



National Transportation Safety Board Aviation Accident Final Report

Location:	Bisbee, AZ	Accident Number:	LAX05GA192
Date & Time:	06/01/2005, 1835 MST	Registration:	N5205F
Aircraft:	Eurocopter AS 350 B2	Aircraft Damage:	Substantial
Defining Event:		Injuries:	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General Aviation - Public Aircraft		

Analysis

While hovering over a mountainous area on an aerial observation mission, the helicopter entered a rapid yaw rotation to the left then descended to ground impact. While hovering over items of interest on the ground, the pilot began a turn to the left at 200 feet above ground level. The helicopter began to turn more rapidly than normal and the pilot applied right pedal. The right pedal application did not counteract the turn rate and the helicopter continued spinning to the left. The pilot then reduced power and pitched the helicopter's nose forward while maintaining right pedal. The helicopter continued to rotate as it descended to impact with the ground. At the time of the accident, the pilot was not aware from which direction the wind was blowing. The pilot's regular flying assignment consisted of high-altitude surveillance flights over Florida and he was on a short duration pilot augmentation assignment to the Tucson operations base and had limited mountain flying experience. A pilot flying in the area immediately following the accident reported winds greater than 20 knots and blowing from the west. The helicopter was operating at a gross weight of 4,020 pounds. The maximum allowable gross weight of the helicopter is 4,961 pounds. The density altitude was 7,850 feet mean sea level (msl) and the out of ground effect hover capability of the helicopter was about 8,000 feet msl. Post accident examination of the helicopter did not reveal any preimpact airframe or engine malfunctions.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's failure to maintain an adequate forward airspeed, which resulted in an in-flight loss of control due to a loss of tail rotor effectiveness, while operating near the out of ground effect hover capability of the helicopter. Contributing factors to the accident was the high density altitude and the pilot's lack of experience in the operating environment.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Findings

1. TERRAIN CONDITION - MOUNTAINOUS/HILLY
2. (F) LACK OF FAMILIARITY WITH GEOGRAPHIC AREA - PILOT IN COMMAND
3. (F) WEATHER CONDITION - HIGH DENSITY ALTITUDE
4. WEATHER CONDITION - TAILWIND
5. (C) COMPENSATION FOR WIND CONDITIONS - INADEQUATE - PILOT IN COMMAND
6. (C) LOSS OF TAIL ROTOR EFFECTIVENESS - ENCOUNTERED - PILOT IN COMMAND
7. (C) DIRECTIONAL CONTROL - NOT MAINTAINED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings

8. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On June 1, 2005, at 1835 mountain standard time, a Eurocopter AS 350 B2, N5205F, collided with the ground while performing an aerial search about 5 nautical miles east-southeast of Bisbee, Arizona, in the Mule Mountains. The United States Customs and Border Protection (CBP), who was also the registered owner of the helicopter, was operating it as a public-use flight. The airline transport pilot sustained serious injuries; the observer sustained minor injuries. The helicopter sustained substantial damage. The helicopter departed from the Davis-Monthan Air Force Base at 1523, and made an en route fuel stop at Naco, Arizona, about 1700, where the pilot also picked up the observer. The pilot and observer were performing patrol operations when the accident occurred. Visual meteorological conditions prevailed, and the flight was followed via CBP flight following.

A United States Border Patrol (BP) agent was driving south on highway 80 near the accident time, and looked through a "split" in the mountains, when he saw the helicopter about 2,600 feet away, laterally. The helicopter was circling slowly; first to the right, then to the left, then back to the right again. It appeared that the personnel onboard were looking at something on the ground. Then the helicopter dropped out of sight between two hills. When he looked toward the helicopter again, he saw a cloud of dust and then saw it positioned on the ground with the main rotor turning. The entire event took place over a period of about 20 seconds. The agent presumed the pilot landed the helicopter in the desert and did not realize that the helicopter had crashed until the following morning. The agent had worked many times in the area of the accident site and said that the wind conditions varied. He further stated that sometimes the, "valleys turn into funnels for the wind."

Pilot Statements

CBP received a written statement from the pilot. In the pilot's statement, he reported encountering an "uncontrollable left yaw." He attempted to regain control of the helicopter prior to impacting the ground.

In a later conversation with the National Transportation Safety Board investigator-in-charge (IIC), the pilot reported the following information:

The pilot refueled and picked up a BP agent at the Naco BP station. Normally, ground agents with the Border Patrol will radio in information regarding search areas for the mission. The day of the accident flight, the BP agent did not receive any information from the ground personnel so instead the pilot and agent elected to transition the washes and ridgelines south of Highway 80.

While flying southbound approximately 200 feet above the rising terrain, at airspeed between 40 to 60 knots, the pilot began a left turn to continue searching a wash area. The left turn rate was greater than the pilot expected and full right pedal deflection did not counteract the left turn. The pilot thought that he lost tail rotor authority and lowered the nose of the helicopter while decreasing power. The turn tightened and just prior to impact with the ground, the pilot pulled power [collective] attempting to soften the helicopter's touchdown. During the loss of control, the pilot did not hear any alarms or see any warning lights prior to the helicopter's impact with the terrain.

The pilot stated that during the flight and into the loss of control, he did not feel or hear anything that indicated a mechanical problem with the helicopter. As the helicopter began turning to the left, the pilot initially thought that the turn was due to a loss of tail rotor authority. His initial response to reduce power and pitch the aircraft nose forward while maintaining right pedal to gain airspeed only aggravated the flight characteristics of the aircraft. As the conditions worsened, the pilot believed that the loss of control could have been mechanical in nature.

Just prior to ground impact, the pilot raised the collective to its full up position. After coming into contact with the ground, the pilot stated that he heard the low rotor horn. After waiting for the main rotor to stop, the pilot and the BP agent exited the aircraft.

The pilot reported that upon departing Naco, the winds were from the west-southwest. The air was smooth and he did not experience any chop or control problems transitioning the terrain during the flight. The pilot could not recall from which direction the wind was blowing just prior to the accident.

Passenger Statement

The passenger was interviewed by the Safety Board IIC on June 14, 2005. He reported that they flew over a ridge, coming from the south, and entered a bowl shaped area with hills on all sides. There was one outlet area to the northwest to which the passenger could see Highway 80.

He reported that they descended into the area to inspect debris on the ground. They circled the debris to the right, in a flight condition similar to a hover, and determined that the debris was trash. They continued the circle to the right about 200 feet above ground level, when suddenly the pilot began fighting the controls and the helicopter dropped. The passenger heard a "beep, beep, beep" sound immediately prior to, or immediately following, the helicopter's reverse in turn direction to the left. The helicopter turned about 10 times to the left prior to impact with the ground. The helicopter impacted the ground and the rotor blades continued to turn. Once the main rotor blades stopped turning, the pilot and passenger evacuated the helicopter out of the left door. The passenger believed that the helicopter's position relative to terrain precluded any chance of an in-flight collision with an object.

The passenger stated that the flight was bumpy and gusty when they flew near the hills, and that as the wind blew the helicopter, the pilot would counteract its effects with the flight controls. The passenger also stated that the normal length of the flights was 4 hours.

PERSONNEL INFORMATION

Pilot

The pilot has been employed by the CBP since 1987. He was initially employed as an airplane pilot but in 2001, transitioned to the helicopter. He has an airline transport pilot certificate with helicopter and multiengine airplane ratings, and holds commercial privileges for single engine land airplanes. The pilot holds a type rating for the Cessna Citation. The pilot also holds a flight instructor certificate for helicopters, single and multiengine airplanes, and instrument airplanes and helicopters.

At the time of the accident, the pilot's total reported flight time was 8,000 hours. The pilot had accumulated approximately 700 hours total time in helicopters; 600 hours which were in the accident make and model helicopter at the time of the accident, and 500 hours as pilot-in-

command. The pilot was authorized to wear night vision goggles (NVGs) and had accumulated 37.2 hours of flight experience with NVGs at the time of the accident.

The pilot was authorized by the CBP's Miami Air and Marine Branch to conduct maintenance check flights (MCF) in the AS 350. On June 13, 2003, the pilot attempted to obtain authorization as an instructor pilot (IP) for the CBP. The pilot received "below standards" ratings in the following areas: oral evaluation; normal approach; and autorotational descents. In the comments sections, the check pilot noted, "It was determined by the SIP [senior instructor pilot] that additional training is needed to make IP better standardized. [The pilot] is a good pilot but needs a little more training before IP evaluation." Prior to this, the accident pilot had received six training flights for the IP from February 7, 2003, until June 12, 2003, and was recommended for the IP check ride on June 12. In the notes section for the June 12th flight, the evaluating SIP noted that the pilot, "performed above standards." Following the pilot's failure to pass the IP check ride, CBP personnel logged the check ride attempt as additional training in the helicopter.

The pilot underwent AS 350 recurrent training at Helistream, Incorporated, on October 6, 2004. The training included a cumulative of about 6 hours of flight time and additional ground instruction. The topics covered were as follows: normal procedures; abnormal and emergency procedures; high altitude mountain flying; instrument flying; and hazardous flight conditions. The grading scale on the training was between 1 and 5, with 1 being excellent and 5 being unsatisfactory. The pilot received an average rating (3) in the "high altitude mountain flying," which was covered on day two of training. The pilot received an above average rating (2) in "instrument flying" and "hazardous flying conditions." All of the "normal procedures" and "abnormal and emergency procedures" showed an increase from average to above average, excluding the "t/r control failure/malfunction" and the "hydraulics failure," which were rated average and also covered during day two. Many of the other operational areas were covered over 2 to 3 days with noted improvement in the pilot's performance.

The pilot was required to report for duty at the Tucson area border patrol operation for a special operation that began on March 30, 2005. The operation involved increased support of the BP operations. The area of operations was divided into seven geographic areas. Most of the pilots flying the mission were on a 9-day duty rotation in the area, and had varied flying experience backgrounds. Pilots were pulled from all of the available branch stations to contribute to the mission. Upon arriving at Tucson, the pilot underwent his annual flight check and night vision goggles recurrent training from April 6 to 7. The accident occurred during the pilot's third tour for the Tucson mission. The operational flying environment for the Tucson mission consisted of low-level mountainous flying over desolate, desert terrain. The pilot's normal flying environment in Florida consisted of surveillance flights. The pilot also performed a 6-week mission in Salt Lake City, Utah, during the winter Olympics.

Approximately 7 days of the 9-day duty requirements were used for scheduled flights. The pilots were normally scheduled in 8-hour duty increments beginning at 0500, 1600, or 2400. Normally, the flights would operate over a period of 4 hours. However, depending on the mission requirements, the actual flying time might decrease or increase accordingly.

As previously mentioned in this report, the mission areas were divided into specific geographical areas. Prior to operating in a new geographical area, pilots were required to undergo a familiarization flight (FAM-flight) of the area. The pilot reported for duty on May 24th and completed a FAM-flight of the mission area on May 25th. The FAM-flight was

coupled with another mission and the total recorded flight time for both the FAM-flight and mission flight was 3.5 hours. It should be noted that the FAM-flight record could not be immediately located in the CBP's records since it was logged with the mission flight.

On the pilot's three mission tours, he was scheduled on the 1600- to 2400-hour shift, and the night of the accident was the last flight on his duty schedule prior to returning to Florida. The helicopter was scheduled to return to Davis-Monthan at 1900.

According to the pilot, his normal mission duties in Miami were entirely different than those required for the Tucson mission. He said the nature of the Tucson mission required pilots to take the knowledge acquired from the provided training and familiarization flights, and learn through experience flying in the area.

The pilot was on a duty schedule from 1500 to 2300, and his flight time was scheduled between 1600 and 2000. Working in the east desert section required the pilot to depart Davis-Monthan about 1530 in order to arrive at the Naco station close to 1600. The pilot usually returned to Davis-Monthan about 2100. There was one occasion where the pilot was required to wear night vision goggles while returning from Naco and he was the sole person onboard.

The pilot stated that the current work schedule was tiring but that he felt rested enough to complete the mission requirements.

Passenger

The senior BP agent was a passenger on the accident flight. He was based in the accident area for about 1 year. This was his third flight in a helicopter. The purpose of the flight was to assist the BP agents on the ground in finding illegal immigrants. The ground agents would radio to the helicopter if they suspected any activity. The pilot was from Miami and not familiar with the area, so the passenger was assigned to fly with him to help him locate specific areas dictated by the ground crews.

According to the passenger, the activity was quiet the day of the accident.

HELICOPTER INFORMATION

The helicopter was to be maintained in accordance with Federal Aviation Administration (FAA) regulations, the CBP policy, and through a government contract with L-3 Communications, a repair station authorized under 14 CFR Part 145. The last inspection performed on the helicopter occurred on May 18, 2005, and was an "F" inspection, which included the 100-, 150-, 200-, 300-, and 500-hour inspections, at an aircraft total time of 2,384.3 hours and engine time of 4,031.1 hours. The total airframe time on the helicopter was 2,476.0 hours at the time of the accident. The next inspection was a 100-hour and was due at 2,484.0 hours. The helicopter was transferred from the Houston branch of the CBP for the mission.

Prior to the helicopter's release for each flight, per CBP policy, maintenance is required to sign-off on the helicopter. This form was not signed for the accident flight.

Per CBP policy, three airworthiness directives (ADs), in the form of inspections conducted prior to each flight, were required for continuous airworthiness. These ADs were not signed off for the accident flight. AD 2001-26-55 compliance was mandated to prevent failure of the tail rotor blade, which could result in severe vibration, loss of the tail rotor gearbox, and subsequent loss of control of the helicopter. AD 2002-03-52 was created to detect bonding

failure between the metal bushing and each STARFLEX star arm end, which could result in severe lateral vibrations and subsequent loss of control of the helicopter. AD 2003-22-06 was created to prevent separation of the control rod outboard spherical bearing ball from its outer race, rubbing of the body of the control rod against the tail rotor blade pitch horn clevis, failure of the control rod, and subsequent loss of control of the helicopter.

Just prior to the accident flight, all three hydraulic accumulators were serviced and ground tested after a CBP pilot reported that the cyclic moved violently to the left during the hydraulic check. The helicopter was repaired, ground tested, and returned to service.

L-3 Communications used a maintenance tracking system called Electronic Maintenance Records Keeping System (EMRKS), to track all of the maintenance performed on the helicopter. It should be noted that maintenance personnel were not able to locate particular records for the helicopter through this computer system and there were standardization discrepancies in the entries among the aviation maintenance technicians assigned to the Tucson mission.

METEOROLOGICAL INFORMATION

The closest official aviation weather reporting station was Douglas Bisbee Airport, which was 5 miles west-northwest of the accident site. The automated surface observation system reported the following information at 1756: wind from 280 at 15 knots, gusting to 19 knots; visibility 10 statute miles; sky clear; temperature 90 degrees Fahrenheit; dew point 29 degrees Fahrenheit; altimeter 29.87 inches of mercury. At 1856, the following conditions were reported: wind from 280 at 11 knots; visibility 10 statute miles; sky clear; temperature 86 degrees Fahrenheit; dew point 27 degrees Fahrenheit; altimeter 29.88 inches of mercury.

A Safety Board meteorologist reviewed weather data during the time of the accident. In summary, no frontal boundaries or radar echoes were identified over Arizona. The closest upper air sounding to the accident site indicated west-southwesterly winds at 15 knots below 6,000 feet with little change in direction. The sounding was dry with relative humidities less than 20 percent and supported thermals through 13,000 feet.

A BP pilot flying in the accident area immediately following the accident, reported greater than 20-knot winds blowing from the west.

WRECKAGE AND IMPACT INFORMATION

The helicopter impacted rough, cactus and ocotillo tree covered terrain. The terrain surrounding the helicopter formed a bowl with walls that rose to elevations of 5,500 feet mean sea level (msl). A terrain saddle approximately 750 feet wide formed an opening to this bowl on its northwestern wall.

The nose of the helicopter pointed in a southwesterly direction and the accident site was at an approximate elevation of 4,900 feet msl.

The FAA coordinator responded to the accident scene. The tail rotor and gearbox were displaced from the helicopter and located approximately 25 feet from the main wreckage. All of the components were confined to a 50-foot area surrounding the helicopter. The initial impact point was located approximately 25 feet from where the helicopter came to rest and the tail rotor strike tab was located a few feet from the initial impact point.

Control continuity was established from the antitorque pedals aft to the end of the tail rotor drive shaft. Cyclic and collective continuity were also confirmed to the main rotor hub. The two fuel boost pumps were supplied with power and functionally tested, with no anomalies noted.

MEDICAL AND PATHOLOGICAL INFORMATION

Immediately following the accident, the pilot underwent toxicological testing for drugs and alcohol at the Copper Queen Community Hospital, Bisbee. The tests were negative for ethanol and all tested drugs.

SURVIVAL ASPECTS

The helicopter seats were equipped with Oregon Aero seat cushions (Part Number 30420) and lumbar supports (Part Number 38031). Oregon Aero seat cushion systems have been tested and meet or exceed the 19G vertical/26G horizontal/50-millisecond lumbar load survivability specification of 14 CFR Part 23.562. The interior foam and outer covering meet the Federal Aviation Regulation (FAR) requirements as specified under 14 CFR Part 23.853.

The airplane was tracked using a CBP flight following system that was installed on the helicopter. Following the accident, the pilot used his cell phone to notify CBP that an accident had occurred and that assistance would be necessary. The BP agent climbed to the top of the nearest hill and used his cell phone to notify BP of the accident. The BP handheld radio did not work.

TESTS AND RESEARCH

The wreckage was recovered on June 3, 2005, for further examination.

On June 7, the Safety Board IIC, the FAA accident coordinator and representatives from American Eurocopter, Turbomeca, CBP, all parties to the investigation, examined the wreckage.

All of the fixed flight controls were manually actuated. One tail rotor blade remained attached to the tail rotor gearbox, which was manually manipulated. The pitch change links changed the pitch of the attached blade and the blade rotated with corresponding gearbox rotation. The cockpit controls were manually moved and produced their corresponding movement through the transmission to the main rotor hub.

The end sections of the pitch change rod and the tail rotor drive shaft were removed from the helicopter. The coupling and bellcrank were removed from the tail rotor gearbox. All of the parts were sent to the Safety Board Material Laboratory, Washington, D.C., and examined by a metallurgist. The results of the examination indicated that the fracture surfaces were consistent with overload failures. Examination of the tail rotor drive shaft revealed that the dimple shapes on the fracture surface were consistent with the drive shaft rotating clockwise, and the aft piece rotating counterclockwise. The pitch change rod is connected to the bellcrank by an eye that is stamped on its aft end. One side of the eye was fractured. Bending of the pitch change rod eye suggested an excessive tension load on the input rod. The full metallurgical report is included in the accident file supporting docket material.

The main rotor blades had light chordwise scratching on blade tip surfaces and the leading edge was colored brown by an organic material. Investigators that responded on scene indicated that the brown color was green at the time of the accident.

The right skid was broken from the helicopter during the accident sequence. Both fuselage attachments were curled under the helicopter and the breakages were similar. The left skid remained attached to the fuselage. The bottoms of the skids were examined. The right skid showed fore and aft scoring overlaid by sideways scoring. Approximately 3 inches aft of the steel cross tube there was a dent. The left skid showed fore and aft scoring with a lesser amount of sideways scoring.

The engine was examined. The aircraft fuel filter and the Michigan fuel filter were previously removed. The Michigan filter contained small deposits; the aircraft fuel filter was clean. The chip detectors were removed and were clean. The oil filter was clean and the oil bypass button was not popped. All remaining fuel and oil filters were clean and had traces of fuel or oil. Oil was present in the oil tank.

The engine's axial compressor rotated freely and there were no loose fuel lines, or damage on the front or rear supports. The collective and throttle were manually actuated from the cockpit and continuity was established from the throttle control arm to the engine. The throttle and the anticipator traveled freely. The fuel shutoff was functionally tested and produced a positive shutoff. There was no blade damage evidence in the tail pipe. Continuity was established from the engine's free turbine to the main rotor and free-wheel rotation aft to the tail rotor.

On June 21, 2004, the tail rotor servo was examined and tested at the Hawker Pacific Aerospace Facility, Sun Valley, California. The IIC and a representative from Hawker Pacific Aerospace were present during the examination.

During the recovery of the helicopter, the tail rotor servo piston was cut approximately 3 inches from the rod end to facilitate recovery. Because of this, many of the functional tests on the test-bench were not performed.

The tail rotor servo was mounted on a test bench. The cut piston end rested on the bench. The bypass lock operated normally. No external leakage was noted during or following the tests. The servo control was pressurized to 580.4 pounds per square inch (psi). When the piston was extended and retracted, the dynamometer readings were within specification limitations (.58 pounds and .67 pounds, respectively). The bypass locking mechanism locked at 80 psi and unlocked at 150 psi. The piston travel was free and correct and there was no chattering evident during the testing.

The tail rotor servo was disassembled. The disassembly did not reveal any mechanical or operational anomalies with the servo. All of the bearings and seals were intact and smooth. The cylinder bores were free from gouging or scrape marks. The filter was free of contaminants. The bypass and servo spools were clean and free from gouging or scrape marks and they moved freely in their housings.

Using a Safety Board computer and the weather conditions from the Bisbee Automated Surface Observation System, the IIC calculated the density altitude to be approximately 7,850 feet msl.

The CBP Safety Officer calculated the weight and balance of the helicopter. Using the installed gear and equipment on the helicopter, the gross weight was calculated to be 4,020 pounds. The maximum gross weight of the helicopter is 4,961 pounds. Using the calculated density altitude of 7,850 feet and performance charts supplied by Eurocopter, the out of ground effect hover capability of the helicopter was 8,000 feet.

ADDITIONAL INFORMATION

According to the Rotorcraft Flying Handbook (FAA-H-8083-21), "Unanticipated yaw is the occurrence of an uncommanded yaw rate that does not subside of its own accord and, which, if not corrected, can result in the loss of helicopter control. This uncommanded yaw rate is referred to as loss of tail rotor effectiveness (LTE) and occurs to the right in helicopters with a counterclockwise rotating main rotor and to the left in helicopters with a clockwise main rotor rotation."

Furthermore, "At higher altitudes where the air is thinner, tail rotor thrust and efficiency is reduced. When operating at high altitudes and high gross weights, especially while hovering, the tail rotor thrust may not be sufficient to maintain directional control and LTE can occur." The handbook recommends the following procedures to help reduce the onset of LTE [all references to the left pedal were changed to right pedal]:

1. Maintain maximum power-on rotor rpm. If the main rotor rpm is allowed to decrease, the anti-torque thrust available is decreased proportionally.
2. Avoid tailwinds below an airspeed of 30 knots. If loss of translational lift occurs, it results in an increased power demand and additional anti-torque pressures.
3. Avoid out of ground effect (OGE) operations and high power demand situations below an airspeed of 30 knots.
4. Be especially aware of wind direction and velocity when hovering in winds of about 8 to 12 knots. There are no strong indicators that translational lift has been reduced. A loss of translational lift results in an unexpected high power demand and an increased antitorque requirement.
5. Be aware that if a considerable amount of right pedal is being maintained, a sufficient amount of right pedal may not be available to counteract an unanticipated left yaw.
6. Be alert to changing wind conditions, which may be experienced when flying along ridge lines and around buildings.

The handbook recommends to, "Apply full right pedal while simultaneously moving cyclic control forward to increase speed. If altitude permits, reduce power. As recovery is affected, adjust controls for normal forward flight...If rotation cannot be stopped and ground contact is imminent, an autorotation may be the best course of action. Maintain full right pedal until the rotation stops, then adjust to maintain heading."

On February 2, 2005, Eurocopter issued Service Letter number 1673-67-04 that reminded pilots of the yaw control forces on helicopters. The Service Letter concluded with the following statements:

1. In hover flight or at very low forward flight speed, stopping a quick rotation to the left must be performed by immediately applying the RH [right hand] yaw pedal with a significant and maintained amplitude, regardless of the tail rotor type.
2. In hover flight or at very low speed, intentional initiation of a turn to the left shall always be made by moderate action on the yaw pedals.
3. Wind coming from the left or tail wind increases the aircraft rotation speed.

The helicopter and engine were released to the CBP on June 23, 2005, excluding the parts retained for further examination. The tail rotor servo, end portions of the tail rotor drive shaft

and tail rotor pitch change rod, bellcrank, and tail rotor gearbox coupling were released to the CBP on July 12, 2005. No parts or pieces were retained.

Pilot Information

Certificate:	Airline Transport; Flight Instructor	Age:	45, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane; Helicopter	Second Pilot Present:	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Helicopter; Instrument Airplane; Instrument Helicopter	Toxicology Performed:	Yes
Medical Certification:	Class 1 With Waivers/Limitations	Last FAA Medical Exam:	03/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	09/01/2004
Flight Time:	8000 hours (Total, all aircraft), 600 hours (Total, this make and model), 6000 hours (Pilot In Command, all aircraft), 120 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Eurocopter	Registration:	N5205F
Model/Series:	AS 350 B2	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	3109
Landing Gear Type:	Skid	Seats:	5
Date/Type of Last Inspection:	05/01/2005, Continuous Airworthiness	Certified Max Gross Wt.:	4961 lbs
Time Since Last Inspection:	78 Hours	Engines:	1 Turbo Shaft
Airframe Total Time:	2476 Hours at time of accident	Engine Manufacturer:	Turbomeca
ELT:	Installed, activated, did not aid in locating accident	Engine Model/Series:	Arriel 1D1
Registered Owner:	United States Customs Nat'l Aviation Center	Rated Power:	712 hp
Operator:	United States Customs and Border Protection	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	DUG, 4154 ft msl	Distance from Accident Site:	14 Nautical Miles
Observation Time:	1756 MST	Direction from Accident Site:	70°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	15 knots / 19 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	280°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.87 inches Hg	Temperature/Dew Point:	32° C / -2° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tucson, AZ (DMA)	Type of Flight Plan Filed:	None
Destination:	Tucson, AZ (DMA)	Type of Clearance:	None
Departure Time:	1500 MST	Type of Airspace:	

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	1 Minor	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious, 1 Minor	Latitude, Longitude:	31.439444, -109.835278

Administrative Information

Investigator In Charge (IIC):	Kristi Dunks	Report Date:	02/28/2006
Additional Participating Persons:	Randy Prine; Federal Aviation Administration; Scottsdale, AZ Mitchell Brininstool; United States Customs and Border Protection; San Angelo, TX Archie Whitten; Turbomeca USA; Grand Prairie, TX Joe Syslo; American Eurocopter; Grand Prairie, TX		
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. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).