Aviation Investigation Final Report

Location:	TENSED, Idaho	**Accident Number:**	SEA99LA031
Date & Time:	January 19, 1999, 14:45 Local	**Registration:**	N67264
Aircraft:	Hiller UH-12E	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Aerial observation		

Analysis

The pilot-in-command (PIC) took off with a full load of fuel (82 gallons) approximately 1230 pst. The main fuel tank contained 46 gallons of fuel (2.9 gallons unusable) with the remaining fuel in external saddle tanks. Approximately 1445 (2.25 hours after takeoff), the engine flamed out while the PIC was executing a zero airspeed pedal turn course reversal over high trees. The helicopter descended into the trees impacting terrain. The PIC reported that 'within moments preceding the flameout, he noted that his fuel level had reached approximately 15 gallons in the main tank. At that time he turned on the auxiliary fuel tanks transfer switch.' and that 'the time between turning on the transfer switch to the flameout was approximately 45 to 60 seconds.' Cruise fuel flow to the engine was reported at 17-20 gallons/hour (takeoff power fuel flow was reported as 32 gallons/hour). Post crash examination revealed less than one gallon of fuel in the rotorcraft's main fuel tank, and none in the fuel line which connects the tank to the engine fuel nozzle, none within the engine driven fuel pump filter, nor within the power turbine governor fuel filter. The aircraft's fuel gauge was observed to have no markings on the glass faceplate. No fuel leaks were found within the main fuel tank. A post crash test run of the engine revealed normal performance. No low fuel warning system was installed on the rotorcraft.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot-in-command's inadequate fuel management which resulted in fuel exhaustion. Contributing factors were the absence of cautionary markings on the fuel gauge, and high trees at the accident site.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: CRUISE

Findings
1. (C) FLUID,FUEL - EXHAUSTION
2. (C) FUEL MANAGEMENT - INADEQUATE - PILOT IN COMMAND
3. (F) ACFT/EQUIP,INADEQUATE INSTRUMENT DISPLAY

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

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

Findings
4. (F) OBJECT - TREE(S)

Factual Information

HISTORY OF FLIGHT

On January 19, 1999, approximately 1445 hours Pacific standard time, a Hiller UH-12E, turbo-shaft powered rotorcraft, N67264, registered to an individual, being operated by Valley Helicopter Service, and being flown by a commercial pilot, was destroyed during collision with trees and terrain following a total loss of power while in cruise approximately five miles northeast of Tensed, Idaho. The pilot and one passenger sustained serious injuries, while the remaining passenger sustained minor injuries. Visual meteorological conditions were reported to exist at the accident site, and a company flight plan (flight following) was in effect. The flight, which was a survey of migrating elk for the Coeur d'Alene Indian Reservation, was operated as a 14 CFR Part 91 flight, and originated from Tensed at approximately 1230.

According to the operator, the aircraft was fueled with 82 gallons of Jet A fuel. The fuel truck driver, through which the flight was maintaining flight following, reported that following the morning flight (0800 until 1145) he refueled that rotorcraft at 1145. He also reported that the rotorcraft departed for the second flight of the day and that "right after he was airborne we made radio contact at 12:33pm." And that he remembered because the pilot said "check your time I have 3.5 hrs of fuel and I will meet you at the CDL Tribe compound at 4:00pm." The driver then refueled his fuel truck. He reported that subsequent to the refueling at 2:40pm "On the return trip from the airport, on the hill area near Skyline Dr, between Potlatch and Tensed I made radio contact. James instructed me to go to Plummer, check into a motel and meet him at the compound." This was the last radio contact the driver had with the rotorcraft (refer to attached statement).

The pilot was interviewed by an inspector from the Federal Aviation Administration's (FAA) Spokane Flight Standards District Office on January 22, 1999. He reported in the interview that "he was flying up a draw and, upon reaching the top, performed a zero airspeed pedal turn to reverse course and fly back down the draw. After performing the turn the aircraft began to settle in a normal fashion. (The pilot) increased collective to arrest the rate of descent and immediately heard the engine spool down (fail). He stated that, in an attempt to re-light the engine he flipped on the auto re-light system but the engine did not respond."

The pilot further reported that "within moments preceding the flameout, he noted that his fuel level had reached approximately 15 gallons in the main tank. At that time he turned on the auxiliary fuel tanks transfer switch. He stated that turning on the transfer switch at 10 to 15 gallons was a normal and routine practice in the Hiller and that he watches the fuel level "like a hawk" to insure the timely transfer of fuel. He said that the time between turning on the transfer switch to the flameout was approximately 45 to 60 seconds to the best of his

recollection."

The passenger seated to the pilot's right (minor injury) reported in a telephone interview with the investigator that he was unconscious for a brief period of time following the accident and that he estimated that it took him 1.5 to 2 hours to hike out for help following the accident. He reported calling 911 from a farmhouse and reporting the accident.

The passenger seated to the pilot's left (serious injury) reported in a telephone interview with the investigator that they landed around 1130 on the morning of the accident and stopped for an hour for lunch. He also reported that the last time he noted the time after takeoff was approximately 1430 before the crash. He reported that after the crash approximately 20-25 minutes had passed after which he looked at his watch and it read 1505. He also reported that following the accident he noted he was soaked in fuel which he believed came from the rupture of the left saddle tank.

The Benewha County Sheriff's Department received a 911 telephone notification at 1732 hours reporting the accident.

PERSONNEL INFORMATION

The pilot reported a total of 4,000+ hours of flight experience of which 1,500+ hours were logged in the UH-12E Hiller/Soloy rotorcraft.

AIRCRAFT INFORMATION

According to the Model UH-12E Service Manual, the aircraft was equipped with a single, 46 gallon bladder main fuel tank located in the belly of the helicopter. The manufacturer reported that the main tank's unusable fuel was 2.9 gallons. Fuel was fed via engine-driven pump suction from a screened pickup tube within the tank, and then on to the engine. An electric boost pump, which when operating, provided a continuous fuel pressure head to the engine driven pump, was installed upstream of the fuel tank pickup. The boost pump fuel pressure head served to prevent inadvertent air pickup in the fuel lines upstream of the pump, which could result in engine shutdown.

An analog fuel gauge in the cockpit displayed main fuel tank quantity in gallons (refer to photograph 1). The quantity is provided by a combined forward and aft fuel quantity pickup unit within the tank.

Additionally, the aircraft was equipped with two metal, external, auxiliary tanks. The capacity of each of these tanks was reported as 18.8 or 20 gallons, dependent upon the source of information (Flight Manual Supplement or UH-12E Service Manual, respectively). These two tanks were joined at a "tee" fitting which then fed fuel through an electrically operated solenoid into the main fuel tank. According to Hiller Engineering Report 59-51, the fuel transfer (flow) rate from both auxiliary tanks is 73 gallons/hour when the auxiliary tanks are filled to within 15

gallons of full tanks. Cruise fuel flow to the engine was reported at 17-20 gallons/hour (takeoff power fuel flow was reported as 32 gallons/hour).

WRECKAGE AND IMPACT INFORMATION

The aircraft crashed in heavily wooded terrain consisting of approximately 75 foot high coniferous and deciduous trees (refer to photograph 2). The aircraft came to rest on its left side (refer to photographs 3 and 4).

Another inspector from the FAA's Spokane Flight Standards District Office traveled to the crash site and reported the following initial observations:

1. The right "saddle" tank was approximately 1/3 full and fuel was observed leaking from the tank. 2. The left "saddle" tank was deformed/compromised and fuel had leaked out. 3. The "AUTO RELIGHT" switch was found in the ON position. 4. No fuel was observed in the rotorcraft's main fuel tank. 5. No fuel was found in the fuel line which connects the tank to the engine fuel nozzle.

TESTS AND RESEARCH

Subsequent to the recovery of the wreckage, the FAA inspector and a representative from the engine manufacturer (participant) re-examined the rotorcraft and reported the following observations:

1. A vacuum check of the fuel system was conducted with no abnormalities noted. 2. No fuel was found within the engine driven fuel pump filter . 3. No fuel was found within the power turbine governor fuel filter. 4. The airframe fuel filter was opened and found to be approximately half full of fuel. 5. The main fuel tank contained less than one gallon of fuel. 6. The auxiliary (saddle) fuel tank solenoid transfer valves were electrically tested with no malfunction noted. 7. The electric boost pump was tested with no malfunction noted. 8. Fifteen gallons of fuel was placed in the main fuel tank and left for two hours. No evidence of a fuel leak within the bladder was observed. (Refer to ATTACHMENT FAA-I)

Additionally, the aircraft's fuel gauge was observed to have no markings on the glass faceplate (refer to photograph 1). The gauge was marked with a white band over an approximate 90 degree arc. The left end of the arc was identified with the letter "E" and the right end of the arc was identified with the letter "F." The arc was graduated at its top and the gauge was labeled "FUEL QTY U.S. GALS." There was no "LOW FUEL" warning system installed and non was required.

Power was applied to the fuel quantity measuring system following recovery of the wreckage in an effort to determine the operation and accuracy of the fuel gauge. The gauge pegged at the 'full scale' position and it could not be determined whether this condition existed before the accident. There was no reference in the 100 hour inspection records dated January 1, 1999, of

a fuel gauge problem.

The engine and associated accessories was shipped to the facilities of Air Services International, (ASI) Inc., Scottsdale, Arizona. The engine was test run on February 12, 1999, under the oversight of an air safety investigator from the Safety Board's Southwest Regional Office. Engine starts were normal and the engine performed as designed, attaining or exceeding test specifications for overhaul standards (refer to attached Rolls Royce report).

ADDITIONAL INFORMATION

The engine, which had been maintained under the control of the Safety Board during its shipment and testing at ASI, was subsequently returned to the insurance representative. Release of the engine was completed on April 21, 1999 (refer to NTSB Form 6120.15 attached).

THIS NARRATIVE WAS MODIFIED ON MARCH 6, 2007.

Pilot Information

Certificate:	Commercial	**Age:**	37,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Center
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	February 6, 1998
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	4000 hours (Total, all aircraft), 1500 hours (Total, this make and model), 3000 hours (Pilot In Command, all aircraft), 65 hours (Last 90 days, all aircraft), 25 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Hiller	**Registration:**	N67264
Model/Series:	UH-12E UH-12E	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2509
Landing Gear Type:	Skid	**Seats:**	3
Date/Type of Last Inspection:	January 9, 1999 100 hour	**Certified Max Gross Wt.:**	3100 lbs
Time Since Last Inspection:	12 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	4282 Hrs	**Engine Manufacturer:**	Allison
ELT:	Installed	**Engine Model/Series:**	250-C20
Registered Owner:	POPE, JAMES, R.	**Rated Power:**	400 Horsepower
Operator:	VALLEY HELICOPTER SERVICES LLC	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	GGVA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PUW ,2551 ft msl	**Distance from Accident Site:**	29 Nautical Miles
Observation Time:	14:53 Local	**Direction from Accident Site:**	186°
Lowest Cloud Condition:	Unknown	**Visibility**	10 miles
Lowest Ceiling:	Broken / 4200 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	60°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	6°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	, ID	**Type of Flight Plan Filed:**	Company VFR
Destination:		**Type of Clearance:**	None
Departure Time:	12:30 Local	**Type of Airspace:**	Class G

Airport Information

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

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious, 1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious, 1 Minor	**Latitude, Longitude:**	47.119636,-116.789604(est)

Administrative Information

Investigator In Charge (IIC):	Mccreary, Steven
Additional Participating Persons:	DONNIE WARE; SPOKANE , WA WARREN SEITZINGER; INDIANAPOLIS , IN ROBERT CRISPIN; GARDENA , CA
Original Publish Date:	June 21, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=45886