National Transportation Safety Board
Aviation Accident Final Report

Location:	Panaca, NV	**Accident Number:**	LAX03TA043
Date & Time:	12/01/2002, 1310 PST	**Registration:**	N48020
Aircraft:	Bell 47G-3B-1	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 91: General Aviation - Public Aircraft		

Analysis

The helicopter experienced a loss of engine power and landed hard during an autorotation, severing the tail boom. The number 6 cylinder's intake valve separated, with the valve's head wedged in the intake valve seat bore. Removal of the rocker box cover on that cylinder revealed that the spring retainer was broken into numerous pieces. The piston head showed over 15 impressions consistent in dimension to that of the valve head. After examining the number 6 cylinder, a metallurgist determined that the valve failed in between the intake valve head and the valve stem.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: separation of the no. 6 cylinder intake valve head from the valve stem, which resulted in a loss of engine power. The mechanism responsible for the valve failure is unknown.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: MANEUVERING

Findings
1. (C) ENGINE ASSEMBLY,VALVE,INTAKE - SEPARATION

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
2. AUTOROTATION - INITIATED - PILOT IN COMMAND

Occurrence #3: HARD LANDING
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
3. MISC ROTORCRAFT,MAIN ROTOR/TAIL BOOM CONTACT
4. TERRAIN CONDITION - GROUND

Factual Information

On December 1, 2002, about 1310 Pacific standard time, a Bell 47G-3B-1, N48020, experienced a loss of engine power and landed hard during an autorotation near Panaca, Nevada. The Bureau of Land Management was operating the helicopter under the provisions of 14 CFR Part 91. The commercial pilot, the sole occupant, was not injured; the helicopter sustained substantial damage. Visual meteorological conditions prevailed, and a company flight plan had been filed. The local public use positioning flight originated from Caliente, Nevada, about 1200.

The pilot was positioning the helicopter to perform a horse herding operation for the Bureau of Land Management at the time of the accident. Two witnesses reported seeing two grey smoke emissions from the engine prior to a loss of engine power and hard landing, severing the tail boom.

In a written statement, the mechanic who regularly preformed the maintenance on the helicopter, reported that earlier in the year the helicopter underwent a 1,000-hour engine inspection, which included an engine overhaul; it was returned to service on April 30, 2002. The cylinder assemblies used for the overhaul were purchased from Engine Components, Inc., in San Antonio, Texas. The maintenance tag attached on the cylinders attested that "the repair made to the unit listed on reverse side was made and inspected in accordance with current regulations of the FAA [Federal Aviation Administration] and the part is Airworthy and approved for return to service."

The mechanic further stated that he conducted an engine examination after the accident under the supervision of the FAA. Upon removal of the induction tubes and the induction manifold, the mechanic discovered internal discoloration similar to that for the exhaust tubes. He removed the number 6 cylinder and noted that the intake valve was broken, with the valve's head wedged in the intake valve seat bore. Removal of the rocker box cover on that cylinder revealed that the spring retainer was broken into numerous pieces. The piston head showed over 15 impressions consistent in dimensions to that of the valve head.

The mechanic added that at the time of the accident, the cylinder had accumulated 10 hours since overhaul and the engine had accumulated 110.3 hours since the last overhaul. The cylinder was sent to Engine Components, Inc., for further examination under the auspice of the FAA. The mechanic's complete written account is appended to this report in the public docket.

Engine Components, Inc., completed a technical report in summation of their findings. In pertinent part, the director of quality and metallurgy stated that the retainer failed due to overload. He opined that during engine operation the valve fractured first, resulting in the valve stem impacting the retainer and keys leading to their facture and deformation. He noted that the broken valve was a new part supplied by Lycoming during the cylinder overhaul. The complete report is appended to the report in the public docket.

Pilot Information

Certificate:	Commercial	**Age:**	59, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	06/19/2002
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	29351 hours (Total, all aircraft), 16120 hours (Total, this make and model), 26934 hours (Pilot In Command, all aircraft), 51 hours (Last 90 days, all aircraft), 17 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N48020
Model/Series:	47G-3B-1	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	2812
Landing Gear Type:	Skid	**Seats:**	3
Date/Type of Last Inspection:	10/31/2002, 100 Hour	**Certified Max Gross Wt.:**	2950 lbs
Time Since Last Inspection:	100 Hours	**Engines:**	1 Reciprocating
Airframe Total Time:	7471 Hours as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	TVO-435-B1A
Registered Owner:	Clifford J. Heaverne	**Rated Power:**	270 hp
Operator:	Bureau of Land Managment	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	CDC, 5622 ft msl	**Distance from Accident Site:**	63 Nautical Miles
Observation Time:	1353 PST	**Direction from Accident Site:**	95°
Lowest Cloud Condition:	Few / 4300 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	340°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	7°C / 0°C
Precipitation and Obscuration:			
Departure Point:	Caliente, NV	**Type of Flight Plan Filed:**	None
Destination:	Panaca, NV	**Type of Clearance:**	None
Departure Time:	1200 PST	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	37.790278, -114.425000

Administrative Information

Investigator In Charge (IIC):	GEORGE E PETTERSON	**Report Date:**	12/28/2004
Additional Participating Persons:	Frank Vavra; Federal Aviation Administration; Las Vegas, NV		
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.ntsb.gov/pubdms/.		