NTSB National Transportation Safety Board

Back to basics: Why investigate accidents?

Robert L. Sumwalt
NTSB Board Member

Why investigate accidents and incidents?

"The sole purpose of the investigation of an accident or incident shall be the prevention of accidents and incidents."

- ICAO Annex 13 Paragraph 3.1

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Linking investigation to prevention

- Issue safety recommendations
- Send a message to stakeholders
  - Industry
  - Government
  - Associations

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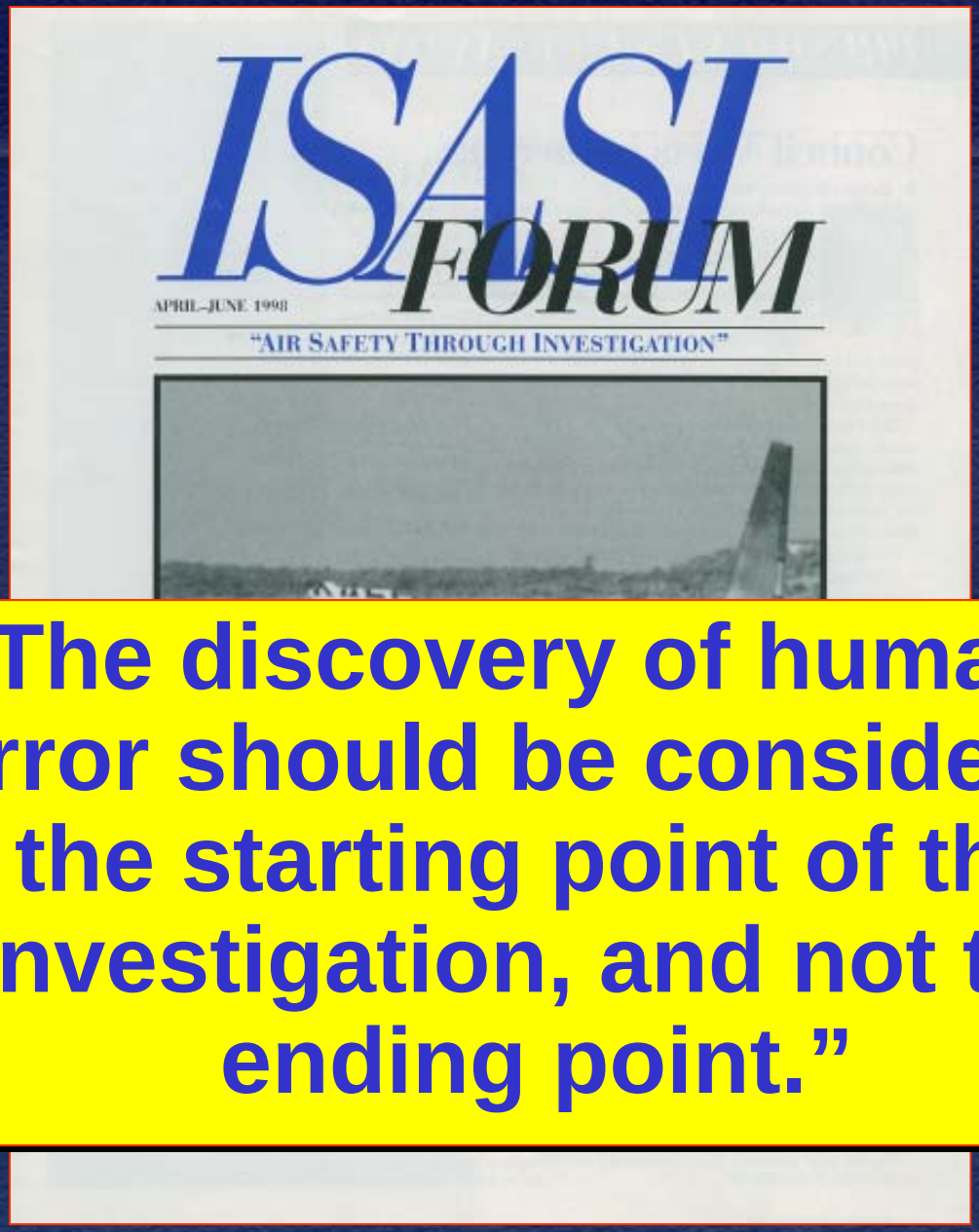

"The discovery of human error should be considered the starting point of the investigation, and not the ending point."

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Two Icing Accidents

- Allegheny Airlines February 1979
  (changed name to USAir in 1979)
- USAir March 1992

2 similar accidents, same airline

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Allegheny Airlines 1979

Allegheny Airlines 1979

No Safety Recommendations

"… the probable cause of the accident was the captain's decision to take off with snow on the aircraft's wing and empennage surfaces…"

Icing Accidents

- February 1979 - Allegheny Airlines
  Nord 262 Clarksburg, WV
- February 1980 - Redcoat Air Cargo
  Britannia 253F Boston, MA
- January 1982 - Air Florida
  B737 Washington, DC

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Icing Accidents

- February 1985 - Airborne Express
  DC-9-10 Philadelphia, PA
- December 1985 - Arrow Air
  DC-8 Gander, Newfoundland
- November 1987 - Continental
  DC-9-10 Denver, CO

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Icing Accidents

- March 1989 — Air Ontario
  F28 — Dryden, Ontario
- November 1989 — Korean Air
  F28 — Kimpo, Korea
- February 1991 — Ryan International
  DC-9-15 — Cleveland, OH

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Icing Accidents

- December 1991 — SAS
  MD80 — Stockholm, Sweden
- March 1992 — USAir
  F28 — New York, New York

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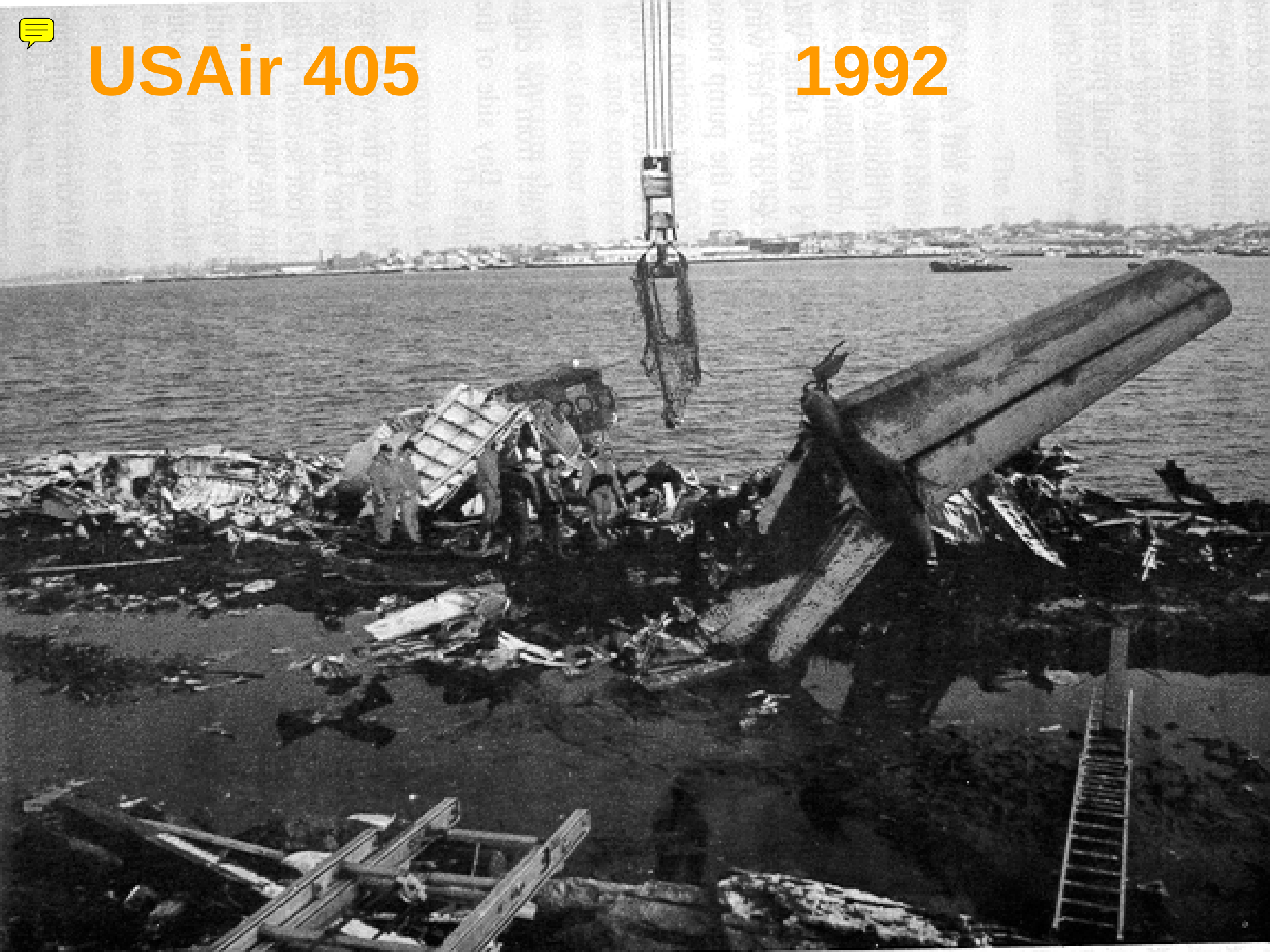
USAir 405 1992



USAir 405 1992

16 Safety Recommendations

"…the probable causes of this accident were the failure of the airline industry and the FAA to provide flightcrews with procedures, requirements, and criteria compatible with departure delays in known icing conditions, and the decision of the flightcrew to take off …"

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As a result of this accident

- More effective de-icing/ anti-icing fluids
- Better guidance – “Hold-over charts”
- New Federal Aviation Regulations regarding ground de-icing
- Better training
  - Flight crews
  - Ground crews
- ATC procedures for minimizing ground delays after de-icing

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An effective investigation

- 13 years between the Allegheny and USAir 405 crashes, 10 similar accidents
- 19 years after USAir 405, ___ air carrier accidents due to ground icing

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July 10, 2007, Sanford, FL

- Cessna 310 owned by NASCAR
- Flight planned Daytona Beach to Lakeland
- 5 fatalities

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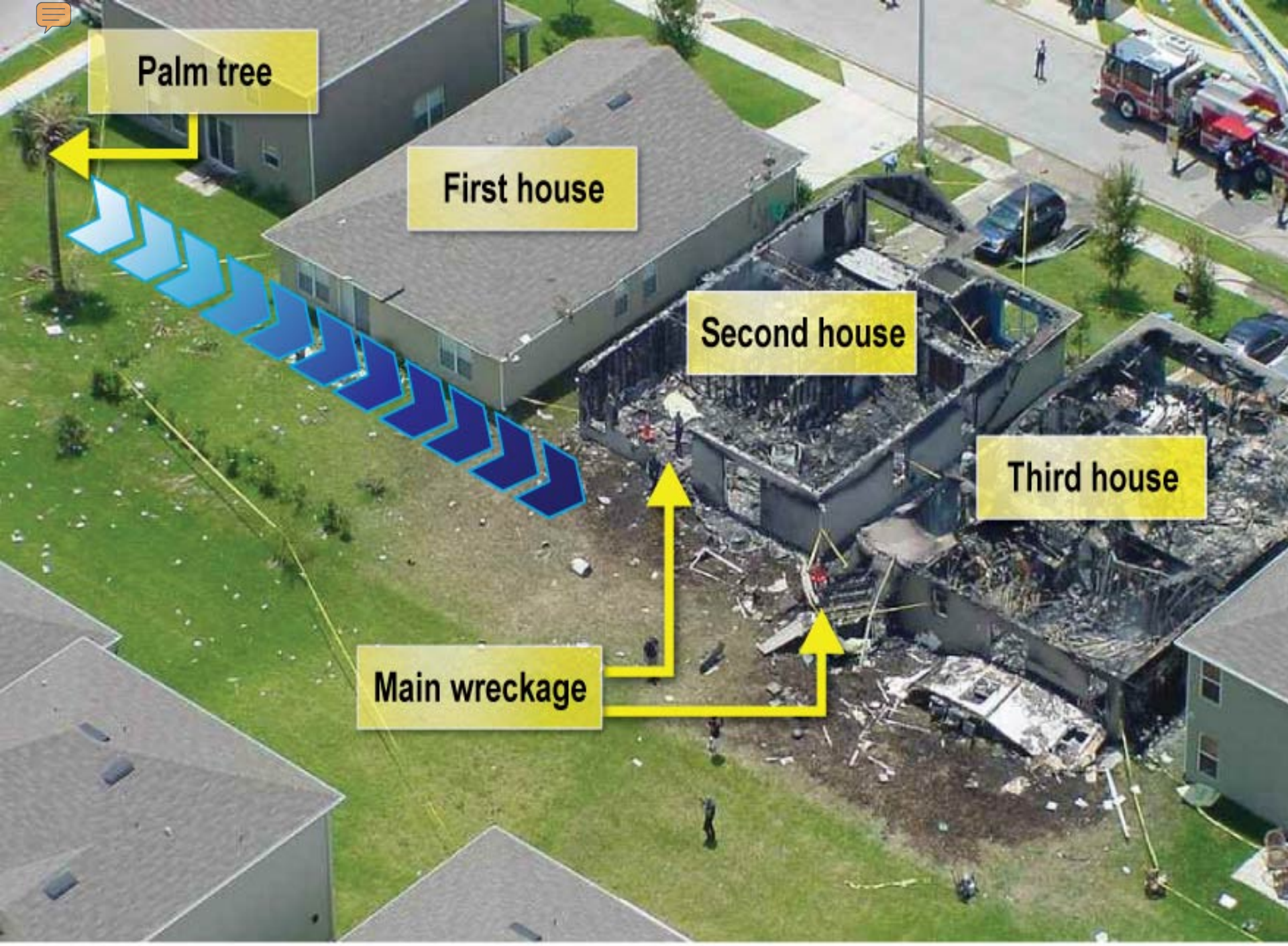
Palm tree
First house
Second house
Third house
Main wreckage

Declared Emergency

“Smoke in the cockpit.”

“Shutting off radios, elec.”

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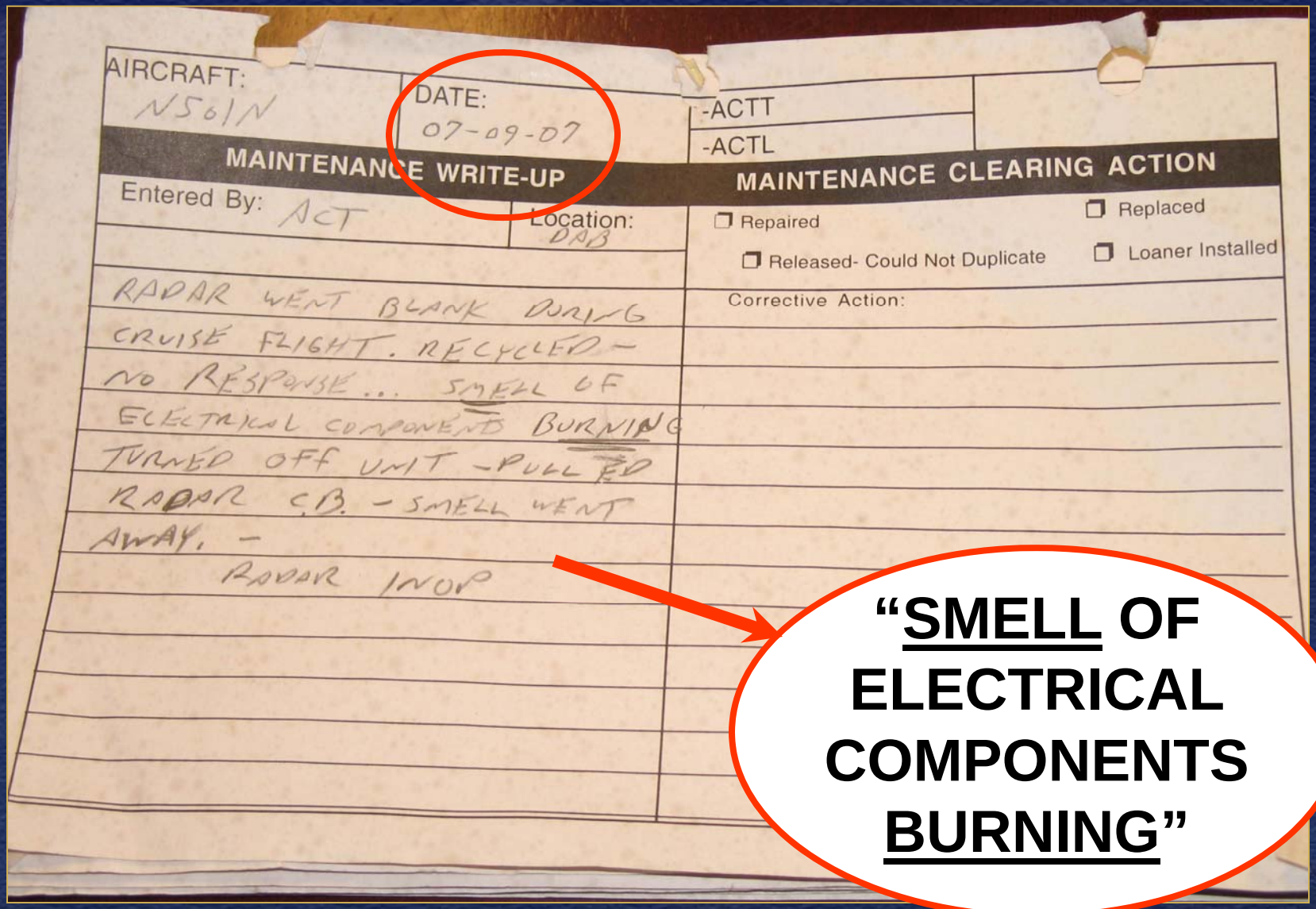
Maintenance Discrepancy Entry



Events - Previous Day

- That pilot followed company procedures
  - White original log sheet left in airplane binder
  - Handed yellow copy to DOM
  - Verbally informed technician
- Brief in-office discussion
- Airplane not inspected, modified, or grounded
- Airplane remained available for flight

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Active Failures

MECHANIC

- Did not inspect maintenance log or correct the discrepancy

PILOTS

- Dismissed radar issue as unimportant
  - accepted airplane “as is” and departed
- Likely reset weather radar circuit breaker for the flight

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Inadequate Organizational Processes and Procedures

- Maintenance forms not serialized, tracked, or retained
  - Yellow copy never provided
- No assurance discrepancies would be addressed
- No procedures for providing flight operations personnel (pilots and dispatchers) with airplane airworthiness information.

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Inadequate Procedures

- Most often a preflight fact sheet would be taped to airplane with highlighted items signed off by a mechanic
  - Not a requirement, not spelled out in SOP
- No guidance was provided to PIC for determining airworthiness of assigned aircraft

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Culture of Non-Compliance

- Aviation director could not readily locate SOP manual
- SOP manual viewed as a “training tool”
- SOP words versus reality
- Aircraft to only be used for company business
  - Accident flight was a personal flight
- PIC must possess ATP
  - PIC did not possess ATP
- Last 3 maintenance discrepancies had not been addressed

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Latent Conditions

- NASCAR enabled the accident by failing:
  - to have adequate processes and procedures to prevent such an event, and
  - to ensure compliance with the procedures they did have in place.

- “This accident started before the aircraft even left the ground.”

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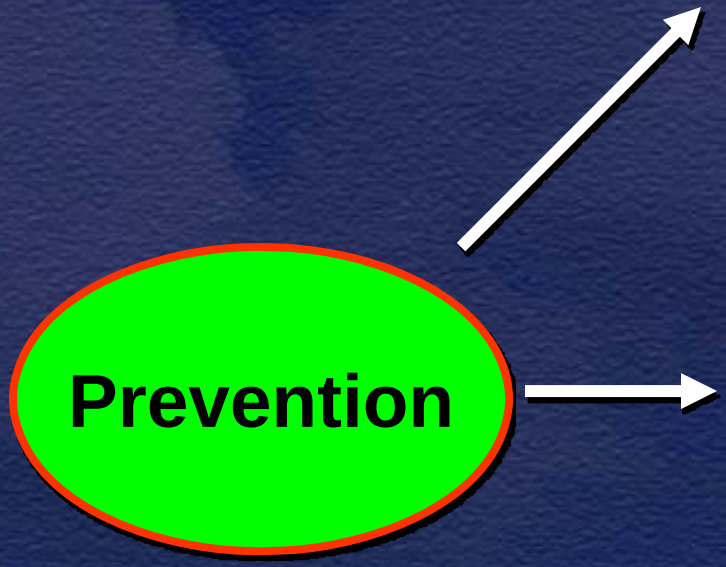
NASCAR Cessna 310



5 Safety Recommendations

"…actions and decisions by NASCAR's corporate aviation … management and maintenance personnel to allow the accident airplane to be released for flight with a known and unresolved discrepancy, and;

- "The accident pilots' decision to operate the airplane with that known discrepancy … that likely resulted in an in-flight fire."

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Air Tahoma

Sept 1, 2008

The Investigation Revealed…

- Elevator trim cables were rigged improperly, resulting in the trim cables being reversed.
  - When pilot applied nose-up trim, the elevator trim system actually applied nose-down trim.
- Inspector's block on maintenance work cards were not signed off by the Required Inspection Item (RII) inspector.

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59. Elevator System Rigging
a. Connect elevator cables and rig in accordance with Allison Convair M/M, section 8, figure 8.2.107.

Inspection:_____

AIR TAHOMA
CV 580 Overhaul

Card No.: 55-04
Date: 10/03/96
Rev: Original
Area: Horizontal Stabilizer and Elevator

A/C: N587
Date: 8-21-08
T.A.T.: 7196514
STA.: LCK

	MECH L/H	MECH R/H
b. Connect elevator servo trim tab cables and rig in accordance with Allison Convair M/M, section 8, figure 8.2.108 and 8.2.108A. Inspection:_____	N/A [redacted]	[redacted]
c. Connect elevator gust lock and rig in accordance with Allison Convair M/M, section 8, figure 8.2.114. Inspection:_____	[redacted]	N/A [redacted]
d. Connect autopilot cables to elevator bell cranks. Rig I.A.W. with AIR TAHOMA INC. CV580 Maintenance Supplement 22-10-01. Inspection:_____	[redacted] N/A	
NOTE: A COMPLETE INSPECTION OF ALL ELEVATOR CONTROLS MUST BE ACCOMPLISHED AND SIGNED OFF BY AN RII QUALIFIED INSPECTOR AND A LOG BOOK ENTRY MADE TO THIS EFFECT. RII Inspector:_____	[redacted]	

Not signed by RII Inspector

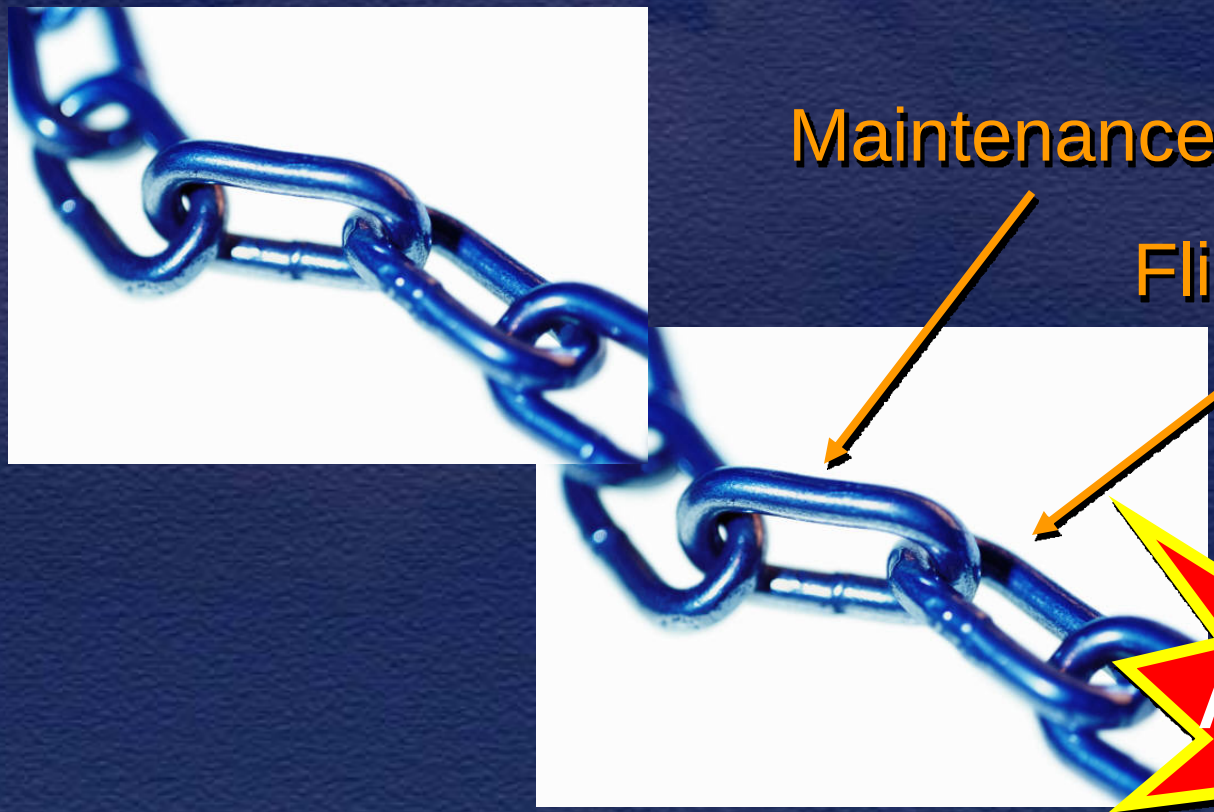
Air Tahoma

No Safety Recommendations

The improper (reverse) rigging of the elevator trim cables by company maintenance personnel, and their subsequent failure to discover the misrigging during required post-maintenance checks.

- Contributing to the accident was the captain's inadequate post-maintenance preflight check.

Links in Error Chain



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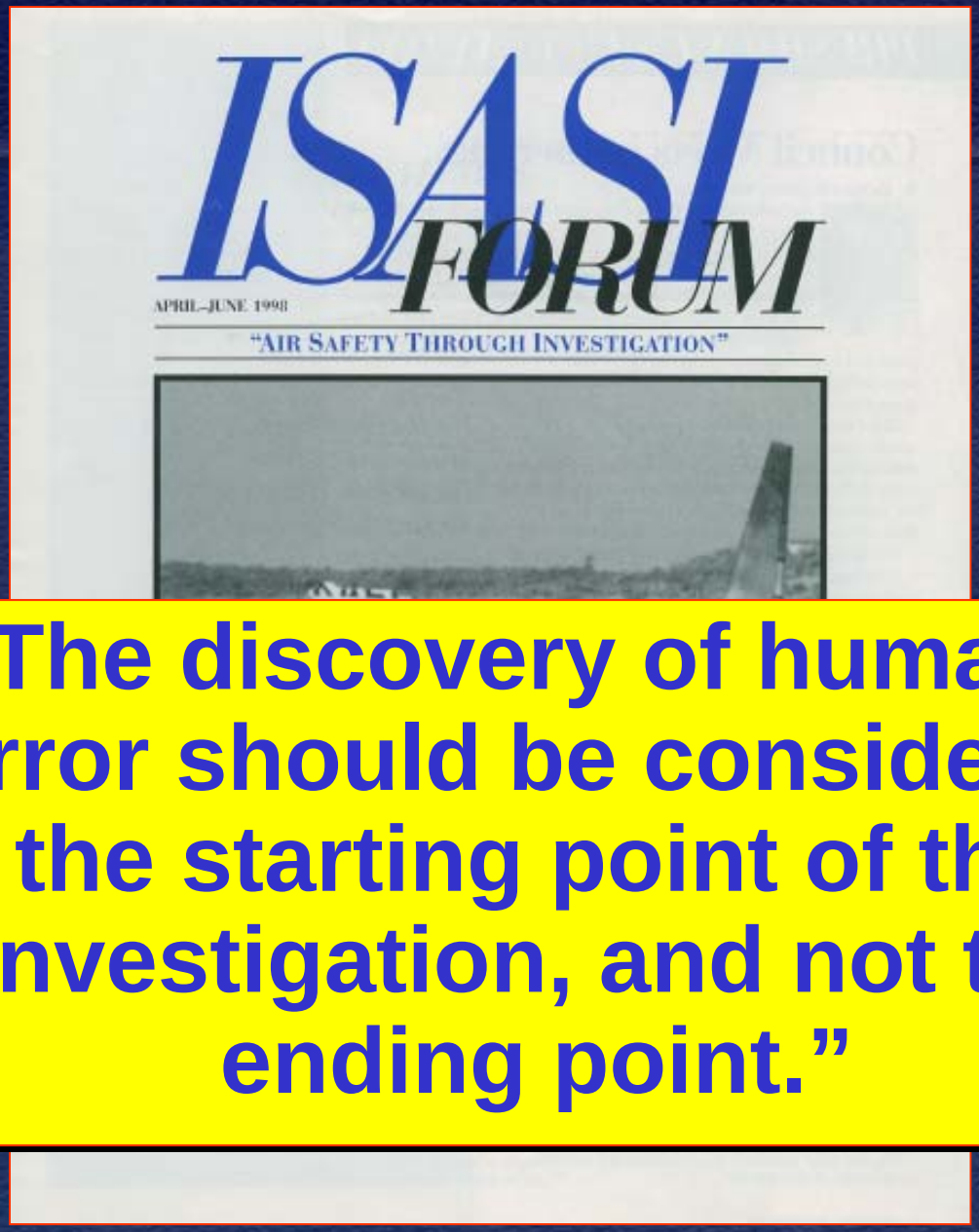

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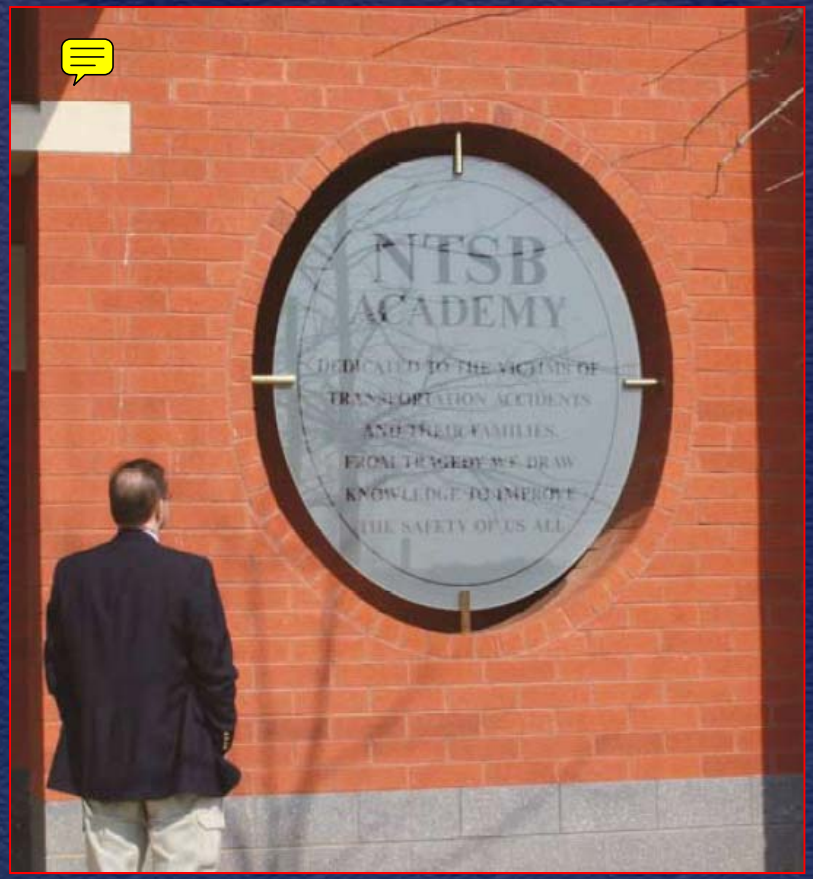
PREVENTION is why we investigate!



"From tragedy we draw knowledge to improve the safety of us all."

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