Aviation Investigation Final Report

Location:	HOLLISTER, California	**Accident Number:**	LAX98LA108
Date & Time:	March 7, 1998, 09:56 Local	**Registration:**	N204DR
Aircraft:	Bell UH-1B	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Serious
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot initiated a right turn, then he felt and heard a thump. He lowered the collective and attempted to straighten from the turn. He felt a strong vibration and the nose of the aircraft pitched down. A ground crewman who witnessed the accident reported that while the helicopter was about 35 feet agl, he saw a large piece of the tail and a rotor blade fly off the ship, followed by the tail rotor hub assembly, the remaining blade, and the 90-degree gearbox. The helicopter began a 360-degree right spiral, made 2 1/2 rotations, and then impacted the ground in a 30-degree nose-down attitude. He further noted that the engine still seemed to be producing about 60 percent power. The tail and tail rotor gearbox was found about 125 feet from the fuselage. Metallurgical examination of the vertical tail fin, tail rotor gearbox, and tail rotor blades disclosed an area of chafing which wore through the vertical fin's spar and initiated a fatigue crack. The fatigue crack initiated in an area where the vertical fin driveshaft cover fastened on the left side of the aircraft near the upper end. Chafing had occurred between the cover and the spar, wearing away the spar. According to Bell, the UH-1B requires a daily inspection to visually check the area of the upper vertical fin, per the Aviation Unit Technical Manual, where the fatigue cracking occurred.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the maintenance personnel to recognize and repair the chafed area of the tail rotor driveshaft, which resulted in an in-flight separation of the tail fin and hub assembly.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: MANEUVERING - AERIAL APPLICATION

Findings
1. VERTICAL STABILIZER - FATIGUE
2. (C) MAINTENANCE,INSPECTION - INADEQUATE - COMPANY MAINTENANCE PERSONNEL
3. VERTICAL STABILIZER - SEPARATION
4. ROTOR DRIVE SYSTEM,TAIL ROTOR GEARBOX(90 DEG) - SEPARATION

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING - AERIAL APPLICATION

Findings
5. ROTOR DRIVE SYSTEM,TAIL ROTOR GEARBOX(90 DEG) - SEPARATION
6. AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

On March 7, 1998, at 0956 hours Pacific standard time, a Bell UH-1B, N204DR, crashed near Hollister, California, following a separation of the tail rotor gear box. The aircraft was destroyed and the commercial pilot, the sole occupant, suffered serious injuries. Visual meteorological conditions prevailed and no flight plan was filed. The flight was operated by Cantrell Helicopters under 14 CFR Part 137.

The pilot reported that he was spraying a field approximately 1-mile northeast of Hollister. At the end of his third pass over the field, he pulled up to go over power lines and was starting a right turn when he felt and heard a thump. He lowered the collective and attempted to straighten out from the right turn. The pilot stated that a strong vibration started and the nose of the aircraft pitched down. The helicopter started a right turn, which began increasing in momentum. The pilot's memory of the event ceases at this point.

There was a ground crewman in the field who witnessed the accident. The witness stated that while the pilot was making a pass down the field about 35 feet agl, he saw a large piece of the tail rotor blade fly off the ship, followed by the tail rotor hub assembly, the remaining blade, and the 90-degree gearbox. The helicopter started into a 360-degree spiral to the right, made 2 1/2 rotations, then impacted the ground in a 30-degree nose-down attitude. The witness helped the pilot exit the helicopter and noted that the engine was still producing about 60 percent power.

A Federal Aviation Administration inspector from the San Jose Flight Standards District Office responded to the accident site and examined the wreckage. The tail fin and tail rotor gearbox was found approximately 125 feet from the fuselage. The tail rotor gearbox and tail rotor blades were examined at the Bell Helicopter Textron Materials Laboratory in Fort Worth, Texas, under the supervision of the Safety Board. A copy of their report is appended to this file. Their report was forwarded to the Safety Board's Materials Laboratory for review.

The Bell metallurgist reported that examination of the tail vertical fin disclosed an area of chafing which wore through the spar and initiated a fatigue crack. The fatigue crack initiated in an area where the vertical fin driveshaft cover fastened on the left side of the aircraft near the upper end. Chafing had occurred between the cover and the spar, wearing away the spar. The primary fatigue crack initiated in the worn area, but the origin of the crack had been destroyed. The fatigue crack propagated from the spar downward through eight rivet holes in the skin a distance of 7 inches, then turned aft a distance of 3.8 inches. The fatigue crack propagated through the entire width of channel a distance of 6.5 inches and through the five areas of the stiffener. The fatigue cracking in the vertical fin covered 65 to 75 percent of the structure's cross section.

According to Bell, the UH-1B helicopter requires a daily inspection to visually check the area of the upper vertical fin, per the Aviation Unit Technical Manual (55-1520-219-PMS), where the fatigue cracking occurred.

The operator reported that he did not have the aircraft logbooks in his possession, therefore the Safety Board conducted no review.

Pilot Information

Certificate:	Commercial; Flight instructor; Private	**Age:**	38,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	August 28, 1997
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	1144 hours (Total, all aircraft), 40 hours (Total, this make and model), 1062 hours (Pilot In Command, all aircraft), 102 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N204DR
Model/Series:	UH-1B UH-1B	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	62-1881
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	100 hour	**Certified Max Gross Wt.:**	7200 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	T53L-11
Registered Owner:	DEL RIO AVIATION	**Rated Power:**	1100 Horsepower
Operator:	CANTRELL HELICOPTERS	**Operating Certificate(s) Held:**	
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RHV ,133 ft msl	**Distance from Accident Site:**	27 Nautical Miles
Observation Time:	09:47 Local	**Direction from Accident Site:**	330°
Lowest Cloud Condition:	Clear	**Visibility**	20 miles
Lowest Ceiling:	Broken / 6000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	9°C / 3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	, CA (307)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	00:00 Local	**Type of Airspace:**	Class E

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	36.889377,-121.240936(est)

Administrative Information

Investigator In Charge (IIC):	Rich, Jeff
Additional Participating Persons:	REIGH GRANDLUND; SAN JOSE , CA DAVE DOSKER; DALLAS , TX
Original Publish Date:	August 3, 1999
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=30047