Aviation Investigation Final Report

Location:	BEAVER DAM, Arizona	**Accident Number:**	LAX96FA155
Date & Time:	April 5, 1996, 19:54 Local	**Registration:**	N600CT
Aircraft:	Cessna 182RG	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	4 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

While flying at 12,500 feet msl over a mountainous area, the engine propeller began to overspeed, and then the engine quit. The pilot executed an emergency landing, and the airplane collided with a tree. Examination of the engine revealed that Nos. 3, 4, 5, and 6 connecting rods separated and their journals displayed oil starvation and high temperature distress signatures. The examination also showed that the oil consumption emanated from the No. 6 cylinder. The airplane squawk list and previous fueling records showed that the engine had a high oil consumption rate. The pilot that flew the airplane on a flight a week before the accident reported that in a 5-hour flight, the engine consumed 10 quarts of oil. One of the passengers reported that she saw the pilot check the oil before departing on the accident flight. The accident pilot said that the oil level was between 7 and 8 quarts before departing on the accident flight; he told his insurers that the oil level was about 5 quarts before departing on the last segment of the accident flight. The pilot said that he checked the oil by pulling the dipstick once. The pilot that previously flew the airplane said that he had to insert and remove the oil dipstick three times before obtaining an accurate level. He said that the oil viscosity on the dipstick tube was so thick it indicated a higher level.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: an engine failure due to oil starvation resulting from the pilot's improper aircraft preflight. A factor relating to the accident was: failure of the operator to ascertain that proper maintenance was performed after the airplane's high oil consumption rate was reported.

Findings

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

Findings
1. (C) FLUID,OIL - STARVATION
2. (C) AIRCRAFT PREFLIGHT - IMPROPER - PILOT IN COMMAND
3. (F) MAINTENANCE - NOT PERFORMED - COMPANY/OPERATOR MANAGEMENT

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

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: EMERGENCY LANDING

Findings
4. OBJECT - TREE(S)

Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

History of Flight

On April 5, 1996, about 1954 hours mountain standard time, a Cessna 182RG, N600CT, crashed about 46 miles southeast of Beaver Dam, Arizona. The pilot was conducting a visual flight rules personal flight to Las Vegas, Nevada. The pilot did not file a flight plan, but he was receiving radar flight following from the Federal Aviation Administration (FAA), Los Angeles [California] Air Route Traffic Control Center (ARTCC). The airplane, operated by Sunrise Aviation, Santa Ana, California, was destroyed. The certificated commercial pilot and three passengers sustained serious injuries. Visual meteorological conditions prevailed. The flight originated at John Wayne Airport, Santa Ana, California, about 1330. The flight landed at Grand Canyon Airport, Grand Canyon, Arizona, about 1715 and departed about 1901.

The FAA, Western-Pacific Region Operations Officer reported that at 1942 the pilot told the Los Angeles ARTCC sector controller that the airplane's engine was developing a propeller governor problem and declared an emergency. According to the radio communications between the pilot and the LAX ARTCC sector controller, he reported that the engine propeller stopped at 1948. The sector controller provided the pilot with information on the nearest airports/airstrips. When it was apparent that the airplane's altitude was insufficient to negotiate the airport, the sector controller pointed out a secondary road near the airplane's position. At 1952, the sector controller lost radar and radio communications with N600CT.

The pilot said in a telephone interview conducted on April 6, 1996, that the engine began to overspeed while flying at 12,500 feet mean sea level (msl). He immediately reduced the propeller control lever to 2,400 rpm and then the engine rpm began to decrease. The pilot increased the propeller control lever to a full low pitch (high rpm) setting and reduced the throttle. The engine began to vibrate violently and then smoke filled the cockpit. The pilot said that the smoke smelled like burning oil.

He said that he declared an emergency and the sector controller provided him with radar vectors to a road. The airplane's altitude was insufficient to negotiate the road and the pilot elected to land in an open area. The airplane's left wing struck a tree when it was approaching the open area.

In a subsequent telephone interview, the pilot said that he checked the oil level before John Wayne Airport. He said the oil level was between 7 and 8 quarts. The pilot told his insurance representative that the oil level was at 5 quarts when he departed Grand Canyon Airport.

The passenger said that she observed the pilot do a preflight inspection before departing John Wayne and Grand Canyon Airports. She said that the pilot used a checklist each time when he

walked around the airplane and before taking off. The pilot physically checked the fuel and the oil level. He checked the oil level by pulling out the dipstick, wiping it clean, reinstalling the dipstick, and then pulled it out again and rechecked the oil level.

In a written statement, the pilot said that he was "checked-out" in the airplane on April 2, 1996. He said that before being checked-out in the airplane, the company dispatcher gave him the aircraft logbook and squawk list. He said that aircraft logbook entries were appropriate concerning the required inspections, and that the squawk list contained several unresolved maintenance discrepancies including a "high oil consumption" discrepancy.

The pilot said that he had previously scheduled the airplane for the accident flight. When he checked the schedule book his name had been erased and that an entry indicated it was scheduled for maintenance. In response to the pilot's concerns, the dispatcher contacted someone concerning the maintenance schedule and then told the pilot that the airplane was not scheduled for any maintenance.

The pilot asked his instructor about the high oil consumption rate squawk. After consulting with a senior instructor, the instructor told the pilot that the person who reported the high oil consumption "...doesn't know what he's talking about...." The instructor then said that the accident airplane sits tail low when on the ground and that the dipstick oil readings are usually lower than the actual amount of oil in the sump. The instructor said that most pilots overfill the oil and that it subsequently overflows.

The instructor confirmed the pilot's statement regarding the pilot's overfilling the oil. He also said that the entry on the schedule book was the owner's initials (MC) and not the initials used for maintenance scheduling (MX). He said that the owner often schedules the accident airplane for personal use.

Crew Information

The pilot holds a commercial pilot certificate with airplane ratings for single engine land and instrument. He also held certified flight instructor certificate with an airplane single engine rating. The pilot received a third-class medical certificate on October 1, 1994; the certificate contained a "must wear glasses" limitation endorsement.

A review of the pilot's FAA records shows that he obtained the flight instructor's certificate on September 7, 1995. A Cessna 172RG was used during the flight test. Satisfactory completion of the flight test satisfied the biennial flight review requirements of current federal air regulations.

Safety Board investigators did not review the pilot's flight hours logbook. The flight times listed in this report were provided by the pilot to the best of his recollection. His flight logbook was not available. The pilot indicated on the flight time report that he had not accrued any night flight hours within the preceding 90 days. To carry passengers at night, current federal

air regulations 61.57 (d) require that the pilot must have made at least three night takeoffs and landings to a full stop in the same category/class aircraft within the preceding 90 days of the flight.

According to Federal Air Regulations, night time is considered to be 1 hour after official sunset and 1 hour before official sunrise. According to a computer generated Sun/Moon program, at the time of the accident, the altitude of the sun was -9.5 degrees (below the horizon) and the moon was -12.4 degrees (below the horizon). Sunset began at 1847 and twilight ended at 1908.

Aircraft Information

Safety Board investigators obtained the airplane and engine maintenance logbooks and the squawk list from the operator on April 5, 1996. The logbooks' examination disclosed that the last 100-hour inspection of the airframe and engine was completed on January 11, 1996, by Southern Aviation Maintenance, John Wayne Airport. The airframe and engine's total time at the time of the inspection were 2,087.3 hours (a tachometer hourmeter reading of 530.30 hours). At the time of the accident, the airframe and engine accrued 2,140.3 hours.

According to a Textron Lycoming Service Instruction No. 1009AJ, the recommended overhaul time is 2,000 hours. Current federal regulations do not require compliance with the manufacturer's recommended overhaul time for flight conducted under the provisions of Title 14 CFR 91. The accident flight was conducted under Title 14 CFR 91.

Southern Aviation Maintenance also completed the last annual inspection on April 13, 1995. The airframe and engine accrued 1,882 hours at the time of the inspection.

According to the Sunrise Aviation hobbsmeter log sheet, the pilot flew the accident airplane 4.2 hours on the day of the accident.

The squawk list was dated on April 4, 1996. Several unresolved discrepancies were noted, two of which included oil leakage and high oil consumption problems on March 3, 1996, and April 1, 1996, respectively.

In a telephone interview conducted on April 19, 1996, the pilot said that he checked the oil level before departing on each leg of the flight. He said he checked the level by "pulling the dipstick once" and that the oil was below 8 quarts when he departed John Wayne Airport and "slightly" less that 7 quarts when he departed Grand Canyon Airport.

On April 19, 1996, Safety Board investigators interviewed a pilot who last flew the accident airplane on April 1, 1996. He said that on March 30, 1996, he rented the airplane from the operator and flew to Deer Valley Airport, Phoenix, Arizona (2.5 hours flight time), and returned to John Wayne Airport (3.1 hours - included a local flight) on April 1, 1996. Before returning to John Wayne Airport he checked the oil and found that airplane consumed 5 quarts of oil. He

added 4 quarts of oil.

After returning to John Wayne Airport, the refueler checked the oil and determined that it was down 5 quarts. The refueler added 4 quarts of oil. The pilot said that he had to insert and remove the dipstick three times before obtaining an accurate level. He said that the oil viscosity on the dipstick tube was so thick it always indicated a higher level reading. He said that he advised the operator of the airplane's high oil consumption and the operator told him to make an entry on the airplane's squawk list.

Besides the pilots' statements noted above, Safety Board investigators interviewed several pilots who had flown the airplane. All the pilots said that the oil temperatures and pressures on their flights were normal.

One pilot said that he added 4 quarts of oil before departing on his flight. When he returned from the 2.4 hours flight, another pilot added 2 quarts of oil. He reported this to Sunrise Aviation personnel and was told that because the airplane sat low, most pilot's overfill the engine oil level. He also said that the oil on the dipstick was thick and dirty.

Another pilot said that he took the airplane to Las Vegas, Nevada. He observed that the oil level was not showing on the dipstick. He called an instructor at Sunrise and was told that it was normal. The pilot added 3 quarts of oil before departing Las Vegas.

A Lycoming representative reported that in an airplane tail low condition, the oil readings would show a higher than normal reading. He said that the factory recognized this anomaly and issued Service Instruction No. 1379. The Service Instruction provides for a replacement of a new oil level gauge, oil level gauge tube, oil level gage adapter and oil ring seal. He also said that compliance with the Service Instruction is done at the "owner's" discretion. The engine disassembly examination showed that the operator complied with the referenced Service Instruction.

The operator said that Southern Aircraft Maintenance does the maintenance on all of the company's aircraft. He said that the maintenance write-ups are sent daily to Southern Aircraft Maintenance. He said that Southern Aircraft Maintenance is authorized and expected to perform the necessary maintenance to correct any unresolved maintenance discrepancies. In this instance, the operator was not aware that Southern Aircraft Maintenance did not inspect or ascertain if N600CT was subject to high oil consumption or oil leakage.

The operator also said that if, in the opinion of the flight instructor or the dispatcher, that a maintenance discrepancy warrants grounding of the airplane, then it is so noted in the squawk list. In this instance, the squawk list did not contain any grounding items.

The owner of Southern Aircraft Maintenance said in an interview conducted on April 23, 1996, that his company only replaced the magnetic compass after they completed last 100-hour inspection. He said that he was not aware of the high oil consumption rate maintenance

discrepancy write-up. He also said that he did not have a copy of the daily squawk list.

Sunrise Aviation's chief flight instructor reported that she obtained the squawk list from Southern Aircraft Maintenance sometime after the accident. A copy of the squawk list is contained in this report.

Wreckage and Impact Information

An on-scene investigation was not conducted. The airframe and engine were examined at Air Transport, Inc., Phoenix, Arizona, on April 15, 1996. The parties to the investigation listed in this report participated in the examination.

The aircraft retriever said he cut the forward side of the fuselage, aft of the engine firewall, during the retrieval process. He said that the crash site was in a remote wilderness and that the airplane struck some trees before coming to rest. All the airplane's major components and flight control surfaces were found at the crash site and remained attached at their respective attach points. Safety Board investigators established continuity of the flight control cables to the cabin/cockpit area.

Oil stains were found on the lower left side of the airframe and on the underside of the engine cowling. Some vegetation was found impinged on the rivet heads. Some oil stains appeared to have been removed when the airplane contacted the vegetation at the crash site.

The airframe gascolator was free of contaminates.

The engine crankcase displayed two holes next to the numbers 4 & 6 cylinder bases. Minor residual oil stains were found on the crankcase next to the holes.

The numbers 3, 4, 5, and 6 connecting rods separated from their respective journals. The numbers 1 and 2 connecting rods were seized on their respective journals. All the journals displayed high temperature distress signatures. The degree of the high temperature signatures increased from the rear of the crankshaft (the number 6 connecting rod journal) to the number 1 connecting rod journals. The crankshaft journals did not display any high temperature distress signatures and its oil galleries were unobstructed.

The cam lobes displayed normal operating and wear signatures; the cam shaft contained two impact signatures between the numbers 3 and 4 lobes next to the separated connecting rods.

The numbers 1, 2, 5, and 6 pistons displayed extensive vertical score marks at its skirt area. The number 5 piston oil scraper ring was seized. All the compression rings were loose and did not display any abnormal wear patterns. Some of the piston domes displayed detonation and high temperature distress signatures.

The exhaust valves exhibited some high temperature distress; the no. 1 exhaust valve

displayed extensive pitting and high temperature signatures.

The oil pump gears displayed normal operating signatures and the oil pump housing did not contain any scoring marks.

The oil sump contained extensive bearing, connecting rod cap material, and other metallic debris. The oil screen contained minor bearing babbit particles. Bearing material was also found in the engine suction strainer and governor gasket.

The oil breather lines did not leak when pressurized. The oil cooler exhibited two impact holes on each side. Residual oil stains were found next to the holes.

The carburetor finger screen and carburetor bowl were free of contaminates. The carburetor bowl did not contain any fuel or any foreign contaminates. The fuel pump produced pressure upon movement of its output control lever.

Magneto timing could not be accomplished; the flywheel was not attached to the engine. Both magnetos produced spark upon rotation of its single-drive output shaft.

The upper and lower spark plugs displayed normal operating signatures. The center electrodes did not show any extensive ovaling signatures. The number 6 cylinder upper and lower spark plugs and their associated intake and exhaust valves contained oil coated carbon deposits.

The vacuum pump produced pressure when its drive shaft was rotated.

Both propeller blades were found bent toward the face side about 70 degrees. The blades showed some chordwise scuffing marks, but no leading edge gouging.

The aircraft retriever told Safety Board investigators that there was no evidence of any extensive oil spillage at the accident site. He said the engine contained less than 2 quarts of oil.

Medical and Pathological Information

Toxicological examinations on the pilot were not conducted, nor were they requested.

Tests and Research

The engine was further examined at Textron Lycoming, Williamsport, Pennsylvania, on May 16, 1996. The examination was accomplished under the supervision of an FAA inspector from the Harrisburg [Pennsylvania] Flight Standards District Office. The inspector and the manufacturer's representative reports showed the same findings as noted under the Wreckage and Impact section herein this report.

The FAA inspector concluded, in part, "...The subject engine failed due to oil depletion...." He also said, "...The #6 cylinder was identified as one of the possible causes of oil depletion. A combination of oil usage, oil leakage, and oil venting is likely...."

On May 8, 1996, a Santa Ana Police Department Forensic Specialist examined the airplane's schedule book to raise the erased impressions on April 5, 1996. The specialist concluded that the schedule book initials were MC (the owner's initials) and not MX (the maintenance schedule initials).

Additional Information

The airframe was orally released to the operator's insurance representative on April 15, 1996. The engine was returned to Air Transport, Inc., on August 2, 1996.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	33,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	October 12, 1994
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	303 hours (Total, all aircraft), 245 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N600CT
Model/Series:	182RG 182RG	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	18200441
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	January 11, 1996 Annual	**Certified Max Gross Wt.:**	3100 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	O-540-J3C5D
Registered Owner:	SUNRISE AVIATION COMPANY	**Rated Power:**	235 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Dusk
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	50 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/ None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	GRAND CANYON (GCN)	**Type of Flight Plan Filed:**	None
Destination:	LAS VEGAS (LAS)	**Type of Clearance:**	None
Departure Time:	19:01 Local	**Type of Airspace:**	Class G

Airport Information

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

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:	3 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Serious	**Latitude, Longitude:**	36.89962,-113.939781(est)

Administrative Information

Investigator In Charge (IIC):	Llorente, A.
Additional Participating Persons:	DALE NELSON; LAS VEGAS , NV MARK PLATT; VAN NUYS , CA DAVID RYAN; WICHITA , KS
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