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NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Structures Group Chairman's
Factual Report

(7 Pages)

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594
May 12, 2009

STRUCTURES GROUP CHAIRMAN'S FACTUAL REPORT

DCA09MA026

A. ACCIDENT

Location:	Hudson River, Weehawken, New Jersey
Date:	January 15, 2009
Time:	1527 (EST)
Aircraft:	Airbus A320-214, N106US, S/N 1044

B. STRUCTURES GROUP

Chairman:	Brian Murphy National Transportation Safety Board (NTSB) Office of Aviation Safety (AS-40) Washington, DC 20594
Member:	Frederic BROCARD Airbus A320/A380 Structures Technical Advisor Toulouse, France
Member:	Michael Tallarico US Airways Structures Engineering Pittsburgh, PA
Member:	Jan Randle US Airline Pilots Association (USAPA) Accident Investigation Team Philadelphia, PA

Member: John Bidoglio
International Association of Machinists (IAM)
Flight Safety Committee
Charlotte, NC 28208

C. SUMMARY

On January 15, 2009, about 1527 Eastern Standard Time, US Airways flight 1549, an Airbus A320-214, registration N106US, suffered bird ingestion into both engines, lost engine thrust, and landed in the Hudson River following take off from New York City's La Guardia Airport (LGA). The scheduled, domestic passenger flight, operated under the provisions of Title 14 CFR Part 121, was en route to Charlotte Douglas International Airport (CLT) in Charlotte, North Carolina. The 150 passengers and 5 crewmembers evacuated the aircraft successfully. One flight attendant and four passengers were seriously injured.

This factual report contains the findings documented during the initial on scene investigation. Addendum 1 to this report contains the observations made during a follow-up examination of the wreckage in Harrison, NJ from March 30th to April 2nd. During the initial on scene investigation the group was comprised of members from the NTSB, Airbus Industrie, US Airways, USAPA and IAM. The group during the follow-on investigation was comprised of members from the NTSB, Airbus Industrie, Bureau d'Enquetes et d'Analyses pour la de l'aviation civile (BEA) and the Federal Aviation Administration (FAA).

D. DETAILS OF THE INVESTIGATION

1.0 Aircraft Description

N-number:	N106US
Aircraft Serial Number:	1044
Aircraft Manufacturer:	Airbus
Model:	A320-214
Engine Manufacturer:	CFM
Model:	CFM56-5B4/P
Aircraft Year:	1999
Airworthiness Certificate:	Standard
Approved Operations:	121
Aircraft Type:	Fixed Wing Multi-Engine
Engine Type:	Turbo-fan
Aircraft Category:	Transport
Number of Engines:	2
Number Seats:	150
Max. T/O Weight:	169,785 lbs (Weight Variant 010)
Total Time:	25,241 hours
Total Cycles:	16,299 cycles
Type Certificate	A28NM

2.0 Airworthiness

Following the bird strike and subsequent loss of power the airplane performed an unplanned water landing on the Hudson River. The airplane settled to a wings level attitude and the passengers and crew evacuated onto the wings and into the forward door slides/rafts. The airplane was later towed by tug boat to the Battery Park Wharf just north of the North Cove Ferry Terminal. The airplane was moored with left wing and portions of the forward fuselage and the vertical stabilizer initially visible above the surface of the river. The right wing was submerged below the Battery Park Esplanade. Prior to the airplane's recovery from the river it had become completely submerged with none of the airplane structure being visible from the esplanade

The airplane was recovered using a barge mounted crane and placed on the deck of another barge. The airplane was subsequently relocated to marine salvage company's facility in Jersey City, NJ for examination and documentation.

The right engine remained attached to the wing and the left engine separated from the wing during the unplanned water landing. The horizontal and vertical stabilizers and portions of the movable control surfaces remained attached to the airplane. The nose and main landing gear remained retracted and attached to the airplane. The fuselage and wings sustained damage during the bird strike event, the unplanned water landing and recovery phase.

3.0 Accident Site

The airplane departed from New York's La Guardia Airport (LGA) and made unplanned water landing on the Hudson River.

Figure 1 - USAirways flight 1549 after the passenger evacuation.

4.0 Main Wreckage

Figure 2 – USAirways Flight 1549 being placed on the recovery barge.

5.0 Fire Damage

There was no evidence of a post crash fire and no evidence or any patterns like those typically associated with a moving or in-flight fire were identified. No soot patterns were identified and no melted or splattered aluminum was observed on any of the structure.

6.0 Structure

6.1 Nose and forward fuselage, FR35 (reference Attachment 1)

The upper portion, from the 9 o'clock to 3 o'clock position, of the radome exhibited damage consistent with impact (reference Attachment 2 Photo 2). The damage consisted of dents and crushed honeycomb core, along with skin fractures and punctures. The radar weather antenna, located behind the radome, was also bent aft on its left hand side at about the 9 o'clock position. The lower part of radome had damage consistent with a soft body impact along with evidence of bird remains (reference Attachment 2 Photo 3). The evidence of bird remains were confirmed by the United States Department of Agriculture (USDA) wildlife investigators.

The left hand side (LHS) of the fuselage from frame station (FR) 1 to FR12 in the area above the static ports had numerous gouges, scrapes and dents between the frames and the fuselage skin was punctured at FR4 (reference Attachment 2 Photo 6). A smooth dent measuring 6 inches by 12 inches was also located between FR11 and FR12; the damage was consistent with soft body impact damage with no evidence of paint transfer,

(reference Attachment 2 Photos 4 and 5). Between FR13 and FR15, forward of the left hand side passenger door (L1), three punctures were observed in the fuselage skin (reference Attachment 2 Photo 6). Between FR21 and FR22 aft of the L1 door another puncture to the side of the fuselage skin, measuring 8 inches by 11 inches, was observed and documented (reference Attachment 2 Photo 7).

Below the right hand cockpit sliding window, a dent with no evidence of paint transfer was observed with traces of bird remains in the damaged area (reference Attachment 2 Photo 8). No further damage to the forward right hand side of the fuselage was observed from the radome to FR35.

6.2 Center fuselage, FR35 to FR47 (reference Attachment 1)

The left hand side belly fairing aft of the wing was fractured or missing. The right hand side belly fairing was missing from FR37 up to the end of belly fairing at FR51. The main landing gear bay was not damaged and the landing gear was in the up and locked position. The main landing gear doors were no longer attached the airplane.

6.3 Rear fuselage FR47 to FR64 (reference Attachment 1)

The lower left hand side of the rear fuselage was fractured between FR56 and FR64 and bent outward away from the aircraft center line (reference Attachment 2 Photo 9). On the right hand side at about the same location the fuselage was bent and buckled inward (reference Attachment 2 Photo 10). The frames on the right hand side of the fuselage were fractured between stringers 23 and 41 (reference Attachment 2 Photo 11). The internal cargo structure was damaged and the floor panels at FR57 were buckled upward (reference Attachment 2 Photo 13).

6.4 Rear fuselage FR64 and aft (reference Attachment 1)

From FR66 aft the crossbeams were sheared in the aft direction and the longitudinal seat-tracks remained in position. The lower third of the aft pressure bulkhead was sheared away and the lower part of the fuselage was torn in the aft direction (reference Attachment 2 Photo 12).

The tail cone was separated from the original attachment points except for the right hand side lower location and no longer retained its conical shape. The auxiliary power unit (APU) was still attached to the remaining structure of the tail cone (reference Attachment Photos 14 and 15).

6.5 Left Wing (reference Attachment 1)

The leading edge of slat #1 was ripped and torn from the leading edge to the trailing edge of the slat during the recovery by the lifting straps (reference Attachment 2 Photo 16). The leading edge of slat #2 outboard of engine mounts was torn and ripped from leading edge to trailing edge of the slat and a dent was located near the outboard edge

(reference Attachment 2 Photo 17). The leading edge of slat #3 had three dents, one inboard, one mid and one outboard. The wing leading edge slats 4 and 5 were separated from the wing during the initial rescue and recovery efforts and the slat tracks remained attached to the airplane wing structure (reference Attachment 2 Photo 18). The trailing edge of the inboard flap between rib 1 and rib 4 was missing. The inboard flap is bent upwards between the flap track and rib 1 of the wing. The left hand aileron was intact and remained attached to the wing structure (reference Attachment 2 Photo 19).

6.6 Right Wing (reference Attachment 1)

The leading edge of the right wing, aft of slat #1, was damaged during recovery (reference Attachment 2 Photo 20). Slat #3 had a dent inboard of the outboard edge on the leading edge (reference Attachment 2 Photo 21). The right hand aileron separated from the wing (reference Attachment 2 Photo 22). The outboard flap was broken at wing rib 4 and the flap remained attached to the airplane. The damage was symmetrical to the damage observed on the left hand side outboard flap. The inboard flap was turned upwards between the flap track and wing rib 1 and wrapped around the inboard aft end of the engine pylon fairing (reference Attachment 2 Photo 23).

6.7 Left Engine Pylon

The pylon and the engine separated from the wing structure and the only remaining pieces of pylon structure were the forward and aft wing to pylon fittings (reference Attachment 2 Photo 24). The forward fitting lugs fractured at pylon side, whereas for the aft attachment fittings, the pylon to wing fitting pins and rib 10 of the pylon remained attached to the wing structure. The remainder of the pylon structure remained attached to the left engine.

6.8 Right Engine Pylon

The pylon remained attached to the wing via the forward pylon to wing fitting. The aft pylon to wing fitting remained attached, and rib 10 of the pylon was fractured (reference Attachment 2 Photos 25 and 26).

6.9 Vertical Stabilizer (reference Attachment 1)

Visual inspection from ground showed two dents and/or marks were identified on vertical stabilizer leading edge along with one on the top of the rudder. The vertical stabilizer damage was located at leading edge between the tip and Rib 11. The rudder damage is located on right hand side aft of the hinge line approximately 8 inches from the top (reference Attachment 2 Photo 27).

6.10 Horizontal Stabilizer (reference Attachment 1)

Visual inspection from ground showed both the right and left hand side tip structure to have impact damage on the leading edges. The right hand side horizontal stabilizer

lower and upper skin panels were fractured between Ribs 11 and 12 (reference Attachment 2 Photo 28).

6.11 Passenger Doors (reference Attachment 1)

The left forward passenger door (L1) and the two rear passenger doors (L2 and R2) were all in good condition. The right forward passenger door (R1) was damaged, the lower arm fitting and the two guide rods were fractured (reference Attachment 2 Photo 29).

6.12 Cargo Doors (reference Attachment 1)

Both the forward and aft cargo doors were open when the airplane was lifted from the river. The forward cargo door was reported to be in the open position by the first recovery team diver. This finding was validated by the underwater video documentation. The forward cargo door frames, rollers, latches and drift pins were in good condition and undeformed. The aft cargo door latches and rollers were in good condition, and the door frame structure was fractured at multiple locations. The airplane was initially supported on the barge by the right engine and aft cargo door.

Brian K Murphy
Aircraft Structures
Group Chairman