



Aviation Investigation Final Report

Location:	Sioux Falls, South Dakota	Incident Number:	CEN17IA094
Date & Time:	January 26, 2017, 21:45 Local	Registration:	N911MK
Aircraft:	EUROCOPTER DEUTSCHLAND GMBH MBB BK 117 C-2	Aircraft Damage:	Minor
Defining Event:	Powerplant sys/comp malf/fail	Injuries:	3 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Unspecified)		

Analysis

The pilot and two crewmembers were conducting a night helicopter air ambulance flight. While en route, the No. 2 engine twist grip caution light illuminated. The pilot checked the instruments and did not notice anything anomalous. The twist grip light disappeared then reappeared and flickered a few more times. All parameters were in the proper range. Shortly after, he heard a "winding down sound," then "a hissing sound" and detected "the smell of exhaust in the cabin." He responded by turning off the cabin heat then lowered the collective and diverted toward an airport. During the turn, the No. 2 engine FIRE light illuminated, and he noticed an orange glow from the back-right side of the helicopter. He pressed the No. 2 engine emergency off switch, noticed that the FLI needles split, and continued with one engine inoperative. Subsequently the No. 1 fire bottle light illuminated, which, indicated there was a fire in the engine compartment, so he activated the bottle. Then the No. 2 fire bottle light illuminated, which indicated that the fire had not yet been extinguished, so he discharged the second fire bottle. The FIRE light extinguished, and he continued the flight and made a running emergency landing at the diversion airport.

A post-incident examination of the helicopter and inspection of both engines was completed. The No. 2 engine deck area was thermally damaged from an oil fire. The No. 2 engine exhibited significant internal coke buildup with blockages noted in the rear bearing scavenge line and the airframe's vent line 3-way union. The blocked scavenge line allowed the oil to escape the rear bearing chamber, which resulted in oil in the engine's main air path, in the rear bearing vent line, and onto the engine deck. A failure of the rear bearing occurred due to excessive oil lubrication in the rear bearing chamber. The No. 2 engine gas generator rear bearing was found severely damaged and seized; the seizure of the bearing was due to the bearing operating in excess oil.

The No. 1 engine rear bearing assembly also exhibited significant coke buildup in similar locations but continued to operate normally during the incident. The bearing was found covered with coke, but otherwise in good condition. The 3-way union was partially blocked with coke.

The operator would have benefitted in using a high thermal stability oil. The engine maintenance performed by the operator was lacking proper recording and was not completed exactly as prescribed in the engine maintenance manual. If performed properly, the rear bearing strainer maintenance check, the permeability test, and permeability trend analysis could have helped the operator recognize the impending clogging of the rear bearing scavenge line.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be:

The gas generator rear bearing oil scavenge line blocked with coke, which resulted in a failed rear bearing due to an excess of oil lubrication. Contributing to the incident was the operator not completely performing the maintenance items and not utilizing an oil for higher temperatures.

Findings

Aircraft	Oil - Fluid condition
Aircraft	Oil system - Damaged/degraded
Aircraft	Oil system - Fatigue/wear/corrosion
Aircraft	Oil system - Capability exceeded
Aircraft	Oil system - Incorrect service/maintenance
Aircraft	Oil - Incorrect service/maintenance
Aircraft	Oil - Fluid type
Personnel issues	Scheduled/routine maintenance - Maintenance personnel

Factual Information

History of Flight

Enroute	Fire/smoke (non-impact)
Enroute	Engine shutdown
Enroute	Powerplant sys/comp malf/fail (Defining event)

Pilot Information

Certificate:	Airline transport; Flight instructor	Age:	34, Male
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	5-point
Instrument Rating(s):	Helicopter	Second Pilot Present:	No
Instructor Rating(s):	Helicopter	Toxicology Performed:	No
Medical Certification:	Class 2 Without waivers/limitations	Last FAA Medical Exam:	May 12, 2016
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	November 16, 2016
Flight Time:	4827 hours (Total, all aircraft), 1622 hours (Total, this make and model), 4756 hours (Pilot In Command, all aircraft), 55 hours (Last 90 days, all aircraft), 12 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:	None	Age:	Male
Airplane Rating(s):	None	Seat Occupied:	Rear
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Passenger Information

Certificate:	None	Age:	Male
Airplane Rating(s):	None	Seat Occupied:	Rear
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	EUROCOPTER DEUTSCHLAND GMBH	Registration:	N911MK
Model/Series:	MBB BK 117 C-2 C2	Aircraft Category:	Helicopter
Year of Manufacture:	2008	Amateur Built:	
Airworthiness Certificate:	Transport	Serial Number:	9218
Landing Gear Type:	Skid	Seats:	5
Date/Type of Last Inspection:	January 16, 2017 AAIP	Certified Max Gross Wt.:	7904 lbs
Time Since Last Inspection:		Engines:	2 Turbo shaft
Airframe Total Time:	6283.5 Hrs at time of accident	Engine Manufacturer:	Safran Helicopter Engines
ELT:	C126 installed, not activated	Engine Model/Series:	Arriel 1E2
Registered Owner:	AVERA MCKENNAN	Rated Power:	760 Horsepower
Operator:	MRIS LLC	Operating Certificate(s) Held:	On-demand air taxi (135)
Operator Does Business As:	Avera McKennan Careflight	Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Night
Observation Facility, Elevation:	KFSD,1427 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	20:56 Local	Direction from Accident Site:	266°
Lowest Cloud Condition:		Visibility	9 miles
Lowest Ceiling:	Overcast / 2700 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	14 knots / None	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	320°	Turbulence Severity Forecast/Actual:	/ N/A
Altimeter Setting:	30.04 inches Hg	Temperature/Dew Point:	-9°C / -12°C
Precipitation and Obscuration:	Light - None - Snow		
Departure Point:	SIOUX FALLS, SD (2SD1)	Type of Flight Plan Filed:	Company VFR
Destination:	ARMOUR, SD (08SD)	Type of Clearance:	None
Departure Time:	21:28 Local	Type of Airspace:	Class G

Airport Information

Airport:	JOE FOSS FIELD FSD	Runway Surface Type:	Concrete
Airport Elevation:	1429 ft msl	Runway Surface Condition:	Dry
Runway Used:	03	IFR Approach:	None
Runway Length/Width:	8999 ft / 150 ft	VFR Approach/Landing:	Full stop;Precautionary landing

Wreckage and Impact Information

Crew Injuries:	3 None	Aircraft Damage:	Minor
Passenger Injuries:		Aircraft Fire:	In-flight
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	3 None	Latitude, Longitude:	43.578334,-96.748054(est)

Administrative Information

Investigator In Charge (IIC):	Lindberg, Joshua
Additional Participating Persons:	Dwight Pladsen; Federal Aviation Administration; Rapid City, SD Seth Buttner; Airbus Helicopters; Grand Prairie , TX Bryan Larimore; Safran Engines; Grand Prairie , TX
Original Publish Date:	May 5, 2021
Last Revision Date:	
Investigation Class:	Class 2
Note:	The NTSB did not travel to the scene of this incident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=94674

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).