**NATIONAL TRANSPORTATION SAFETY BOARD**
Central Region
Denver, Colorado

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Investigator's Statement

DEN08FA101
On Scene – Huntsville, Texas
June 8 & 9, 2008

Examination Observers:

Jennifer Kaiser – NTSB, CRA – Denver, Colorado
Matthew Rigsby – FAA, Aircraft Certification Service Rotorcraft Directorate – Fort Worth, Texas
Mark Stuntzner – Bell Helicopter – Fort Worth, Texas
Dave Riser – Rolls-Royce – Martinsville, Indiana
Terry Kaufman – PHI – Lafayette, Louisiana
Michael Hurst – PHI – Lafayette, Louisiana
Wayne Frazier – PHI – Lafayette, Louisiana
Ed Sangurima – PHI – Conroe, Texas

During the examination the following observations were made:

The initial impact point was identified as several trees, 40 to 50 feet in height, located at 30 degrees, 37 minutes, 57.7 seconds north and 95 degrees, 33 minutes, and 49.6 seconds west, at an elevation of 354 feet mean sea level (msl). The impact heading was measured to be 180 degrees. The tops of multiple trees and many branches exhibited separation features consistent with being torn and cut. Tree and branch width varied from less than one inch to over 13 inches in diameter.

The green main rotor blade, pieces of fragmented honeycomb and Plexiglas, the transmission cowling, and a cabin door were all located in the debris path that extended from the initial impact towards the main wreckage. A tree, measuring 13 inches in diameter, was broken approximately eight feet from the tree base in the direction of impact. This tree was located 100 feet north of the forward tail boom.

The transmission and mast were located 511 feet south of the initial impact point at 30 degrees 37 minutes, 52.8 seconds north and 95 degrees, 33 minutes, 51.0 seconds west and a field elevation of 343 feet msl. The aft portion of the tail boom, including the tail rotor, and tail rotor gear box, was located 50 feet west of the transmission and mast assembly.

The forward portion of the tail boom, including the right side horizontal stabilizer, a portion of the tail rotor drive shaft, left side horizontal stabilizer, and right side auxiliary fin separated from the fuselage and came to rest 578 feet south of the initial impact point. GPS coordinates were recorded at 30 degrees, 37 minutes, 52 seconds north and 95 degrees, 33 minutes, 50 seconds west at a field elevation of 346 feet msl.

The aft portion of the fuselage, to include the aft cabin, engine assembly, and the forward portion of the tail boom and drive shaft, was located 599 feet south of the initial impact point and 22 feet south of the tail boom. GPS coordinates were recorded at 30 degrees, 37 minutes, 51.8 seconds north and 95 degrees, 33 minutes, and 50.1 minutes west at a field elevation of 344 feet msl.

The center portion of fuselage, to include the center portion of the cabin, a section of the landing skid, and the blue main rotor blade, came to rest inverted 22 feet from the aft portion of the fuselage. GPS coordinates were recorded at 30 degrees, 37 minutes, 51.6 seconds north, and 95 degrees, 33 minutes, and 50 seconds west at a field elevation of 344 feet msl.

The forward portion of fuselage, to include the cockpit, instrument panel, and a portion of the landing skid, came to rest inverted ten feet south of the center fuselage section and 629 feet from the initial impact point. GPS coordinates were recorded at 30 degrees 37 minutes, 51.5 seconds north and 95 degrees 33 minutes, 50 seconds west, at a field elevation of 344 feet msl.

The smell of fuel was dominant near the main wreckage.

Jennifer S. Kaiser
Air Safety Investigator
National Transportation Safety Board

**NATIONAL TRANSPORTATION SAFETY BOARD**
Central Region
Denver, Colorado

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Investigator's Statement

DEN08FA101
ASOD
June 10th, and 11th, 2008

Examination Observers:

Jennifer Kaiser – NTSB, CRA – Denver, Colorado
Matthew Rigsby – FAA, Aircraft Certification Service Rotorcraft Directorate – Fort Worth, Texas
Mark Stuntzner – Bell Helicopter – Fort Worth, Texas
Dave Riser – Rolls-Royce – Martinsville, Indiana
Terry Kaufman – PHI – Lafayette, Louisiana
Michael Hurst – PHI – Lafayette, Louisiana
Wayne Frazier – PHI – Lafayette, Louisiana
Ed Sangurima – PHI – Conroe, Texas

During the examination the following observations were made:

The wreckage was recovered on June 9th, 2008, and relocated to a hangar in Lancaster, Texas, for further examination. The wreckage was laid out in a partial mock-up manner. The left forward portion of the fuselage was crushed aft and down. The upper right side of the cabin structure, just aft of the pilot's seat, was crushed down and aft. The roof of the fuselage separated and was fragmented.

The instrument panel was crushed and many instruments destroyed. Instruments from the panel provided the following indications:

Kollsman Window – 29.96 inches
Vertical Speed Indicator – 50 feet per minute climb
Turn and Bank Indicator – Steep right bank, nose down
Airspeed Indicator – Zero knots
HSI – South

The tail boom exhibited crushed and torn metal, aft of the stabilizer, consistent with a main rotor strike. The tail boom included the vertical fin, gearbox, and tail rotor. The driveshaft measured 17.5 inches in length from the point of separation aft to coupling and had wood embedded at the end. The shaft exhibited circumferential scoring two inches from the point of separation. Controls were continuous from the point of separation aft to the tail rotor with both the driveshaft and pitch control. The target blade exhibited leading edge scratching that was green and brown in color. The non-target blade exhibited leading edge dent at midspan. The driveshaft was rotated by hand and movement through the gearbox to both tail rotor blades was noted.

The right side horizontal stabilizer, including the leading edge slat and auxiliary fin, was missing the inboard 12 inches of the leading edge slat. The remaining portion of the left side horizontal stabilizer was 14 inches in length at its longest point. The trailing edge section separated at an angle from the outboard leading edge, inboard to the trailing edge. The outboard portion of the stabilizer was 17.5 inches long, along the leading edge and 35 inches long along the trailing edge creating a diagonal direction of separation.

The top portion of the auxiliary fin separated and the remaining tip was bent down and outboard at an angle from forward to aft. The leading edge of the upper portion of the vertical fin was unremarkable and the trailing edge was crushed in and wrinkled. The lower portion of the leading edge exhibited a small point of impact at midspan and the trailing edge at the same point was wrinkled.

The main transmission and roof structure separated from the fuselage. The mast was bent approximately 35 degrees at the top surface of the rotating swashplate. Tree bark was imbedded into the mast, along a 13 inch span. Two horns of the rotating mast separated and the other two remained attached at the main rotor with the pitch control links. All four main rotor blades separated from the mast with broomstraw separation signatures on all four mounts. All controls were traced through multiple fracture points and determined to be continuous at the time of impact. Facture surfaces were consistent with overload.

The blue blade exhibited a leading edge dent 16 inches outboard from the hub of the blade. The dent was three inches in length, 0.5 inches in depth, in which the skin was torn and the fiberglass splintered.

The orange blade exhibited leading edge scoring and scratching. The blade was partially fragmented starting four inches aft of the leading edge, from 20 inches inboard from the blade tip to 65 inches outboard from the blade hub. The blade exhibited a chordwise fracture of the leading edge abrasion strip 73.5 inches inboard from the blade tip. Vegetation particles were observed in the fracture and along the leading edge of the blade and leading edge scratches were brown in color. The leading edge honeycomb material was “spongy” in feel and the spar was buckled.

The red blade exhibited leading edge scratching along the entire span of the blade. Diagonal scoring initiated 57 inches outboard from the end of the blade and continued for

40 inches. The green blade exhibited leading edge scratching along the entire span of the blade.

The forward cross tube separated from the skid assembly on the right forward portion of the skid. The right step was unremarkable. The left side step separated from the skid in two pieces. The aft cross tube separated from the skid assembly on the aft rear portion of the skid. The skids exhibited surface scratching and scraping but were otherwise unremarkable.

The engine assembly remained partially attached to the aft portion of the main wreckage. The compressor and turbine separated partially from the gearbox and was disengaged. Continuity to the N1 drivetrain was confirmed through rotation of the starter generator gear shaft and tactile detection of the rotation of the spur adapter gear shaft. The splines from the spur adapter gear shaft exhibited tip scoring and wear consistent with rotation at the time of impact. Continuity to the N2 drivetrain was confirmed through rotation of the freewheeling unit shaft. Engine filters were removed and found to be clean of debris or contamination. Signatures were consistent with power at the time of the accident. No anomalies were noted that would preclude power production at the time of impact.

Jennifer S. Kaiser
Air Safety Investigator
National Transportation Safety Board