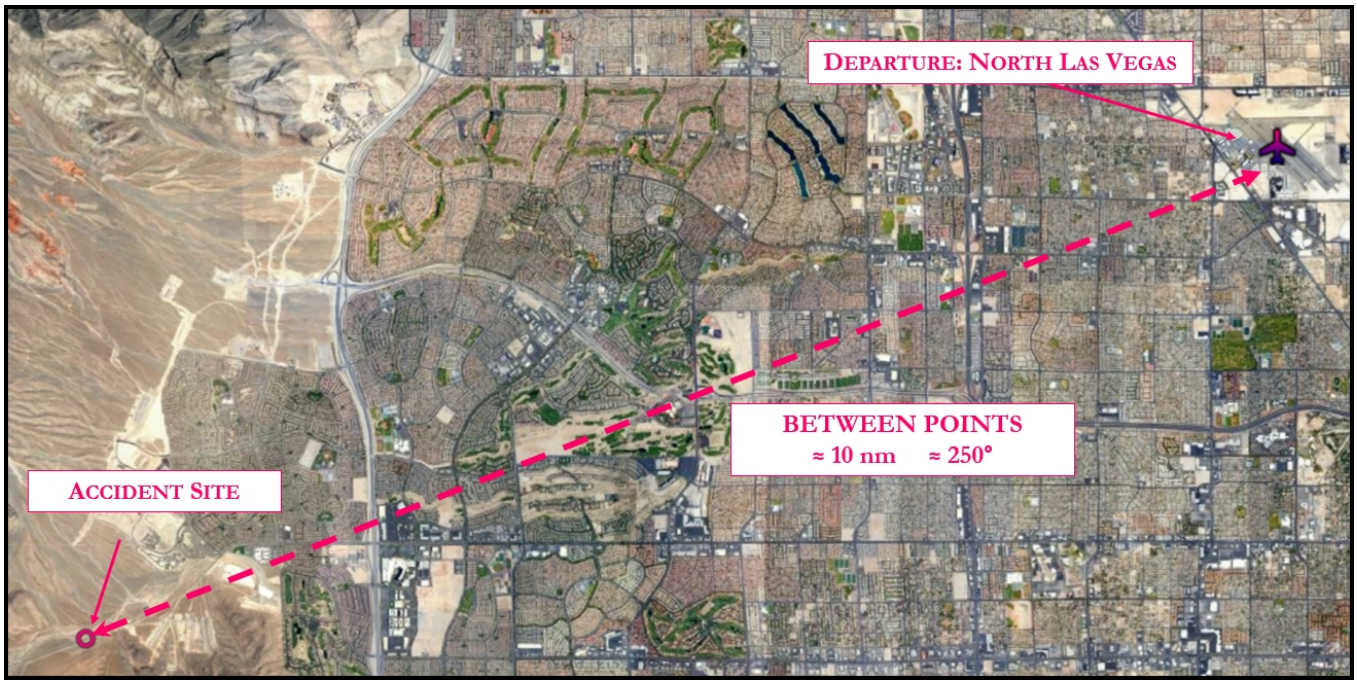
National Transportation Safety Board
Aviation Accident Preliminary Report

Location:	Las Vegas, NV	**Accident Number:**	WPR20FA013
Date & Time:	10/23/2019, 1553 PDT	**Registration:**	N225JM
Aircraft:	Robinson R44	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

On October 23, 2019, at 1553 Pacific daylight time, a Robinson R44 II Raven, N225JM, sustained substantial damage after impacting terrain following an auto-rotation in Las Vegas, Nevada. Binner Enterprises LLC, owned the helicopter and Airwork Las Vegas was operating the helicopter under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91. The airline transport pilot and passenger survived the impact, but later succumbed to their injuries. The personal local flight departed from North Las Vegas Airport, Las Vegas, Nevada, about 1535. Visual meteorological conditions prevailed and no flight plan had been filed.

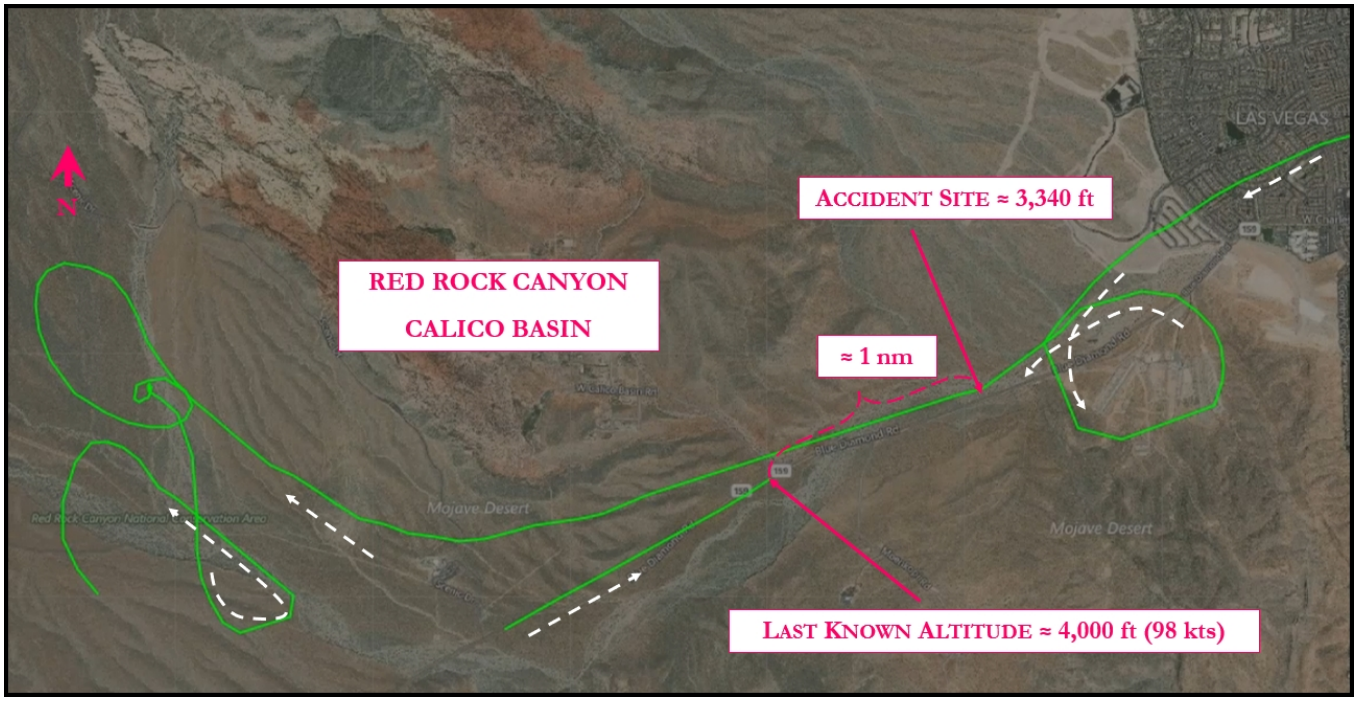
The pilot had called Airworks, the fixed based operator (FBO) that rented the helicopter, in the early afternoon on the day of the accident. During the call he asked the office personnel if the R-44 was available to rent that afternoon. One of the schedulers responded that the helicopter was undergoing maintenance and the pilot stated that he would stop by the office anyway to check if the maintenance was done and put money on his account. The pilot and passenger arrived about 10 minutes later. The pilot asked why the helicopter was in maintenance and the office personnel told him that an earlier flight was canceled because that pilot had found sediment in the fuel tanks. The accident pilot stated that he was happy to wait and about 20 minutes later, the certified flight instructor (CFI) that had canceled that earlier flight called stating that the maintenance was done and the helicopter was ready to fly. The pilot and passenger planned to take an hour flight since they needed to return the helicopter back to the FBO for a tour scheduled at 1900 (see picture 01 to see location of accident site in reference to departure airport).



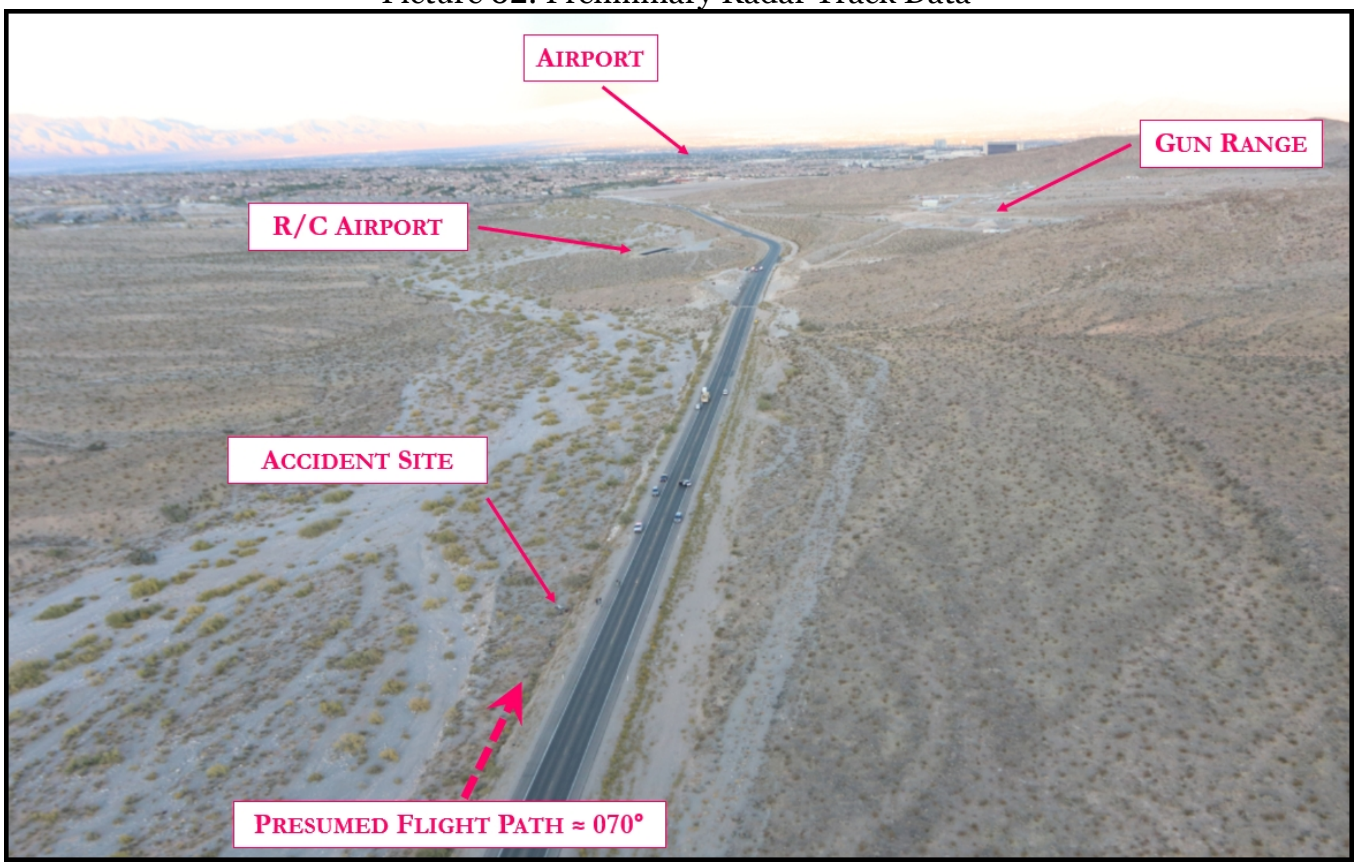
Picture 01: Airport to Accident Site

A witness, who was additionally a pilot, stated that he observed the helicopter while riding a motorcycle southbound on Blue Diamond road. He witnessed the helicopter about 1 to 2 seconds before impact and the accident sequence. He initially saw the helicopter in the upper right-corner of his vision at an estimated 100 to 200 feet agl in a nose-up attitude and in a very steep descent angle heading opposite in his direction of travel. He estimated the helicopter was moving about the same speed as the traffic (about 50 mph), because the closure rate seemed similar to the northbound automobiles. He witnessed the helicopter impact the ravine adjacent to the road (about 200 feet ahead of him and 100 feet to the right) and break apart on impact.

A review of the preliminary radar track data (see picture 02) indicated that after departure, the helicopter departed and continued west-southwest toward the Red Rock Retention Basin checkpoint. After the track cleared the Class Bravo airspace the returns showed a left 360° orbit over Blue Diamond road, consistent with the pilot circling over a remote control (RC) airpark and the Desert Sportsman's Rifle Club. Thereafter the radar showed a track consistent with the helicopter loosely following the road around Calico Basin and climbing up to 4,700 feet mean seal level (msl), equivalent to about 400 feet above ground level (agl). The helicopter then made a left turn and serval maneuvers over the Red Rock National Conservation Area including a possible touchdown where the forward airspeed speed was reduced to 0 kts. After making serval low-level maneuvers, the track was consistent with the helicopter adjoining Blue Diamond road and following the road heading north-northeast. The last radar hit was at 1553:23 and located on the road about 1 nautical mile (nm) west-southwest from the accident site. The last 30 seconds of the track revealed the helicopter was following the road with an airspeed of about 120 to 100 kts at an altitude between 500 to 700 feet agl.



Picture 02: Preliminary Radar Track Data



Picture 03: Wreckage in Relation to Surrounding Landmarks

The accident site was located in the desert terrain about 10 nm from the departure airport on a bearing of 250°. The wreckage was found distributed in a ravine over a 200 foot distance on a median magnetic bearing of about 070° (see picture 03). The ravine and debris field ran parallel to the road and was located about 4-5 feet below the pavement. The first identified area of impact was an approximate 5 inch line (oriented parallel to the road) of scraping and maroon-colored paint transfer across a rock and orange torque strip buried in the dirt before the rock. Adjacent to that line was another parallel line of paint transfer that was red in color. The orientation and colors were consistent with the tail rotor guard (candy-cane: white and red) and tailskid (maroon with orange torque stripe) making contact first indicative of a nose-high attitude (see picture 04).

Picture 04: First Identified Point of Impact

Fueling Information

The primary place that Airwork pilots were instructed to receive fuel was a fueling business at North Las Vegas that owned a 750-gallon AVGAS truck that served three businesses.

According to the records provided by the fuelers, the accident helicopter was fueled twice on October 22 (the day prior to the accident). Once at 1138 with 11.6 gallons and once at 1540 with 16.8 gallons. The pilot-undergoing instruction (PUI) on both those flights stated that the fuel was clean of debris and the helicopter functioned normally; he was scheduled to fly with the same CFI on a morning and afternoon flight on the day of the accident. The records further

indicated that about 1830 the truck refueled with 479 gallons of 100LL AVGAS. Almost immediately after the refueling, the fuel truck then refueled a Cessna 172 with 6.5 gallons. The student and pilot that flew the airplane after that fueling stated that the fuel was clean, and they had no problems on their long cross-country flight.

The accident helicopter was the first aircraft to be fueled in the morning of the accident. According to the fueler, he arrived at the office around 0700 and did the normal procedure of draining the truck: ½ gallon of fuel from the lower sump and ½ gallon from the filtered hose. He drained both into a white porcelain bucket and noted that both were clean. A CFI from Airwork called for fuel and at 0825 the accident helicopter was fueled with 23.6 gallons topping off both the auxiliary and main fuel tanks. Shortly thereafter, another Cessna 172 received 13.3 gallons and the pilots reported no anomalies with the fuel or their flight.

The PUI scheduled with the CFI for the morning flight stated that after getting fuel, he began performing the preflight with the CFI watching behind him. He retrieved the GATS jar fuel tester from under the right rear-seat and proceeded to sump the auxiliary fuel tank. The sample looked clean and he sumped the main tank. The fuel appeared dirty with black and gray specs floating (similar in appearance to sand). He showed the CFI who poured out the sample in the concrete and suggested they take another sample. After taking 2 more samples with the same results the CFI volunteered to clean the jar thinking that perhaps it was dirty. He additionally found a 5-gallon bucket and dumped the fuel samples into it, which totaled about 6 to 7 samples. The CFI then informed the Airwork mechanic of the samples who explained that he was working on several airplanes and would not be able to look at the fuel system until that afternoon.

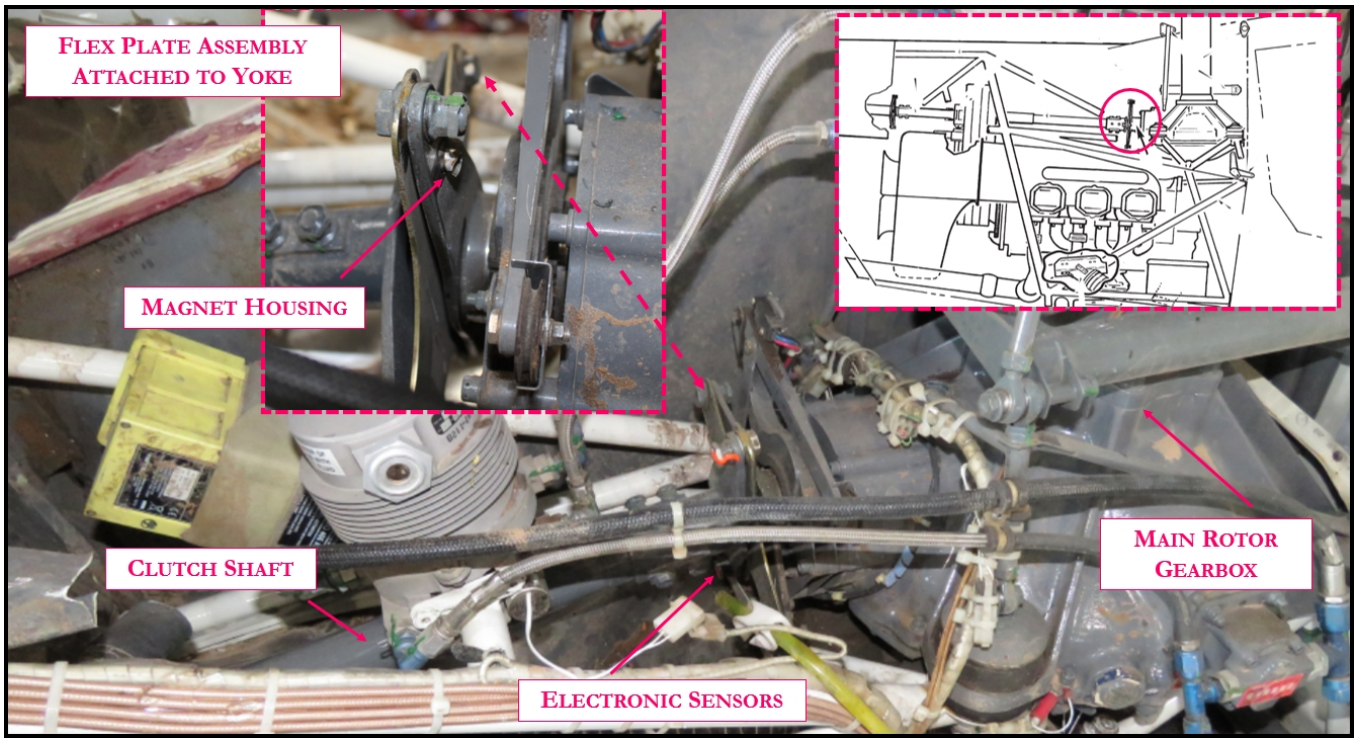
During an interview with a Safety Board investigator, the mechanic stated the he did not have an opportunity to flush the fuel tanks in the helicopter. Later in the day, the CFI relayed to the PUI that the mechanic had not had the opportunity to work on the helicopter and asked him if he wanted to cancel his scheduled afternoon flight, to which the PUI replied that he did based on what occurred in the morning. The accident pilot was then scheduled to fly the helicopter since the PUI was not going to fly. After the flight was canceled the CFI was sumping the fuel tanks likely to ensure the tanks were clear for the accident flight. Despite numerous attempts, the CFI did not make a statement to the NTSB and therefore it is not known what he did to the helicopter before the flight, the fuel in the helicopter, or what he said to the accident pilot.

Preliminary Post-Accident Examination

The preliminary post-accident examination revealed that the exhaust was white in color consistent with a lean operation. The piston faces were additionally white and the valve faces were yellow/white. There was no evidence of a catastrophic failure with the engine.

Investigator removed the gascolator at the accident site. The bowl was full with a liquid consistent in odor with that of 100LL AVGAS, but the color was an orange-yellow; there was some debris in the bowl that was akin to a gelatinous consistency (the liquid was captured in glass bottles for possible future testing). Investigators functionally tested the fuel system and fuel ran from the main tank through the system to the injector lines; the fuel screens were all clean from debris.

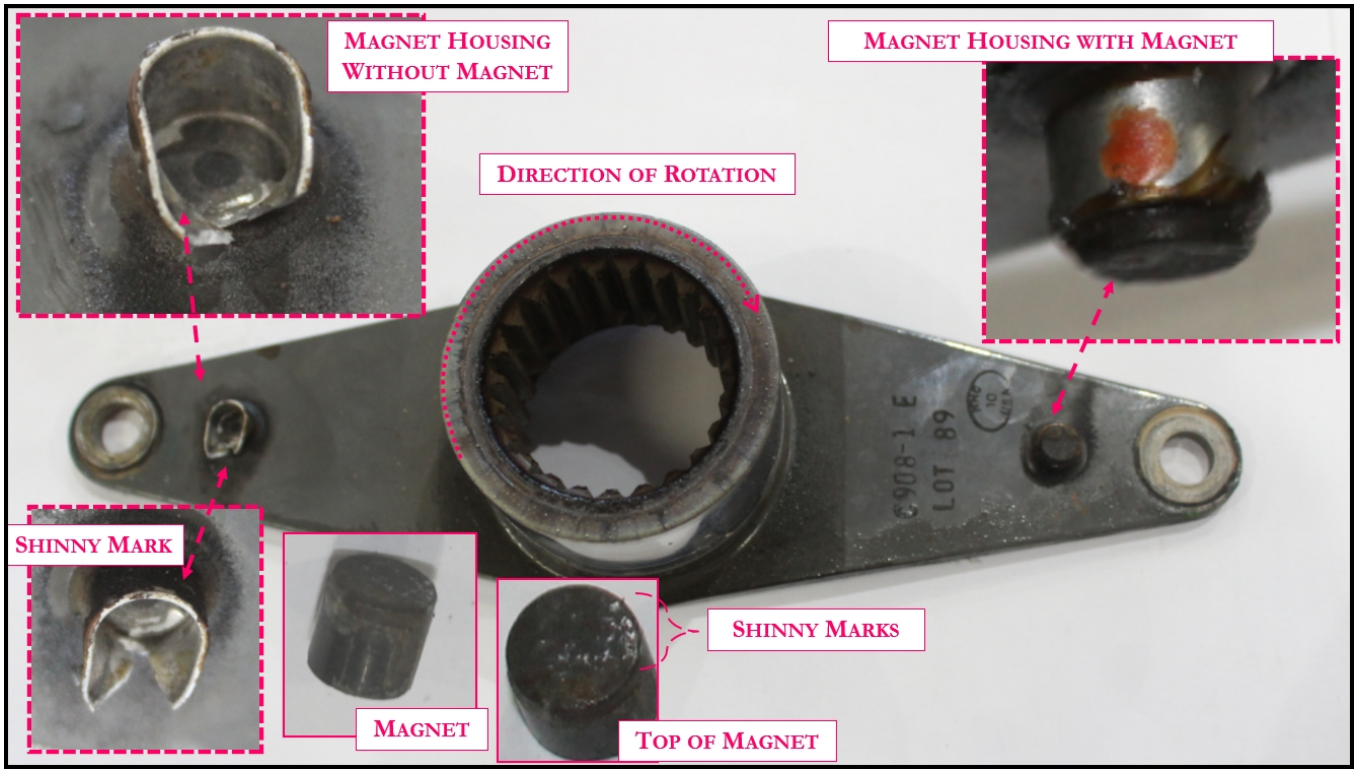
The helicopter was equipped with a rotor dual tachometer and the signal to the cockpit was provided by two magnets at the main gearbox drive yoke that pass by electronic Hall Effect devices (see picture 05). A Robinson representative reported that with only one magnet in place, the main rotor tachometer rpm would indicate about 50% of the actual rotor rpm. The post-accident examination revealed that one magnet was separated from the yoke assembly; the magnet was located on the fuselage frame near the firewall.



Picture 05: Rotor Tachometer System

The magnet housing was shinny at the top of one side (the direction of rotation) consistent with contact of the magnet against a sender. The other magnet assembly remained secured to the yoke assembly. Both the housings showed a color consistent with a dark residue and a yellow/orange mark was on both housings and senders (see picture 06). The yoke assembly was not damaged.

There was evidence of slight damage to both senders, consistent with the magnet assembly separation.



Picture 06: Yoke Assembly

A Robinson Helicopter Company representative reported there have been instances of a magnet separating from a magnet assembly which prompted issuance of Service Bulletin (SB) 86, which required an adhesive be applied between the magnet and the magnet housing and a yellow dot placed on the magnet housing.

Aircraft and Owner/Operator Information

Aircraft Make:	Robinson	**Registration:**	N225JM
Model/Series:	R44 II	**Aircraft Category:**	Helicopter
Amateur Built:	No		
Operator:	Airwork Las Vegas	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	KVGT, 2203 ft msl	**Observation Time:**	2253 UTC
Distance from Accident Site:	10 Nautical Miles	**Temperature/Dew Point:**	28°C / -6°C
Lowest Cloud Condition:	Clear	**Wind Speed/Gusts, Direction:**	11 knots / , 80°
Lowest Ceiling:	None	**Visibility:**	10 Miles
Altimeter Setting:	29.98 inches Hg	**Type of Flight Plan Filed:**	None
Departure Point:	Las Vegas, NV (VGT)	**Destination:**	Las Vegas, NV (VGT)

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	36.146944, -115.381667

Administrative Information

Investigator In Charge (IIC):	Zoe Keliher
Additional Participating Persons:	Rich Ramirez; Federal Aviation Administration; Las Vegas, NV Troy Helgeson; Lycoming Engines; Williamsport, PA Ken Martin; Robinson Helicopter Company; Torrance, CA
Note:	The NTSB traveled to the scene of this accident.