



National Transportation Safety Board Aviation Accident Final Report

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|-------------------------|------------------------|-------------------------|-------------|
| Location: | Kipnuk, AK | Accident Number: | ANC03LA024 |
| Date & Time: | 01/21/2003, 1000 AST | Registration: | N206EH |
| Aircraft: | de Havilland DHC-6-200 | Aircraft Damage: | Substantial |
| Defining Event: | | Injuries: | 10 None |

Flight Conducted Under: Part 121: Air Carrier - Scheduled

Analysis

The air carrier passenger flight was landing on an icy, 2,120 feet long, by 35 feet wide, gravel runway with nearly a direct crosswind from the right at 15 to 20 knots. During the landing roll, at the captain's directions, the first officer fully deflected the ailerons into the wind, while the captain, the designated flying pilot, manipulated the remaining flight controls and power to the engines. The airplane drifted to the left, despite the captain's efforts, and encountered a snow berm alongside the runway. The airplane was pulled to the left, and off the runway into deeper snow, collapsing the nose gear and receiving substantial damage to the fuselage directly aft of the nose gear. The captain noted in his written report to the NTSB that he believed the nose wheel steering did not turn fully to the right as he attempted to maintain directional control during the landing roll. He stated that the nose wheel steering mechanism may have had a mechanical failure. A review of the airplane's maintenance and flight discrepancy logs failed to disclose any preaccident mechanical problems with the nose wheel steering assembly. Postaccident inspection, bench testing, and disassembly of the nose wheel steering actuator, did not reveal any significant operational problems that would have precluded the nose wheel actuator from functioning. Postaccident interviews with the first officer on the accident flight, and the captain who had flown the accident airplane the day before the accident flight, indicated that they were unaware of any difficulties with the nose wheel steering. The first officer noted that the captain did not seem to utilize the rudders quickly enough, or aggressively enough, to maintain directional control during the landing roll, and relied too much on the nose wheel steering. A company captain who flew repair parts to the airplane at the accident site, reported that he walked the runway several times, looking at the accident airplane's path on the runway. He stated that it appeared to him the accident airplane's nose wheel had been turned fully to the right, and had skidded on the icy runway.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The captain's inadequate compensation for crosswind conditions, and his failure to maintain directional control during the landing roll on an icy runway, which resulted in an excursion from the runway and collision with a snow berm. Contributing factors in the accident are a

crosswind, an icy runway, and a snow berm.

Findings

Occurrence #1: LOSS OF CONTROL - ON GROUND/WATER

Phase of Operation: LANDING - ROLL

Findings

1. (F) WEATHER CONDITION - CROSSWIND
2. (C) COMPENSATION FOR WIND CONDITIONS - INADEQUATE - PILOT IN COMMAND
3. (F) AIRPORT FACILITIES, RUNWAY/LANDING AREA CONDITION - ICY
4. (C) DIRECTIONAL CONTROL - NOT MAINTAINED - PILOT IN COMMAND

Occurrence #2: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER

Phase of Operation: LANDING - ROLL

Findings

5. (F) AIRPORT FACILITIES, RUNWAY/LANDING AREA CONDITION - BERM

Occurrence #3: NOSE GEAR COLLAPSED

Phase of Operation: LANDING - ROLL

Factual Information

On January 21, 2003, about 1000 Alaska standard time, a wheel-equipped de Havilland DHC-6-200 airplane, N206EH, sustained substantial damage to the lower fuselage when it collided with a snow berm during the landing roll at the Kipnuk Airport, Kipnuk, Alaska. The Title 14, CFR Part 121 passenger flight was operated by Era Aviation, Incorporated, Anchorage, Alaska, as Flight 863, and departed Bethel, Alaska, en route to Kipnuk, about 0920. Neither the captain, the first officer, or any of the eight passengers, reported any injuries. Day visual meteorological conditions prevailed, and a visual flight rules flight plan was in effect.

According to the operator's director of safety, the captain related that he was landing the airplane on runway 33 during daylight conditions with a 15-knot crosswind from his right (about 050 degrees magnetic). During the landing roll, the airplane drifted too far to the left on the ice and frost-covered runway and encountered a snow berm. The collision with the snow berm fractured the nose wheel fork, and a portion of the fork subsequently damaged the fuselage just aft of the nose wheel. Field repairs were made at Kipnuk with the replacement of the nose wheel fork assembly, and the airplane was ferried to the operator's main repair base in Anchorage, Alaska.

The NTSB investigator-in-charge (IIC), another NTSB air safety investigator, the operator's director of safety, and the operator's chief maintenance inspector, inspected the airplane in Anchorage on January 24. Inspection disclosed substantial damage to several stringers and a longeron in the lower fuselage structure immediately aft of the nose wheel. Additionally, the radar dome, nose baggage door, and adjoining nose cone structure were damaged. The operator's chief maintenance inspector noted that the damage to the cone and baggage door would be repaired by replacing the entire nose cone, which is about 6 feet in length.

The captain was interviewed by the IIC on February 11 at the Anchorage NTSB office. He related that he was the pilot flying, and he made an uneventful approach and touchdown on runway 33. He said the touchdown was within the first 500 feet of the runway, and there was nearly a direct crosswind from the northeast at 15 to 20 knots. He described the landing surface of the 2,120 feet long by 35 feet wide runway as hard-packed gravel, covered mostly by ice and frost. During the landing, he said the first officer fully deflected the ailerons into the crosswind, while he manipulated the rudders, propellers, power to the engines, and nose wheel steering. He said as the airplane slowed, the rudder effectiveness diminished, and, in addition to right rudder input, he attempted to keep the airplane tracking straight on the runway by applying nose wheel steering to the right. He indicated the airplane did not respond to the steering inputs, and went toward the left side of the runway. The left main landing gear tire subsequently encountered snow left piled alongside the runway by a snowplow. The encounter with the snow berm pulled the airplane to the left, and into the snow-covered area outside the runway environment. During the excursion from the runway, the nose wheel became mired in the snow, the nose wheel fork fractured, and the airplane nosed down. The captain noted that the nose wheel steering tiller did not seem to rotate to the right as far as it should, and he was not certain the nose wheel was capable of full travel to the right. He said he did mention his concerns about the tiller to company management personnel sometime after the accident, but he did not make a postaccident entry into the airplane's flight log about the tiller movement, nor did he initially include his concerns in a postaccident written statement which was given to company management and the NTSB IIC.

On February 24, the captain contacted the NTSB IIC and gave him an additional written statement which outlined his concerns about a possible mechanical defect in the nose wheel steering mechanism. He also reiterated information from the previous interview about a lack of a winter area familiarization flight review that he feels should have been provided by the company. He said he had considerable experience flying the accident type airplane, but all of his recent winter flight experience had been to large, hard-surfaced runways at major terminals. He said his last area familiarization flight in the Bethel-Kipnuk area was June, 2002. The captain said the company should have provided him with a winter-specific familiarization flight in the Bethel area prior to assigning him to fly to short, narrow, and icy runways. The captain also amended a portion of his original written report submitted to the operator and the NTSB. The original statement read, in part: "At approximately 30 knots it appeared that the A/C was drifting left. Nose wheel steering had no effect as it was slowly applied to the right, the A/C continued drifting left." The captain amended the word "drifting" in the two preceding sentences to "sliding."

The first officer had a telephone interview with the NTSB IIC on March 6. He related that the captain was the flying pilot, and that the approach and touchdown at the accident site were uneventful. He described the gravel runway conditions as normal winter conditions, somewhat slick, with a roughed-up, ice-coated surface. He said he had flown the same airplane to the same site the day before, and the runway conditions were nearly identical. After touchdown, at the captain's direction, he compensated for the crosswind condition by turning the ailerons completely to the right, into the crosswind. He said the airplane began to drift to the left, and he waited for the captain to make a correction. The airplane continued to drift left, and the left main landing gear tire ran into the snow berm alongside the runway, which pulled the airplane off the runway into a snow field, where the nose wheel fork fractured. When asked if he was aware of any mechanical problems with the airplane that might have precipitated the accident, he said "no." He indicated that he thought the captain delayed his correction for the drift, and that the captain should have used the rudders sooner and more aggressively, instead of attempting to primarily steer the airplane back to the centerline with the nose wheel tiller. The first officer was asked by the NTSB IIC if he was aware of any concerns the captain had about the hydraulically-actuated nose wheel steering not operating satisfactorily. He responded that the captain noted later on, sometime after they had deplaned, that the tiller didn't seem to be working right. He said that the tiller is located only at the captain's station on the left side of the airplane, but that to him, it seemed to be working fine, that the captain he had flown with the day before did not complain about it, and there were no mechanical discrepancies noted in the airplane's daily maintenance logs in any previous flights. He noted that his preflight inspection of the accident airplane before departure from Bethel, discovered no hydraulic leaks near the nose wheel, or anywhere on the airplane, nor had he seen any hydraulic leaks on this particular airplane recently.

On May 7, the NTSB IIC contacted the company captain who was assigned to ferry parts to repair the accident airplane to Kipnuk, and to return the accident airplane to Bethel. He said he arrived about an hour after the accident, and walked the runway several times, looking at the tire tracks from the accident airplane and for anything unusual. When asked if he had discovered anything, such as any signs of hydraulic fluid, he said he saw none at all, and that it was his impression from looking at the tire tracks on the runway, that the wheels had been skidding, and that the nose wheel was deflected fully to the right.

The IIC also had a telephone interview on May 7 with the captain who flew the accident

airplane the day before the accident. He was asked if he was aware of any mechanical problems with the airplane, and in particular, the nose wheel steering. He said he had flown the airplane frequently in the week or so preceding the accident, including the day before, and had not noticed any problems with the steering. He noted that the tiller always felt "a bit spongy" on the accident airplane, but that the nose wheel had always responded quickly, and completely, to a full 60 degree deflection. He also said that the accident captain would have had to make a hard, 90 degree right turn out of the ramp area at the beginning of the accident flight, and should have noticed any problem then.

The nose wheel steering mechanism of the accident airplane is hydraulically actuated. A tiller bar is located only at the captain's station (left seat). The tiller bar is connected via cable to the nose wheel steering actuator. The tiller bar normally rotates through approximately 90 degrees each direction from the horizontal, i.e., the tiller is centered at the nine o'clock position, and should rotate approximately to the twelve o'clock and six o'clock positions, with the twelve o'clock commanding a full right turn of the nose wheel (60 degrees from center), and the six o'clock a full left turn (also 60 degrees from center).

The airplane is maintained on a continuous airworthiness program (CAP). The IIC reviewed the airplane's maintenance records and flight logs for the previous 30 days. The airplane had completed a CAP 20 inspection on January 9, 2003. During the inspection, the hydraulic system, hydraulic system pressure accumulator, hydraulic system fittings, lines, and nose wheel actuator were tested, adjusted, and repaired as necessary. The airplane was also subjected to other routine inspections. The two most recent inspections prior to the accident flight occurred on January 15 and 18. During these inspections, the hydraulic accumulator pressure and hydraulic system fluid levels were checked, and determined to be within the manufacturer's specifications. No hydraulic fluid was added to the system, no leaks were detected, and no pressure was added to the accumulator.

A review of the flight and maintenance logs completed by the flight crews after each duty day, disclosed no mechanical discrepancies of any kind with the accident airplane during the month of January preceding the accident flight.

The nose wheel fork assembly and the nose wheel actuator were examined and bench tested by company maintenance personnel on March 4. The nose wheel actuator was found to extend and retract to full extension, but slightly faster than recommended specifications. The nose wheel steering actuator was sent to Avitech Engineering Corporation, Hayward, California, for overhaul.

On May 6, the IIC contacted the chief inspector, along with the vice president-general manager at Avitech via telephone. They said the nose wheel unit was initially tested as received from the operator prior to overhaul. They noted that although the nose wheel steering actuator was marginally outside of the acceptable test parameters in two categories, the unit functioned normally in its extension and retraction cycles, and moved full travel without impedance.

The IIC reviewed the operator's training practices and records, and discussed the first pilot's concerns about not receiving a winter familiarization flight, with the operator's director of safety, and the FAA's aviation safety inspector assigned as the company's principal operations inspector (POI). Both the POI and director of safety noted that the accident captain had met all requirements to act as pilot-in-command of the accident airplane at the time of the accident. They also noted that while not a regulatory requirement, a winter familiarization flight for

pilots who did not have recent experience in the unique winter operating environment of the Bethel area would be desirable.

Pilot Information

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|----------------------------------|--|--|----------------------------|
| Certificate: | Airline Transport; Commercial | Age: | 29, Male |
| Airplane Rating(s): | Multi-engine Land; Single-engine Land | Seat Occupied: | Left |
| Other Aircraft Rating(s): | None | Restraint Used: | Seatbelt, Shoulder harness |
| Instrument Rating(s): | Airplane | Second Pilot Present: | Yes |
| Instructor Rating(s): | None | Toxicology Performed: | No |
| Medical Certification: | Class 1 Valid Medical--no waivers/lim. | Last Medical Exam: | 12/20/2002 |
| Occupational Pilot: | | Last Flight Review or Equivalent: | 12/23/2002 |
| Flight Time: | 4300 hours (Total, all aircraft), 2000 hours (Total, this make and model), 1600 hours (Pilot In Command, all aircraft), 166 hours (Last 90 days, all aircraft), 26 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft) | | |

Co-Pilot Information

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|----------------------------------|---|--|----------------------------|
| Certificate: | Airline Transport; Commercial | Age: | 30, Male |
| Airplane Rating(s): | Multi-engine Land; Single-engine Land | Seat Occupied: | Right |
| Other Aircraft Rating(s): | None | Restraint Used: | Seatbelt, Shoulder harness |
| Instrument Rating(s): | Airplane | Second Pilot Present: | Yes |
| Instructor Rating(s): | None | Toxicology Performed: | No |
| Medical Certification: | Class 2 Valid Medical--w/ waivers/lim. | Last Medical Exam: | 07/15/2002 |
| Occupational Pilot: | | Last Flight Review or Equivalent: | 10/31/2002 |
| Flight Time: | 2600 hours (Total, all aircraft), 2000 hours (Total, this make and model), 450 hours (Pilot In Command, all aircraft), 210 hours (Last 90 days, all aircraft), 80 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft) | | |

Aircraft and Owner/Operator Information

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|-------------------------------|--------------------------------------|------------------------------------|--|
| Aircraft Manufacturer: | de Havilland | Registration: | N206EH |
| Model/Series: | DHC-6-200 | Aircraft Category: | Airplane |
| Year of Manufacture: | | Amateur Built: | No |
| Airworthiness Certificate: | Normal | Serial Number: | 194 |
| Landing Gear Type: | Tricycle | Seats: | 17 |
| Date/Type of Last Inspection: | 01/10/2003, Continuous Airworthiness | Certified Max Gross Wt.: | 11579 lbs |
| Time Since Last Inspection: | 45 Hours | Engines: | 2 Turbo Prop |
| Airframe Total Time: | 46564 Hours | Engine Manufacturer: | Pratt & Whitney |
| ELT: | Installed, not activated | Engine Model/Series: | PT-6A-20 |
| Registered Owner: | ERA AVIATION INC | Rated Power: | 550 hp |
| Operator: | ERA AVIATION INC | Air Carrier Operating Certificate: | Commuter Air Carrier (135); Flag carrier (121); Large Helicopter (127); On-demand Air Taxi (135) |
| Operator Does Business As: | | Operator Designator Code: | ERAA |

Meteorological Information and Flight Plan

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|----------------------------------|--------------------|-------------------------------|----------|
| Conditions at Accident Site: | Visual Conditions | Condition of Light: | Day |
| Observation Facility, Elevation: | | Observation Time: | |
| Distance from Accident Site: | | Direction from Accident Site: | |
| Lowest Cloud Condition: | Few / 12000 ft agl | Temperature/Dew Point: | -10° C |
| Lowest Ceiling: | None | Visibility | 10 Miles |
| Wind Speed/Gusts, Direction: | 15 knots, 50° | Visibility (RVR): | |
| Altimeter Setting: | 30.09 inches Hg | Visibility (RVV): | |
| Precipitation and Obscuration: | | | |
| Departure Point: | BETHEL, AK (BET) | Type of Flight Plan Filed: | VFR |
| Destination: | Kipnuk, AK (PAKI) | Type of Clearance: | None |
| Departure Time: | 0920 AST | Type of Airspace: | Class G |

Airport Information

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|----------------------|-----------------|---------------------------|----------------------------|
| Airport: | KIPNUK (PAKI) | Runway Surface Type: | Gravel |
| Airport Elevation: | 11 ft | Runway Surface Condition: | Ice; Snow--compacted |
| Runway Used: | 33 | IFR Approach: | None |
| Runway Length/Width: | 2120 ft / 35 ft | VFR Approach/Landing: | Full Stop; Traffic Pattern |

Wreckage and Impact Information

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|----------------------------|---------|-----------------------------|------------------------|
| Crew Injuries: | 2 None | Aircraft Damage: | Substantial |
| Passenger Injuries: | 8 None | Aircraft Fire: | None |
| Ground Injuries: | N/A | Aircraft Explosion: | None |
| Total Injuries: | 10 None | Latitude, Longitude: | 59.933056, -164.030556 |

Administrative Information

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| Investigator In Charge (IIC): | James D La Belle | Adopted Date: | 07/23/2003 |
| Additional Participating Persons: | James Warniers; FAA, Anchorage Flight Standards; Anchorage, AK | | |
| Publish Date: | | | |
| Investigation Docket: | NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ . | | |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.