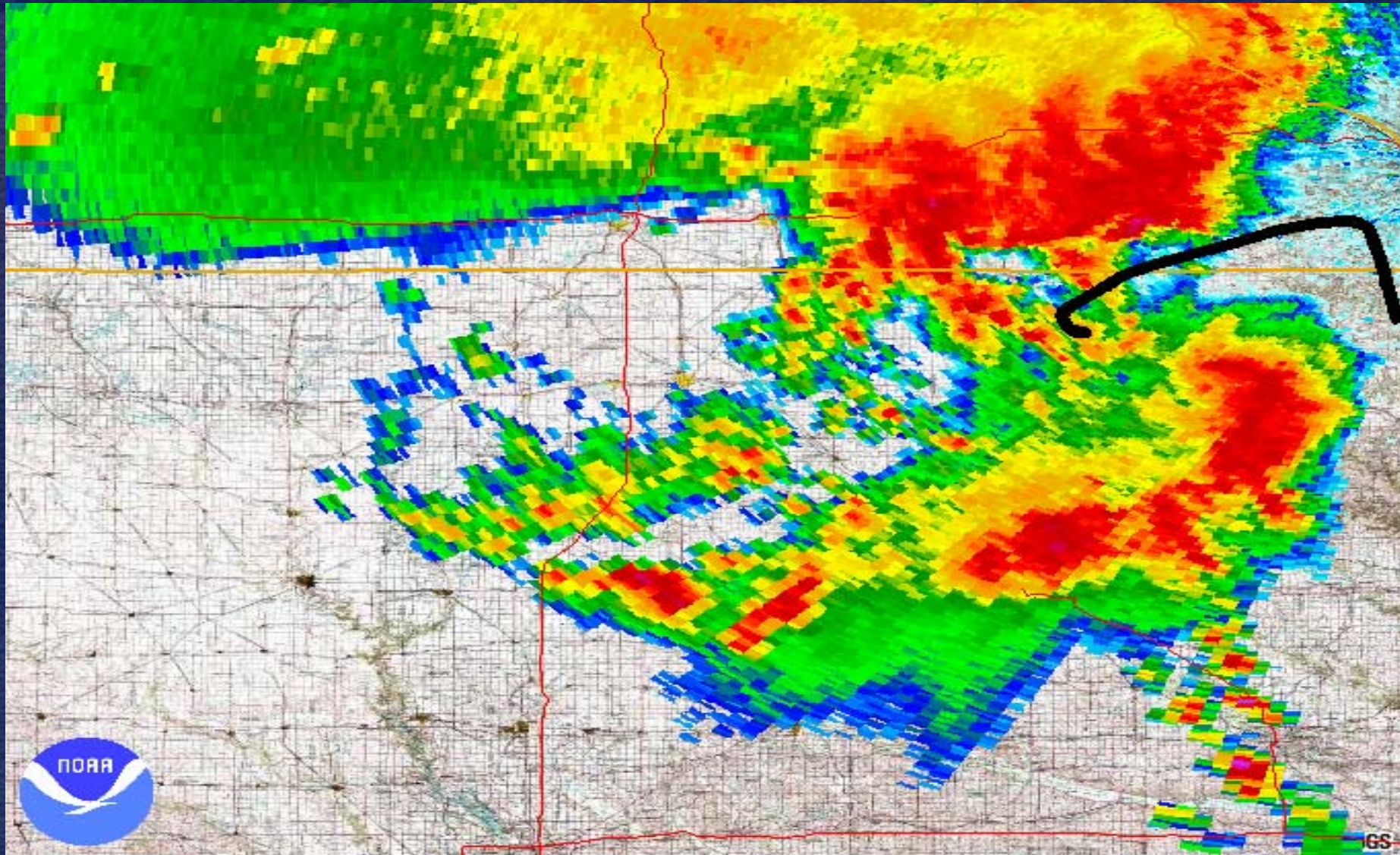
July 19, 2006

Cresco, Iowa

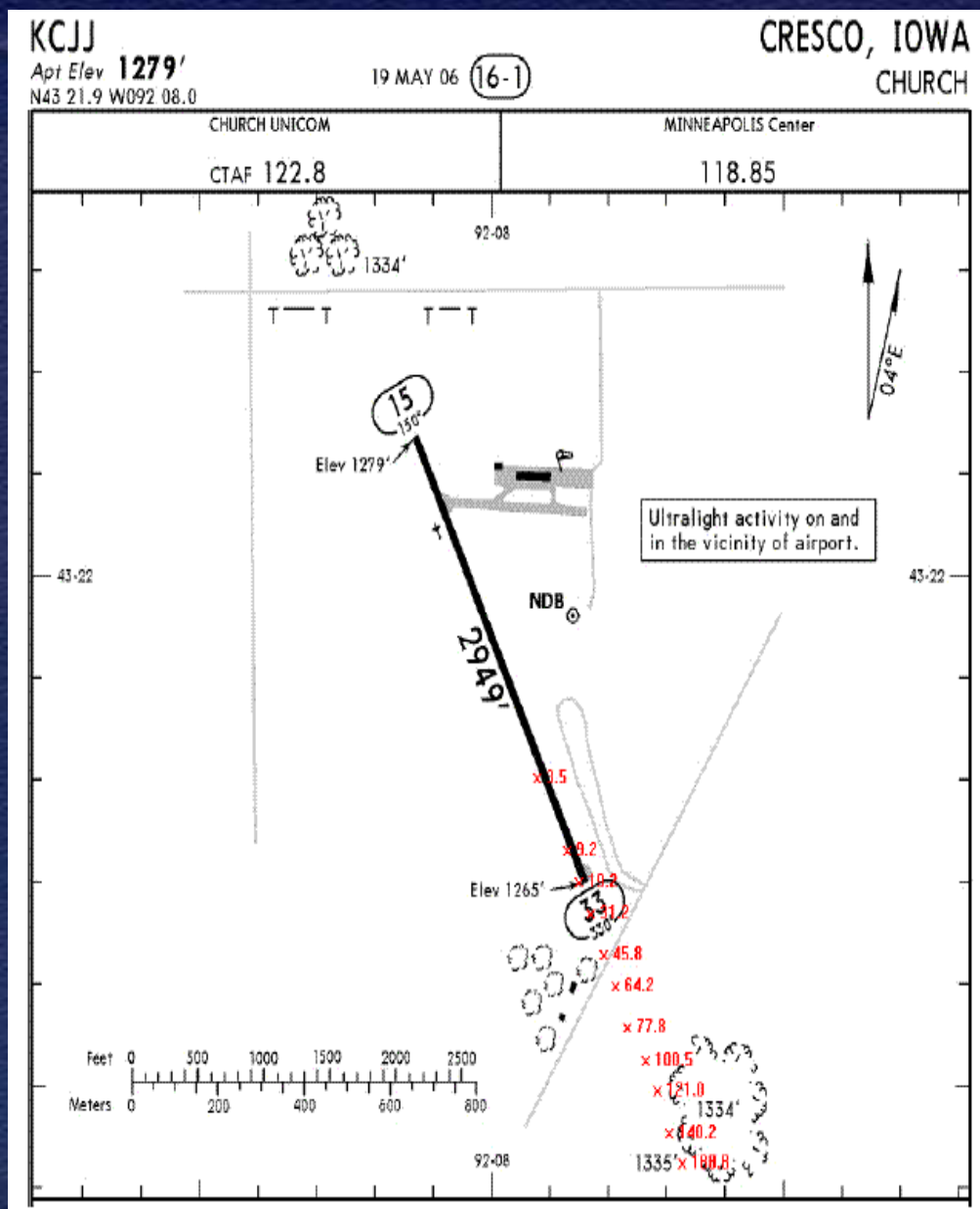
History of Flight



Flight Path Into Weather

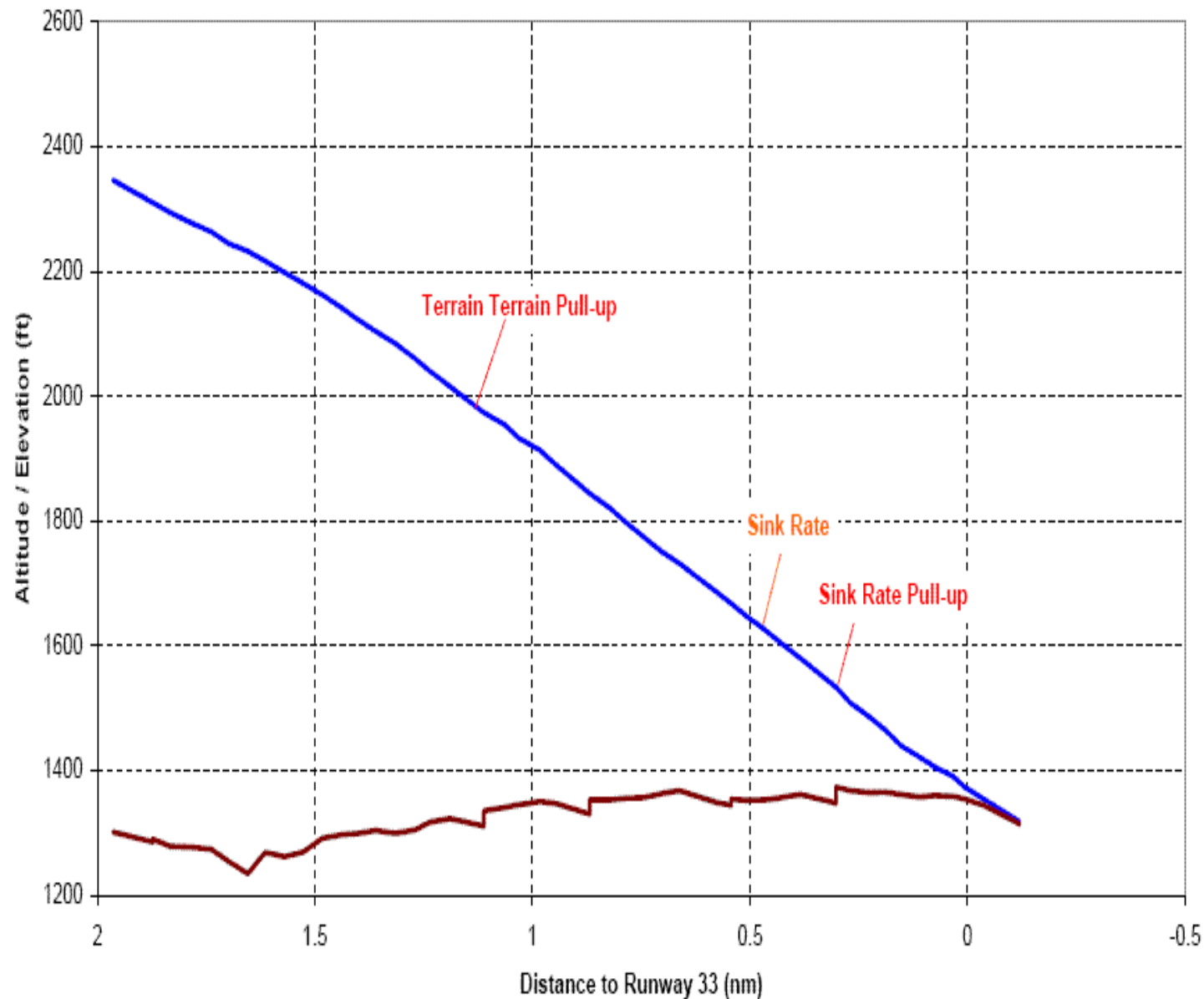


Airport Information Available to Crew



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Probable Cause

The flight crew's inadequate aeronautical decision-making and poor crew resource management (CRM), including the inadequate use of the on-board sources (such as the flight management system and navigation charts), to get critical information about the accident airport, including runway direction and length.

Contributing factors to the accident were the flight crew's failure to consider and understand indications that the runway length was insufficient, and inadequate CRM training for pilots at Part 135 on-demand operators.





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Other Ongoing Investigations of Fatal & Non-fatal Corporate Aircraft Accidents

NASCAR Cessna 310 Crash



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Cessna Citation - Milwaukee



Beech E90 – Ruidoso, NM



Citation 500 – Oklahoma City



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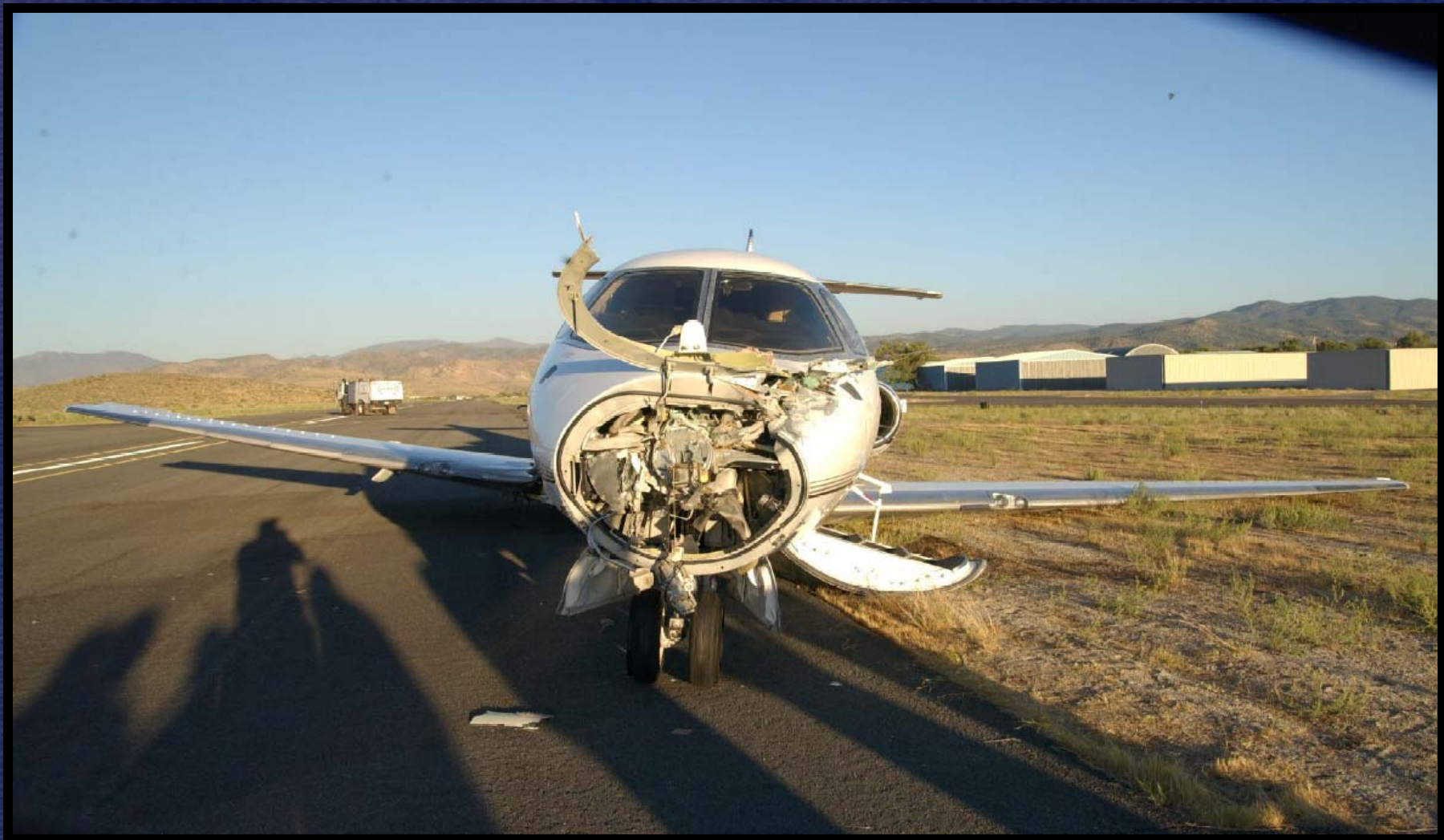
CL-600 Bird Strike - Colorado Springs



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Hawker 800XP / Glider Midair Collision near Smith, Nevada





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OPTIONAL SLIDES FOR THE SOUTHWEST AIRLINES ACCIDENT

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Landing Performance Data

	Certified Data	Advisory Data
Operational role	Flight dispatch	Enroute decisions
FAA-required?	Yes	No
Location	AFM	QRH
Factored data?	Yes	No
Thrust reversers included?	No	Optional
Safety margin source?	FARs	Operator/FAA