



# Aviation Investigation Final Report

<b>Location:</b>	Benson, Arizona	<b>Accident Number:</b>	WPR15FA072
<b>Date &amp; Time:</b>	December 31, 2014, 17:10 Local	<b>Registration:</b>	N57AW
<b>Aircraft:</b>	Bell 206	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	VFR encounter with IMC	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Positioning		

## Analysis

The helicopter was on a visual flight rules (VFR) repositioning flight in preparation for providing contracted air support capability to the local sheriff's office the next day. The operator reported that the helicopter did not arrive at the intended destination, and the wreckage was located 29 miles north of the intended destination. The helicopter was fragmented into multiple pieces along a 174-ft debris path. Ground scars and wreckage distribution were consistent with collision with terrain while in forward flight. The observations from a weather station located 3 miles east-southeast of the accident site indicated ceilings less than 500 ft and visibility less than 1 mile were likely at the time of the accident. The relative humidity had rapidly increased above 90 percent immediately before the accident, which would be indicative of cloud cover and mist at or near the surface. Witnesses living in the local area reported that the visibility at ground level was very limited, with low clouds and fog. Observations near the destination showed lowered visibility and low ceilings as the rain moved eastward through the accident area. Gusty winds ahead of the lowering ceilings would have likely created low-level wind shear. The operator's flight data monitoring system indicated that the helicopter was flying along an interstate about 300 ft above ground level (agl), which decreased to about 200 ft agl, likely as the visibility was reduced. However, the last recorded points indicated that the helicopter had climbed to about 500 ft agl, and was no longer tracking the interstate. It is likely that the VFR flight encountered instrument meteorological conditions, and the pilot was trying to maneuver to an area with greater visibility when the helicopter collided with terrain.

Weather information available to the pilot before takeoff showed a cold front between the departure airport and destination, with forecasted low clouds, rain, ceilings below 600 ft, and gusty winds associated with that front. It was the pilot's responsibility to review the weather before all Part 91 flights; the chief pilot was not required to review the conditions with the pilot for such flights. Had the pilot conducted thorough preflight planning, he should have identified the deteriorating weather conditions and recognized that he could not complete the VFR flight.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's continued visual flight into instrument meteorological conditions which resulted in an inflight collision with terrain. Contributing to the accident was the pilot's inadequate preflight planning, during which he failed to identify forecasted deteriorating weather conditions along the route of flight.

### Findings

<b>Personnel issues</b>	Decision making/judgment - Pilot
<b>Personnel issues</b>	Incorrect action selection - Pilot
<b>Environmental issues</b>	Below VFR minima - Decision related to condition
<b>Environmental issues</b>	Low ceiling - Effect on operation
<b>Environmental issues</b>	Low visibility - Effect on operation
<b>Personnel issues</b>	Weather planning - Pilot
<b>Organizational issues</b>	Oversight of operation - Operator

## Factual Information

### History of Flight

<b>Enroute</b>	Controlled flight into terr/obj (CFIT)
<b>Enroute</b>	VFR encounter with IMC (Defining event)

On December 31, 2014, at 1710 mountain standard time, a Bell 206L-4, N57AW, collided with terrain 7 miles west of Benson, AZ. The commercial pilot and pilot rated mechanic were fatally injured and the helicopter was destroyed. The helicopter was registered to N57AW LLC and operated by Airwest Helicopters under the provision of 14 Code of Federal Regulations Part 91 as a positioning flight. Visual meteorological conditions prevailed for the flight which operated on a company visual flight rules flight plan. The flight originated from Glendale, AZ, at 1550 and was destined for Sierra Vista, AZ.

The helicopter had been at the Airwest facilities in Glendale undergoing a 100-hour inspection. The inspection was completed immediately prior to the helicopter's departure. The purpose of the flight was to reposition the helicopter to Sierra Vista, where it was contracted to provide air support to the Cochise County Sheriff's Office the next day. The Chief Pilot stated that he had numerous face to face discussions with the pilot about the maintenance work being done on the helicopter and the weather conditions. Both the accident pilot and Chief Pilot were comfortable with the intended flight to Sierra Vista. An Airwest mechanic accompanied the pilot on the repositioning flight in order to perform the main rotor mast nut torque check after they landed, which was due within the next 5 flight hours.

The operator reported that the helicopter had not arrived at its destination and that the Sky Connect Flight Data Monitoring (FDM) system indicated that the helicopter was at a stationary location between Tucson and Benson, Arizona. The Cochise County Sheriff located the helicopter wreckage about 2030 at the location the Sky Connect system was reporting. The helicopter was fragmented into multiple pieces along a 174 foot long debris path. Witnesses living in the local area reported hearing a low flying helicopter around the time of the accident, and that the visibility at ground level was very limited, with low clouds and fog.

While en route, the pilot had established communications with Tucson Approach at 17 miles northwest of Tucson International Airport and received flight following as he transited through the Tucson Class C airspace, following Interstate 10. Radar services were terminated after the helicopter exited the Class C area about 17:03.

The helicopter was equipped with a Sky Connect Flight Data Monitoring (FDM) system which reports the helicopters position, heading, direction of flight, altitude, and speed approximately every 2 minutes. Sky Connect recorded the helicopter departing Glendale to the southeast at 15:50. The track proceeded to follow highway I-10 at an altitude of about 300 feet above ground level (agl). During the last 10 minutes of flight, the track recorded that the helicopter descended to about 200 feet agl while remaining over I-10. The last Sky Connect point was recorded at 17:10, and indicated that the helicopter had climbed to over 500 feet agl and had drifted a half mile south of I-10. The final Sky Connect recorded point was 0.4 miles west of the accident site, and 0.5 miles south of I-10.

## Pilot Information

<b>Certificate:</b>	Commercial; Flight instructor; Private	<b>Age:</b>	48, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Helicopter	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Helicopter	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	January 27, 2014
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	October 15, 2014
<b>Flight Time:</b>	1413 hours (Total, all aircraft), 195 hours (Total, this make and model), 80.5 hours (Last 90 days, all aircraft), 37.5 hours (Last 30 days, all aircraft)		

## Pilot-rated passenger Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	59, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Airplane; Helicopter	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Helicopter	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	December 29, 2014
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	(Estimated) 18986 hours (Total, all aircraft)		

The pilot, age 48, held a commercial pilot certificate for rotorcraft-helicopter with an instrument rating, and airplane single engine land private pilot privileges, issued May 29, 2014. Additionally he held a flight instructor certificate rating for helicopter issued on March 6, 2014. He held a second class medical certificate issued on January 27, 2014, with the limitation that he must have eye glasses for near vision available. A review of the pilot's log book revealed that he had 1,413 hours of total flight time, 1,136 hours in helicopters, and 195 hours in the Bell 206L. Within the previous 90 days he had accumulated 80.6 hours in the Bell 206L, 6.7 hours of night time, and 0.3 of simulated instrument time. Within the previous 30 days he had flown 33.3 hours in the Bell 206L, 2.2 hours of night time, and zero hours of instrument time. The pilot's most recent flight review was dated October 15, 2014.

The pilot had been employed by Airwest since October 2013, and had been a full time employee since May 2014. He was on a seven days on and seven days off work schedule with the change in shift occurring on Wednesdays. The pilot started his duty week on Wednesday, Dec 26. The helicopter was down for maintenance for Dec 29, 30, and 31, and no flights were conducted on December 29 and 30. The pilot resided in the Phoenix area and spent the evenings at home while the helicopter underwent maintenance. December 31 was the last day of his 7-day shift, and he planned to reposition the

helicopter to Sierra Vista, then he and the mechanic would drive back to Phoenix.

The pilot rated passenger, age 59, held an airline transport pilot certificate with ratings for airplane single engine and multiengine land, and rotorcraft-helicopter issued on January 26, 2009. He held type ratings for the Boeing 737, Bell 206, and Cessna 500 Citation. He held a flight instructor certificate with a rating for rotorcraft-helicopter issued on November 24, 2014. He held a mechanic certificate with ratings for airframe and power plant including inspection authorization. He held a first class medical certificate with no limitations issued on December 12, 2014. On his most recent first class medical application he reported his total flight time was 18,986 hours and had flown 186 hours in the previous six months.

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Bell	<b>Registration:</b>	N57AW
<b>Model/Series:</b>	206 L4	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>	1992	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	52004
<b>Landing Gear Type:</b>	N/A; Skid	<b>Seats:</b>	5
<b>Date/Type of Last Inspection:</b>	December 31, 2014 100 hour	<b>Certified Max Gross Wt.:</b>	4550 lbs
<b>Time Since Last Inspection:</b>	1 Hrs	<b>Engines:</b>	1 Turbo shaft
<b>Airframe Total Time:</b>	8116.7 Hrs as of last inspection	<b>Engine Manufacturer:</b>	ROLLS-ROYCE
<b>ELT:</b>	C126 installed, not activated	<b>Engine Model/Series:</b>	250 C30P
<b>Registered Owner:</b>	N57AW LLC	<b>Rated Power:</b>	650 Horsepower
<b>Operator:</b>	N57AW LLC	<b>Operating Certificate(s) Held:</b>	On-demand air taxi (135)

The five-seat, conventionally configured single engine helicopter, with skid type landing gear, serial number 52004, was manufactured in 1992. It was powered by an Allison 250 C30P 650-shp engine. A review of the maintenance logbooks documented that the most recent 100-hour inspection was completed on December 31, 2014. Total aircraft time was 8,116.7 hours. A main rotor mast nut torque check was due within the next 5 hours. Total engine time was 13,539.4 hours, and 2,030.5 hours since major overhaul.

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Dusk
<b>Observation Facility, Elevation:</b>	KTUS,4767 ft msl	<b>Distance from Accident Site:</b>	29 Nautical Miles
<b>Observation Time:</b>	16:53 Local	<b>Direction from Accident Site:</b>	288°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	3 miles
<b>Lowest Ceiling:</b>	Broken / 600 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	/	<b>Turbulence Type Forecast/Actual:</b>	/ Unknown
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	/ Unknown
<b>Altimeter Setting:</b>	29.95 inches Hg	<b>Temperature/Dew Point:</b>	6°C / 4°C
<b>Precipitation and Obscuration:</b>	Moderate - None - Mist		
<b>Departure Point:</b>	Glendale, AZ (KGEU)	<b>Type of Flight Plan Filed:</b>	Company VFR
<b>Destination:</b>	Sierra Vista, AZ (KFHU)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	15:50 Local	<b>Type of Airspace:</b>	Class E

The National Weather Service (NWS) Surface Analysis Chart for 1700 MST depicted a cold front that stretched from just south of the accident site southwest across northern Mexico and into the eastern Pacific Ocean. A stationary front stretched from just south of the accident site southeastward into northern and central Mexico. A surface low pressure center with a pressure of 1006-hectopascals (hPa) was located in southeastern Arizona just south of the accident site. Two other surface low pressure centers were located in central and eastern Arizona with pressures of 1008-hPa. The station models around the accident site depicted temperatures in the low 40's to upper 50's Fahrenheit (F), with temperature-dew point spreads of 15° F or more south and east of the accident site and temperature-dew point spreads of 5° F or less west of the accident site, a variable wind between 5 and 20 knots, mostly cloudy skies, and moderate rain west of the accident site. Areas near and ahead of fronts and surface low pressure centers are typically areas where enhanced lift, clouds, and precipitation can occur. The cloudy skies and rainy conditions would have been expected to move from west to east across Arizona with the mid- and upper-level wind pattern.

The area surrounding the accident site was documented utilizing official NWS Meteorological Aerodrome Reports (METARs) and Specials (SPECIs). The following observations were taken from standard code and are provided in plain language. AA1OV-2 Benson, Arizona, observation site (AU445) was the closest weather station to the accident site located 3 miles east-southeast of the accident site, at an elevation of 4,250 feet, and its reports were not supplemented.

Benson weather at 1652 was reported as wind from 250° at 8 knots with gusts to 11 knots, temperature of 4° Celsius (C), dew point temperature of 2° C, a relative humidity of 88 percent, and an altimeter setting of 29.86 inches of mercury.

Benson weather at 1702 was reported as wind from 243° at 8 knots with gusts to 13 knots, temperature of 3° C, dew point temperature of 2° C, a relative humidity of 90 percent, and an altimeter setting of 29.86 inches of mercury.

Pioneer Airfield (KALK) was the closest official weather station to the accident site and had an Automated Weather Observing System (AWOS) whose reports were not supplemented. Pioneer was located 21 miles south of the accident site at an elevation of 4,767 feet. The following observations were taken and disseminated during the times surrounding the accident:

Pioneer weather at 1556 reported as wind from 220° at 21 knots with gusts to 31 knots, 10 miles visibility, clear skies below 12,000 feet above ground level (agl), temperature of 10° C, dew point temperature of -1° C, and an altimeter setting of 29.88 inches of mercury. Remarks: automated station with a precipitation discriminator, peak wind from 230° at 33 knots at 1527, sea level pressure 1006.2 hPa, temperature 10.0° C, dew point temperature -1.1° C, lightning detection system with the sensor not operating.

Pioneer weather at 1656 reported as wind from 210° at 14 knots, 10 miles visibility, scattered clouds at 4,200 feet agl, a broken ceiling at 5,000 feet agl, temperature of 9° C, dew point temperature of 1° C, and an altimeter setting of 29.90 inches of mercury. Remarks: automated station with a precipitation discriminator, peak wind from 220° at 31 knots at 1622 MST, sea level pressure 1006.9 hPa, temperature 8.9° C, dew point temperature 0.6° C, 6-hourly maximum temperature of 12.8° C, 6-hourly minimum temperature of 8.9° C, 3-hourly pressure increase of 0.5 hPa, lightning detection system with the sensor not operating.

Tucson International Airport (KTUS) is located 6 miles south of Tucson, Arizona, and had an automated surface observation system (ASOS) whose reports were supplemented by air traffic control. Tucson is located 29 miles west-northwest of the accident site, at an elevation of 2,643 feet, and had a 12° easterly magnetic variation. The following observations were taken and disseminated during the times surrounding the accident:

Tucson weather at 1648 reported as wind from 010° at 4 knots, 4 miles visibility, light rain, mist, broken ceiling at 600 feet agl, overcast skies at 1,100 feet agl, temperature of 6° C, dew point temperature of 4° C, and an altimeter setting of 29.95 inches of mercury. Remarks: automated station with a precipitation discriminator, one-hourly precipitation of 0.08 inches.

Tucson weather at 1653 reported as wind calm, 3 miles visibility, moderate rain, mist, a broken ceiling at 600 feet agl, overcast skies at 1,100 feet agl, temperature of 6° C, dew point temperature of 4° C, and an altimeter setting of 29.95 inches of mercury. Remarks: automated station with a precipitation discriminator, sea level pressure 1013.0 hPa, one-hourly precipitation of 0.08 inches, 6-hourly precipitation of 0.14 inches, temperature 6.1° C, dew point temperature 4.4° C, 6-hourly maximum temperature of 15.6° C, 6-hourly minimum temperature of 6.1° C, 3-hourly pressure increase of 0.5 hPa.

The observations from Benson indicated both ceilings less than 500 feet and visibility less than 1 mile (LIFR – Low IFR) were likely at the time of the accident near the accident site. Benson relative humidities rapidly increased to 79 percent by 1622 and the relative humidities increased above 90 percent by 1702 which would likely be indicative of cloud cover and mist at or near the surface or 4,250 feet msl. Tucson experienced similar conditions to Benson though conditions at Tucson were only IFR with the ceilings below 1,000 feet. Breezy to windy conditions were present ahead of the lowering visibility and ceiling conditions as seen in the Pioneer and Sierra Vista observations, with ceilings

lowering at both of those locations as the rain moved eastward across southern Arizona after the accident time. The gusty winds ahead of the lowering ceilings and visibilities would have likely created low-level wind shear (LLWS).

Sierra Vista was the closest site with a Terminal Aerodrome Forecast (TAF). The 1206 Sierra Vista TAF expected wind from 300° at 15 knots with gusts to 25 knots, 7 miles visibility, light rain, a broken ceiling at 2,000 feet agl, occasional light to moderate turbulence in clear air from the surface to 9,000 feet, light rime icing in cloud from 3,000 to 6,000 feet, and minimum altimeter setting of 29.92 inHg starting around 1600 and valid through 1900.

The Tucson TAF issued at 1513 was the valid TAF before the approximate 1540 to 1550 takeoff time. The 1513 Tucson TAF expected wind from 320° at 8 knots, greater than 6 miles visibility, light rain, scattered clouds at 600 feet agl, and an overcast ceiling at 1,500 feet agl. Temporary conditions between 1500 and 1900 of 5 miles visibility, light rain, mist, and a broken ceiling at 600 feet agl was forecast.

The National Weather Service Office in Tucson, Arizona, issued an Area Forecast Discussion (AFD) at 1423. The aviation section of the AFD mentioned IFR conditions developing due to lowering ceilings and precipitation from Tucson eastward starting around 1800. The aviation section of the AFD also mentioned the gusty southwest wind ahead of the front with gusts to 35 knots.

"MVFR (marginal VFR) WITH POSSIBLE IFR CONDITIONS DEVELOPING DUE TO LOWERING CEILINGS AND SHOWERS...FIRST AT KTUS/KOLS (Tucson/Nogales) TERMINALS AND THEN AT KDUG (Douglas) AROUND 01/01Z (Dec 31, 1800 MST), . THE HIGHER TERRAIN WILL SEE SIGNIFICANT REDUCTIONS IN VISIBILITY DUE TO RAIN AND SNOW SHOWERS. SOME PARTIAL CLEARING IS THEN EXPECTED FROM WEST TO EAST TOMORROW MORNING. WINDS AHEAD OF THE FRONTAL BOUNDARY WILL GENERALLY BE OUT OF THE SOUTHWEST AT 15 TO 25 KTS WITH GUSTS NEAR 35 KTS WITH THE HIGHEST WIND SPEEDS IN AND AROUND THE KOLS/KDUG TERMINALS. WINDS WILL THEN SHIFT TO A MORE WESTERLY DIRECTION BEHIND THE COLD FRONT. WIND SPEEDS WILL REMAIN ELEVATED OVERNIGHT AT KDUG WHILE RELAXING TO 10 TO 15 KTS AT KTUS/KOLS AFTER 01/07Z."

The following weather information was available to the pilot prior to departing Glendale.

#### Surface Analysis Chart

A National Weather Service Surface Analysis Chart for 1400 indicated a low pressure center west of Phoenix, with a cold front depicted between Phoenix and Sierra Vista. The surface frontal boundary favored cloud and precipitation development.

#### NWS Meteorological Aerodrome Reports (METARs)

Tucson International Airport (KTUS) located along the route of flight about 60 miles northwest of the destination, at 1511 the airport reported wind from 340° at 7 knots, 6 statute miles visibility, light rain and mist, clouds were few at 400 feet, and overcast at 900 feet, temperature was 9°C, and dew point 5°C.



Pioneer Field (KALK) located 5 miles west of the destination airport reported at 1456 wind from 230° at 24 knots gusting to 30 knots, 10 statute miles visibility with a clear sky, temperature 12°C and dew point of -2°C.

The destination airport, Sierra Vista Municipal Airport (KFHU), reported at 1455 wind from 200° at 29 knots gusting to 35 knots, 10 statute miles visibility, clouds were few at 3,600 feet, broken at 20,000 feet, overcast at 33,000 feet, temperature was 13°C, and dew point was -4°C

#### Terminal Area Forecasts (TAF)

The 1206 Sierra Vista (KFHU) TAF for the time period between 1600-1900 expected wind from 300° at 15 knots with gusts to 25 knots, 7 miles visibility, light rain, a broken ceiling at 2,000 feet agl, occasional light to moderate turbulence in clear air from the surface to 9,000 feet, light rime icing in clouds from 3,000 to 6,000 feet, and minimum altimeter setting of 29.92 inHg.

The 1513 Tucson (KTUS) TAF for the time period starting at 1500 expected wind from 320° at 8 knots, greater than 6 miles visibility, light rain, scattered clouds at 600 feet agl, and an overcast ceiling at 1,500 feet agl. Temporary conditions between 1500 and 1900 MST of 5 miles visibility, light rain, mist, and a broken ceiling at 600 feet agl was forecast.

#### AIRMET Sierra, Tango, Zulu

AIRMETs Sierra, Tango, & Zulu were issued at 1345, and valid at the accident time for the accident site. They forecasted mountains obscured by clouds, precipitation, and mist, moderate turbulence below FL180, LLWS potential, and moderate icing below 17,000 feet.

#### Pilot Reports (PIREPS)

A routine pilot report (UA) over Tucson, Arizona, at 1448, 5,000 feet, a Canadair Regional Jet CRJ-700 reported, a broken ceiling with tops at 4,500 feet; wind was from 320° at 11 knots; turbulence was moderate. The airport was first sighted at 500 feet agl.

#### National Weather Service Area Forecast Discussion

The National Weather Service Office in Tucson, Arizona, issued an Area Forecast Discussion (AFD) at 1423 MST. The aviation section of the AFD mentioned IFR conditions developing due to lowering ceilings and precipitation from Tucson eastward starting around 1800. The aviation section of the AFD also mentioned the gusty southwest wind ahead of the front with gusts to 35 knots.

A detailed weather study conducted by an NTSB senior meteorologist is located in the public docket for this accident.

#### WRECKAGE & IMPACT INFORMATION

The wreckage was located in flat desert terrain populated by prairie grass and mature mesquite trees.

The helicopter was fragmented into three sections consisting of the cockpit, cabin and main rotor gear box, the engine, engine deck, and fuel cell, and the tail boom. The debris was oriented on a 173 magnetic degree bearing and extended for 174 feet. The initial point of ground contact was a long ground scar that terminated at a mesquite tree stump with the left landing skid extending from the stump back along the ground scar. There was a less distinct but parallel ground imprint about 12 feet to the west of the landing skid. Surrounding the mesquite tree stump was mesquite branches that had been broken off or chopped. About 12 feet past the stump, on the east side of the bearing line, was a perpendicular 12 foot long ground scar that was consistent in length and form to a rotor blade imprint.

The cockpit, cabin, main rotor gearbox, rotor mast and hub, and tail rotor gearbox and tail rotor blades were located 120 feet from the initial point of impact and entangled with the broken trunk and branches of a second mesquite tree. The cockpit had separated from the fuselage. One rotor blade had separated approximately 4 feet outboard of the rotor hub, and the other was cut by recovery personnel about 4 feet outboard of the hub. One separated blade section was measured as 12 feet in length and was located 90 feet to the west of the main rotor hub. The other blade section measured 8 feet in length, and was located in the wreckage under the cabin. The rotor blades exhibited leading edge bending, trailing edge buckling, and chordwise scratches. The tail rotor and gearbox had separated from the tail boom and was located in the main wreckage cabin area. One blade on the tail rotor was missing about half the blade. Both blades exhibited chordwise scratches. The tail rotor drive shaft remained on the tail boom. Both the forward end of the drive shaft and the tail rotor end of the drive shaft exhibited torsional overload separations. Control tubes routed up the vertical control compartment were fractured in multiple locations, however, all hardware connections from servo actuator to flight controls appeared connected prior to impact. Cockpit flight controls were in place on the right side of the cockpit, the controls had been removed by the operator on left cockpit position. Hydraulic actuators to main rotor system exhibited control continuity. Two pitch change control tubes to main rotor hub were fractured and displayed signatures consistent with overload. All hardware was connected. The pitch change horn on one main rotor blade was fractured at main rotor hub assembly. Pitch change link was located and fracture surface was consistent with impact damage. The main rotor gearbox rotor mast was rotated by hand and the transmission turned freely with no binding or grinding noted. The entire landing gear skid assembly detached from the airframe upon impact, with signatures of a left side low initial impact. Landing skid tubes separated from both cross tubes with the toe of the left skid fracturing forward of the left forward attaching collar.

About 54 feet further down range was the engine and fuel cell, entangled in a third mesquite tree. Fuel drained out of the fuel cell when moved. Four of the engine's compressor impeller blades exhibited leading edge tip bending opposite the direction of rotation and dirt adhesion to all blade surfaces. Manual rotation of the compressor resulted in smooth rotation of the compressor.

The engine was transported to a maintenance facility and disassembled. Downward crush damage/deformation was evident on the exhaust collector support exhaust stack. Dirt adhesion was evident through the entire gas path. Combustor liner was normal in appearance. Dirt adhesion was noted throughout the combustion section. The N1, N2, and accessory gear drive trains all rotated smoothly. Fuel pump and the fuel control unit were undamaged and fuel was noted between the check valve and the fuel nozzle. Both upper and lower chip removed and found free of material.

Investigators did not find any evidence of mechanical anomaly or malfunction that would have

precluded normal operation of the helicopter.

## MEDICAL & PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on January 3, 2015, by the Cochise County Sheriff Forensic Pathologist. The opinion of the forensic pathologist was the cause of death was ascribed to multiple blunt force injuries. The FAA Civil Aerospace Medical Institute Forensic Toxicology Research Team performed forensic toxicology on the specimens from the pilot with negative results for ethanol and listed drugs. Screening for carbon monoxide and cyanide were not performed.

An autopsy was performed on the pilot rated passenger on January 3, 2015, by the Cochise County Sheriff Forensic Pathologist. The opinion of the forensic pathologist was the cause of death was ascribed to multiple blunt force injuries. The FAA Civil Aerospace Medical Institute Forensic Toxicology Research Team performed forensic toxicology on the specimens from the passenger with negative results for carbon monoxide, cyanide, ethanol and listed drugs.

## TESTS & RESEARCH

A Garmin StreetPilot portable GPS was recovered from the helicopter wreckage. It was subsequently sent to the NTSB Vehicle Recorders Laboratory for further examination. The Garmin StreetPilot is a portable GPS designed for automotive use. The display is capable of showing the device position over a variety of mapping options. When enabled, the device is capable of storing track information to non-volatile memory which may be downloaded using manufacturer software. The track information consists of time, latitude, and longitude; altitude is not recorded.

The Vehicle Recorder Laboratory performed an exterior examination which revealed the device had sustained significant impact damage. An internal inspection revealed no significant damage to electronic components. The unit was repaired and downloaded using the manufacturer's software.

A graphical overlay of the accident flight was generated using Google Earth and an aviation sectional chart. The recording began at 1648:20, when the helicopter was northwest of Tucson International Airport (TUS). The track followed Interstate Highway I-10 southeast bound, passed Tucson. The recording ended shortly after the helicopter passed Tucson, at 1657:57.

A copy of the recorder's laboratory factual report is located in the public docket for this accident.

### Wreckage and Impact Information

<b>Crew Injuries:</b>	2 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	31.956111,-110.409446

## **Organizational and Management Information**

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Airwest holds a Part 135 Commuter and On Demand Operations certificate. Airwest was under contract with the Cochise County Sheriff to provide 30 hours of air support per month. The pilots check the weather and aircraft status themselves. They then will check-in with the Chief Pilot, review the weather, aircraft, and mission tasking. The Chief Pilot will give a verbal aircraft release as necessary for Part 135 operations. No approval was required for flights flown under Part 91 regulations, such as a repositioning flight.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	McKenny, Van
<b>Additional Participating Persons:</b>	Pete Kelley; FAA; Scottsdale, AZ Harold Barrentine; Bell; Fort Worth, TX David Riser; Rolls Royce; Indianapolis, IN Greg Barlow; Airwest Helicopters; Glendale, AZ
<b>Original Publish Date:</b>	October 24, 2016
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=90554">https://data.nts.gov/Docket?ProjectID=90554</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).