NATIONAL TRANSPORTATION SAFETY BOARD (NTSB)

Office of Aviation Safety
Washington, District of Columbia 20594

November 27, 2019

Group Chairman's Factual Report

OPERATIONAL FACTORS

ERA17MA316

A. ACCIDENT

Operator:	Air Methods Corporation (AMC)
Location:	Hertford, North Carolina
Date:	September 8, 2017
Time:	About 1120[1] eastern daylight time (EDT)
Helicopter:	N146DU, Eurocopter Deutschland GMBH MBB-BK 117 C-2 (serial number 9474)[2]
Engines:	Turbomeca Arriel 1E2 (left side serial number 47292, known as the number 1 engine, and right side serial number 47346, known as the number 2 engine)[3]

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[1] All times referenced in this report are in the 24-hour clock format.
[2] The current type certificate holder for the accident helicopter airframe is Airbus. The current terminology for the accident helicopter is an Airbus EC145, as the make and model names have changed several times since initial production. The main headquarters for Airbus is in France, but the U.S. division is in Grand Prairie, Texas.
[3] The current type certificate holder for the accident helicopter engines is Safran. The main headquarters for Safran is in France, but the U.S. division is in Grand Prairie, Texas.

C. SUMMARY

On September 8, 2017, about 1120 EDT, a Eurocopter Deutschland GMBH MBB-BK 117 C-2 helicopter, N146DU, was destroyed when it crashed in a field adjacent to a wind turbine farm in Hertford, North Carolina. The commercial pilot, two flight nurses, and one patient were fatally injured. Day visual meteorological conditions (VMC) prevailed at the time, and a company flight plan was filed for a flight that departed the Sentara Albemarle Regional Medical Center Heliport (NC98), Elizabeth City, North Carolina, about 1108. The flight was destined for the Duke University North Heliport (NC92), Durham, North Carolina. The helicopter was registered to Duke University Health Systems, Inc., and was operated by AMC under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 135 as a visual flight rules air medical flight.

D. DETAILS OF THE INVESTIGATION

The NTSB operations group chairman did not accompany the NTSB investigator-in-charge (IIC) to the scene of the accident. After the on-scene activities were completed, the operations group was formed which included members from the NTSB, the FAA, and AMC. The operations group obtained data, records, manuals, timelines, and other pertinent documents from the FAA, AMC, Duke Life Flight (DLF), Airbus, and Safran for review.

The operations group traveled to the headquarters of AMC in Greenwood Village, Colorado on February 14, 2018. The operations group conducted a tour of AMC headquarters, which included the academic training facility and the operational control center (OCC). The operations group met with AMC management. The Chief Pilot, the Director of Flight Safety, and the Director of Aviation Risk and Compliance were interviewed.

The operations group traveled to the FAA Denver Flight Standards District Office (FSDO) in Denver, Colorado on March 22, 2018. The operations group met with FAA Denver FSDO management. The front-line manager (FLM) overseeing the certificate management team (CMT) [4], the principal operations inspector (POI) [5], and an assistant POI were interviewed. The Director of Operations for AMC was also interviewed.

The operations group traveled to DLF headquarters in Durham, North Carolina (part of the Duke University Hospital) on May 16, 2018. The operations group conducted a tour of the DLF headquarters, which included the Duke University rooftop helipads, the DLF communications center, and the flight crew planning room. The operations group met with DLF management. N145DU (a Eurocopter Deutschland GMBH MBB-BK 117 C-2 helicopter with the same cabin and cockpit configuration as the accident helicopter) which is assigned to DLF, was examined and documented.

[4] CMT within the context of this document, refers to the team of FAA principal inspectors assigned to oversee a certificate. Depending on the size and complexity of the operator, a POI, a principal maintenance inspector (PMI), a principal avionics inspector, and assistant inspectors are part of the CMT.

[5] The current POI within the context of this document, refers to the POI assigned to the AMC certificate at the time of the accident.

The operations group traveled to the AMC Smithfield Base at the Johnston Regional Airport (JNX) in Smithfield, North Carolina on May 17, 2018. The operations group conducted a tour of the hangar and the flight crew planning room. The base lead pilot, the clinical team lead, a flight nurse, and a base mechanic were interviewed. N136KY (a Eurocopter Deutschland GMBH EC 135 P2 helicopter[6]), which is also assigned to DLF, was examined and documented.

The operations group conducted telephonic interviews on July 9, 2018 with a pilot and flight nurse who were based out of the DLF headquarters.

The operations group, along with the other NTSB groups assigned to the accident, traveled to the NTSB Training Center in Ashburn, Virginia on May 14, to May 15, 2019 to attend a final findings presentation by Airbus and Safran. Also present were two air safety investigators from Le Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile (BEA).[7]

E. FACTUAL INFORMATION

1.0 History of Flight

On the day of the accident, the pilot arrived at JNX at 0735. The request to transport the patient by air was received by the DLF communications center at 0800. Preliminary coordination took place after the initial request and a flight request was transmitted at 0815. The pilot accepted the mission at 0817. The flight was classified as low risk in accordance with the AMC risk assessment program.

The pilot and both medical crew members departed from JNX at 0827 for the Elizabeth City Regional Airport (ECG), Elizabeth City, North Carolina for refueling. They arrived at ECG about 0924 and loaded 70 gallons of Jet A fuel. About 1011, the crew radioed the DLF communications center and advised they were departing for NC98 and had two hours of fuel on board. They arrived at NC98 about 1022. At 1108, the pilot radioed the DLF communications center and advised they were departing for NC92 with two hours of fuel and four people on board (the pilot, the two flight nurses, and the patient). There were no further communications with the helicopter.

Data transmitted from the helicopter showed that it departed NC98 to the northwest, climbed to about 1,000 ft above mean sea level (amsl) and then turned west. The helicopter climbed to about 2,500 ft amsl and continued a westerly track at a groundspeed of about 120 kts. About eight minutes after takeoff, the helicopter began a turn toward the south. About one minute later, the transmitted data ended at an altitude of about 1,168 ft amsl and a groundspeed of 75 kts, while the helicopter was on a southeasterly track.

[6] The current type certificate holder for the Eurocopter EC 135 is Airbus. The current terminology for the Eurocopter EC135 is an Airbus EC135, as the make and model names have changed several times since initial production.

[7] The BEA is the NTSB-equivalent in France. Per the International Civil Aviation Organization Annex 13, the BEA, along with the German Federal Bureau of Aircraft Accident Investigation, are accredited representatives to the investigation. Airbus and Safran are technical advisors to the accredited representatives.

The helicopter was equipped with a Honeywell Sky Connect Tracker II[8] system that transmitted data to the DLF communications center and the OCC. At the time of the accident, AMC had the Sky Connect Tracker II system configured for data transmissions emitting from the helicopter every 120 seconds. Various data points the helicopter emitted were overlayed on Google Earth as shown below in figure 1 and figure 2. Figure 3 below contains the list of data that was emitted.

Figure 1 – Google Earth Honeywell Sky Connect Tracker II data overlay (courtesy of Airbus and AMC).

[8] The Honeywell Sky Connect Tracker II system used by AMC is for mission awareness and management purposes. Some of the features of the system include tracking of the helicopter along with text and voice communication capability between the pilot and the DLF communications center and the OCC.

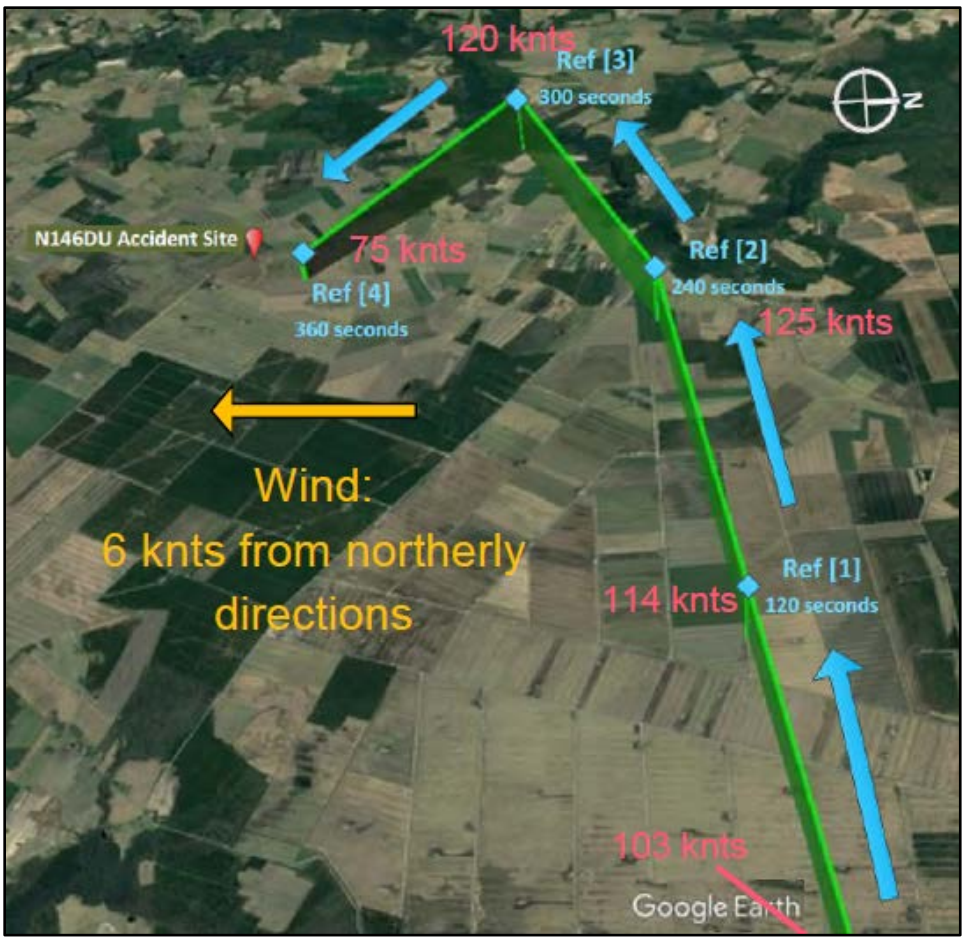


Figure 2 – Google Earth Honeywell Sky Connect Tracker II data overlay (courtesy of Airbus and AMC).

Ref Point	Time	Time Delta [seconds]	Latitude [degrees]	Longitude [degrees]	Altitude [feet]	Course [degrees]	Groundspeed [knots]
[0]	15:12:00	0	36.349833°	-76.334997°	2297	261	103
[1]	15:14:00	120	36.339831°	-76.417000°	2543	261	114
[2]	15:16:00	240	36.333333°	-76.471000°	2530	261	125
[3]	15:17:00	300	36.318500°	-76.511833°	2605	189	120
[4]	15:18:00	360	36.296333°	-76.482833°	1168	132	75

Figure 3 – List of Honeywell Sky Connect Tracker II data (courtesy of Airbus and AMC).

Several witnesses reported observing smoke trailing behind the helicopter while it was in flight. The smoke was described by some witnesses as "heavy" or "dark", while others reported the color as "black", "dark blue," or "blue." One witness reported that the helicopter was "hovering" and "not travelling forward" while it was a "couple of hundred feet" above the wind turbine farm. Another witness reported hearing a "popping noise," he then observed the helicopter turn left, then right. It then descended quickly and appeared "in control" with the main rotor system turning before he lost sight of it.

The helicopter impacted a shallow turf drainage pathway, about 30 ft wide and 2,000 ft long, located between two fields of eight ft tall grass, on a wind turbine farm. The fuselage came to

rest in a seven ft wide ditch in the center of the pathway and was oriented on a heading of 261° magnetic as shown below in figure 4 and figure 5. The terrain surrounding the accident site can be seen below in figure 6.

Figure 4 – Aerial view of the wreckage.


Figure 5 – Ground view of the wreckage.

Figure 6 – Aerial view of the terrain surrounding the accident site.

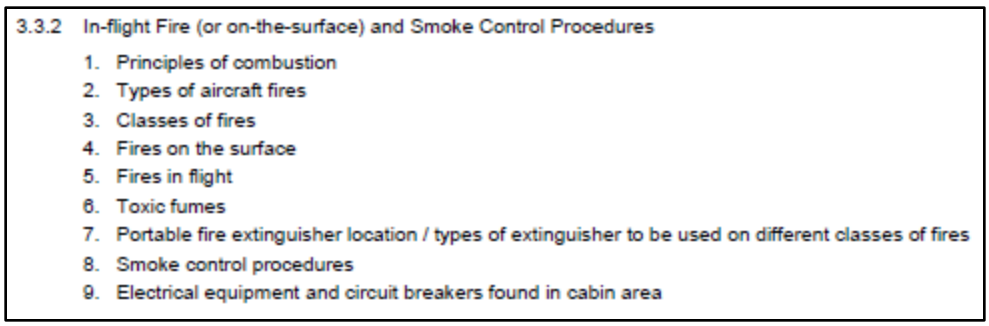
2.0 Crew Information

2.1 Pilot

The pilot, Jeffrey Burke, age 51, held a FAA commercial rotorcraft pilot certificate with an instrument rotorcraft rating. His most recent FAA second-class medical certificate was issued on October 6, 2016, which contained no limitations. The pilot's official title at AMC was captain.

AMC had an FAA-approved 14 *CFR* Part 135 training program, which was outlined in the AMC Pilot Training Program Curriculum. Initial new hire pilot-in-command training involved a ground curriculum and a flight curriculum. The ground curriculum had an operator specific module (with areas such as pilot duties, operations specifications, *CFR*s, etc.) and an airman specific module (with areas such as safety management systems, airport ground operational safety, air medical resource management, etc.). The flight curriculum for the Eurocopter Deutschland GMBH MBB-BK 117 C-2 contained qualification segments on areas such as ground operations, basic flight maneuvers, emergency procedures, instrument procedures, and environmental training.

The AMC Pilot Training Program Curriculum also had an initial and recurrent emergency situation training module. This module contained qualification segments such as ground evacuation, in-flight fire and smoke control procedures (as shown below in figure 7), ditching and evacuation situations, etc.


3.3.2 In-flight Fire (or on-the-surface) and Smoke Control Procedures

1. Principles of combustion
2. Types of aircraft fires
3. Classes of fires
4. Fires on the surface
5. Fires in flight
6. Toxic fumes
7. Portable fire extinguisher location / types of extinguisher to be used on different classes of fires
8. Smoke control procedures
9. Electrical equipment and circuit breakers found in cabin area

Figure 7 – AMC Pilot Training Curriculum emergency situation module on in-flight fire and smoke control procedures (courtesy of AMC).

A review of AMC personnel records[9] indicated that the pilot completed his initial company training, which included pilot ground and flight training, and was assigned as an helicopter air ambulance (HAA) pilot to fly the Eurocopter Deutschland GMBH EC 135 P2 on August 24, 2009 and the Eurocopter Deutschland GMBH MBB-BK 117 C-2 on June 11, 2012. The pilot was assigned to fly the Eurocopter Deutschland GMBH EC 135 P2 and the Eurocopter Deutschland GMBH MBB-BK 117 C-2 at JNX[10]. The pilot was the lead pilot and the safety officer at JNX. The pilot also performed duties as a maintenance test pilot (MTP) for AMC in the Eurocopter Deutschland GMBH MBB-BK 117 C-2.

AMC training records showed no deficiencies and indicated that the pilot had completed all required training, including his most recent competency check ride which was performed on on May 5, 2017.

The pilot did not receive manufacturer flight training in the Eurocopter Deutschland GMBH MBB-BK 117 C-2, nor was that training required.

Prior to coming to AMC, the pilot worked for STAT MedEvac as an HAA pilot flying the Eurocopter EC 135 helicopter. The pilot was based throughout western Pennsylvania.

Before joining the HAA industry, the pilot served in the U.S. Army as an UH-60[11] pilot which included various duty stations and overseas deployments. In addition to this pilot duties in the U.S. Army, the pilot performed duties as a MTP in the UH-60.

2.1.1 Pilot Summary Flight Times

The pilot's AMC summary flight times (helicopters), based on AMC personnel records dated September 11, 2017, were as follows:

Total Pilot-In-Command	2,100+ hours

[9] See attachment 2: AMC Personnel Records.
[10] According to AMC, pilots (those not in check airmen roles) are restricted to being qualified and current only on two separate make and model of helicopters at one time.
[11] The H-60 helicopters utilized by the U.S. military are manufactured by Sikorsky Aircraft. UH-60s utilized by the U.S. Army are known as Blackhawks.

Total Eurocopter Deutschland GMBH MBB-BK 117	1,000+ hours
Total Eurocopter Deutschland GMBH EC 135	1,100+ hours
Total Night	700+ hours
Total Night Vision Goggle (NVG)	300+ hours
Total Instrument	50+ hours
Total Hood	20+ hours

The pilot's flight times from his previous employment with STAT MedEvac was 403 hours (Eurocopter Deutschland GMBH EC 135) and with the U.S. Army was 2,281 hours (UH-60).

Prior to and at the time of the accident, AMC was developing its flight simulator training program. The pilot had attended flight simulator training for the Eurocopter Deutschland GMBH EC 135. The pilot had not attended any flight simulator for the Eurocopter Deutschland GMBH MBB-BK 117, as the AMC flight simulator training program for that helicopter started in August 2017.

2.1.2 Pilot Flight and Duty Times

Flight and duty records[12] revealed that the pilot was on a 12-hour duty day, starting at 0800 and ending at 2200.

In the month of July 2017, the pilot was on duty for 23 days, logged 15.28 flight hours, with eight days off. In the month of August 2017, the pilot was on duty for 13 days, logged 17.01 flight hours, and had 18 days off. In the month of September 2017, the pilot was off duty from September 1 to September 6. The pilot logged 1.7 flight hours on September 7 and returned to work on September 8.

2.1.3 Pilot 72-Hour History

In an interview with the wife of the pilot by the NTSB IIC on September 14, 2017, she reported that her and her husband lived together in Clayton, North Carolina, which was an approximate 11-minute commute to JNX for him. She reported that for the three days before the date of the accident, the pilot had no issues with his sleep or diet. The pilot's work schedule consisted of six days at work followed by six days off from work. She concluded that he was healthy and had no health problems.

The wife reported that the pilot was not on any medications. She further reported that he was happy with his life, he did not have any stressors, and he enjoyed his job at AMC. The pilot did not have employment outside of AMC. She concluded that he never mentioned any concerns to her about the helicopters he flew at AMC or with AMC.

[12] See attachment 3: AMC Flight and Duty Records.

The pilot was off duty on September 5 and September 6, 2017.

On September 7, 2017, his duty day started at 0744 and terminated at 2005. He flew 1.26 hours in N145DU (one mission) and 0.43 hours in N146DU (one mission).

On September 8, the day of the accident, his duty day started at 0735. The accident flight was the first flight of the day for the pilot.

2.1.4 Pilot Medical and Pathological Information

An autopsy of the pilot was conducted under the authority of the North Carolina Department of Health and Human Services, Office of the Chief Medical Examiner, Raleigh, North Carolina, on September 17, 2017. The cause of death for the pilot was attributed to multiple blunt force injuries.

2.1.5 Pilot Post-Accident Toxicological Testing

The FAA's Forensic Sciences Laboratory, Oklahoma City, Oklahoma, performed toxicology examinations for the pilot on September 25, 2017, which were negative for carbon monoxide, ethanol, and drugs. Cyanide testing was not performed.

2.1.6 Pilot Crew Resource Management

During postaccident interviews with various members from AMC and DLF, all individuals interviewed provided positive feedback about the pilot's performance from a crew resource management aspect.

The Director of Operations who performed training and evaluations on the pilot, described the pilot as "well organized, "well prepared," and "always exhibited good pilot skills."

An AMC pilot at JNX, who had interacted with the pilot on a regular basis, described the pilot as "one of our safest pilots," explaining that he was "very much a case of I'm not going to fly until I've got all the I's dotted and the T's crossed."

A DLF flight nurse and clinical team lead at JNX, who had flown with the pilot on various missions, described the pilot as "very friendly," "team oriented," "safety oriented," and "very thorough."

A DLF flight nurse at JNX, who had flown with the pilot on various missions, described the pilot as "thorough," "friendly," and "interacted very well with the medical crew."

An AMC mechanic at JNX, who had flown with the pilot on various maintenance test flights, described the pilot as "very professional" and as "one of the best" pilots that he had flown with in his aviation career.

2.2 First Flight Nurse

The first flight nurse, Crystal Sollinger, age 47, was a registered nurse (RN) and an emergency medical technician (EMT). She had been employed with DLF since January 2001 and had been a flight nurse on the accident helicopter series since 2012. She was based out of JNX.

On September 8, the day of the accident, her duty day started at 0800. The accident flight was the first flight of the day for the flight nurse.

DLF training records showed no deficiencies and indicated that the flight nurse had completed all required training.

2.3 Second Flight Nurse

The second flight nurse, Kristopher Harrison, age 44, was a RN and an EMT paramedic (EMT-P). He had been employed with DLF since November 1999 and had been a flight nurse on the accident helicopter series since 2012. He was based out of JNX, but he also served as a member of the neonatal/pediatric team based out of the Duke University Hospital in Durham, North Carolina.

On September 8, the day of the accident, his duty day started at 0800. The accident flight was the first flight of the day for the flight nurse.

DLF training records showed no deficiencies and indicated that the flight nurse had completed all required training.

3.0 Helicopter

The following information is a general description of the helicopter provided by Airbus:

> *The EC145 (BK 117) was developed in a joint co-operative design between MBB Germany (part of Eurocopter) and Kawasaki Heavy Industries Japan. The BK 117 A1 had its first flight on June 12, 1979 and received its type certification in 1982. The "A2" version was used for evaluation tests and was never certified; when developments to provide more engine power were certified, the helicopter was updated several times between 1985 and 1992 to include following versions; BK 117 A3, A4, B1, B2 and C1. ` More cabin space and use of more modern cockpit display/flight control systems development launched the new C2 variant in 1999. Since the formation of a new joint company (MBB / Aerospatiale) called Eurocopter, the brand name EC145 was used. The first variant was certified in December 2000 as EC145 / BK 117 C2. The military variant of the aircraft is referred to as the Lakota or UH-72.*
>
> *The EC145 / BK 117 C2 is a medium sized, multi-purpose, twin engine helicopter certified under FAR Part 29 with a max gross weight of 3585 Kg. The minimum flight crew consists of one pilot operating the helicopter from the right crew seat. The maximum number of occupants is 11 persons (including flight crew). The EC145 features a fully separated fuel system, dual hydraulic system, dual electrical system and a redundant lubrication system for the main transmission. The helicopter in its basic*

configuration is certified for land operation under day and night visual meteorological conditions. With special equipment installed and operative and under observance of the procedures and limitations, the helicopter is also certified for land operation under day and night instrument meteorological conditions.

The accident helicopter was a 2011 model, Eurocopter Deutschland GMBH MBB-BK 117 C-2 helicopter, N146DU (as shown below in figure 8 and figure 9), a dual-engine turboshaft helicopter. At the time of the accident, the helicopter had logged a total time in service of 2,711 flight hours. The helicopter was maintained under an approved aircraft inspection program, and the most recent inspection of the airframe and engine was on September 6, 2017.

Figure 8 – Historical image of N146DU (courtesy of AMC).

Figure 9 – Historical image of N146DU (courtesy of AMC).

The helicopter was equipped with an air medical interior design and had single pilot controls installed. The pilot's station was the front right seat. The two flight crew members that performed medical duties were stationed in seats in the cabin. The passenger was secured in a stretcher, that was stationed in the cabin. The DLF program designation for the helicopter was Life Flight 3.

The helicopter was equipped with two Turbomeca Arriel 1E2 turboshaft engines that were rated at 760 shaft horsepower. Both engines were manufactured in 2010 and were installed in the helicopter during initial production. Both engines had accumulated 2,711 hours of operation at the time of the accident.

For additional information on the airworthiness of the helicopter, refer to the NTSB Airworthiness Group report. For additional information on the maintenance records and powerplants of the helicopter, refer to the NTSB Maintenance Records and Powerplant Group report.

3.1 Weight and Balance

A review of the weight and balance data provided by AMC showed the helicopter was within its weight and balance limitations for the accident flight.

3.2 Cockpit Restraint Systems

During the investigation, the sister ship (N145DU) to the accident helicopter at DLF in Durham, North Carolina, was examined and documented.

The operations group chairman, who is 5’10” (70 inches tall) sat in the pilot’s seat in N145DU, which is the front right seat. The seat was adjusted for flight operations. The five-point restraint system was fastened with the inertia reel locked. It was noted that with the cockpit design, depending on the pilot’s seat adjustment, it may not be possible to reach all switches/buttons with the inertia reel locked as shown below in figure 10 and figure 11.

Figure 10 – View of the cockpit, N145DU.

Figure 11 – View of the cockpit, N145DU.

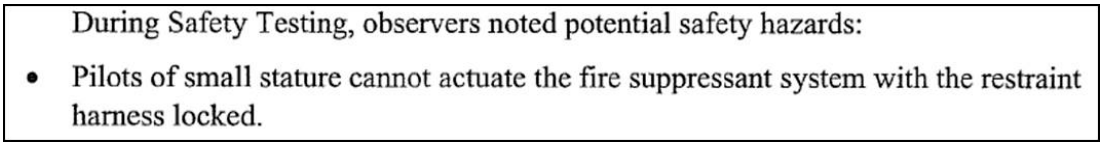
This denial of access was particularly noticed with the “MASTER” and “EMER OFF SW 1” buttons located on the upper left side of the cockpit display, in the caution and warning unit. The inertia reel could be locked manually by the pilot (as shown below in figure 12) by activating a lever or can be locked automatically by a certain degree of rapid forward motion of the pilot’s body (such as during an accident sequence).

Figure 12 – View of the five-point restraint system and the inertia reel lock lever mounted on the outer right side of the seat, N145DU.

According to the pilot’s most recent FAA second-class medical certificate that was issued on October 6, 2016, his height was listed as 5’8” (68 inches tall). It could not be determined, if the

pilot flew with the inertia reel locked during the accident flight due to the impact damage and postimpact fire sustained to the cockpit.

A search by the NTSB revealed information in the UH-72A Lakota Light Utility Helicopter Operational Test and Evaluation Report, conducted by the U.S. Army, that discusses information about the UH-72A restraint system. This document discusses a finding during testing that pilots of a small stature cannot actuate the fire suppressant system (engine "FIRE" warning light) with the restraint harness (inertia reel) locked as shown below in figure 13.

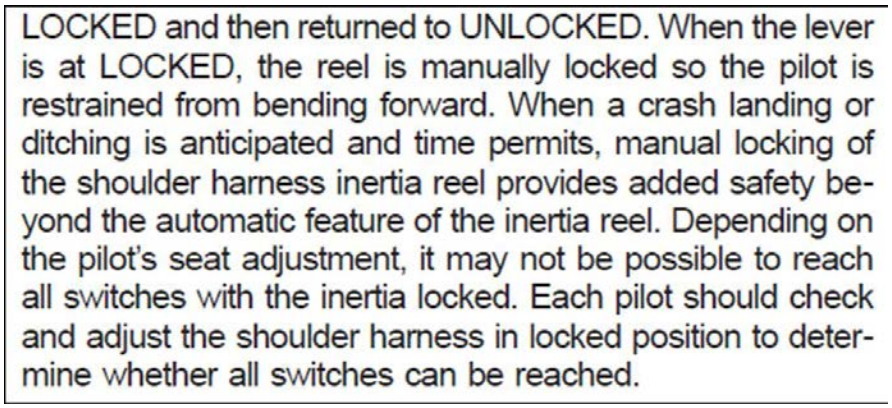


During Safety Testing, observers noted potential safety hazards:

- Pilots of small stature cannot actuate the fire suppressant system with the restraint harness locked.

Figure 13 - UH-72A Lakota Light Utility Helicopter Operational Test and Evaluation Report finding (courtesy of the U.S. Army).

A search by the NTSB revealed educational information in the Boeing H-47[13] series Operator's Manual used by the U.S. Army. This information, as shown below in figure 14, educates pilots of the limitation of potentially not to being able to reach all switches based on the pilot's seat adjustment, with the inertia reel locked.



LOCKED and then returned to UNLOCKED. When the lever is at LOCKED, the reel is manually locked so the pilot is restrained from bending forward. When a crash landing or ditching is anticipated and time permits, manual locking of the shoulder harness inertia reel provides added safety beyond the automatic feature of the inertia reel. Depending on the pilot's seat adjustment, it may not be possible to reach all switches with the inertia locked. Each pilot should check and adjust the shoulder harness in locked position to determine whether all switches can be reached.

Figure 14 - U.S. Army H-47 series Operator's Manual excerpt (courtesy of the U.S. Army).

A search by the NTSB revealed no such information about educating pilots of the limitation of potentially not to being able to reach all switches based on the pilot's seat adjustment, with the inertia reel locked in the Eurocopter Deutschland GMBH MBB-BK 117 C-2 rotorcraft flight manual (RFM). Additionally, no such information was found in any additional Airbus educational documents (such as an Airbus Safety Information Notice for example) or any additional FAA educational documents (such as a Safety Alert for Operators for example).

4.0 Meteorological Information

The nearest official weather reporting station is ECG. About 34 minutes after the accident, 1154,

[13] The H-47 helicopters utilized by the U.S. Army, known as Chinooks, are manufactured by Boeing.

an Aviation Routine Weather Report (METAR) was reporting: Wind, 350° (True) at 6 kts; visibility, 10 statute miles; sky condition, clear; temperature, 75° F; dew point, 54° F; altimeter, 30.18 inches Hg.

5.0 Flight Recorders

The helicopter was equipped with an OuterLink Voice & Video Recorder (N007-007), a type of flight data recorder (FDR) that is not crashworthy. The helicopter was not equipped with a crashworthy FDR or a cockpit voice recorder (CVR), nor was it required to be under 14 *CFR* Part 135.

At the time of the accident, AMC held accreditation from the Commission on Accreditation of Medical Transport Systems (CAMTS)[14]. For CAMTS accreditation, a crashworthy FDR or CVR is not required to be installed in an aircraft that belongs to an air medical operator.

For additional information on flight recorders, refer to the NTSB Flight Data Monitoring Device – Specialist's Factual Report.

6.0 Survival Aspects

6.1 Restraint Systems and Seats

AMC reported that all three crew members had access to a four-point restraint system for their positions in the cockpit and cabin. Additionally, all the seats installed in the helicopter for the crew members were energy-attenuating seats.

The passenger was secured to a medical stretcher with three straps, that was secured to the floor of the cabin through a FAA supplemental type certificate (STC) litter system (Metro Aviation STC SR09403RC).

6.2 Aviation Life Support Equipment

AMC and DLF has aviation life support equipment requirements for their crew members. Crew members are required to wear a helicopter flight helmet, wear a flame-retardant flight suit, wear appropriate undergarments, wear flame-retardant flight gloves (with the exception of when medical examination gloves are being worn by flight nurses for medical treatment of a patient in the cabin), and wear leather boots for all flight operations.

7.0 Company Overview

7.1 AMC

AMC was established in 1980 as a 14 *CFR* Part 135 commercial on-demand air taxi operator specializing in HAA services. AMC operates over 300 bases that serve 48 states (including

[14] CAMTS is an independent, non-profit agency based in Sandy Springs, South Carolina, that audits and accredits air medical aircraft and surface medical transport services worldwide to a set of industry-established criteria.

Alaska), and its fleet of over 450 aircraft consists primarily of helicopters manufactured by Airbus and Bell Helicopter, along with AgustaWestland and MD Helicopters. While most of the fleet is helicopters, AMC also operates several airplanes manufactured by Beechcraft and Pilatus. AMC has several community-based programs, operating under various regional and local brand names (example programs include Air Idaho Rescue, AirLife, ARCH Air Medical Service, Black Hills Life Flight, Guthrie Air, LifeNet, MedFlight, Mercy Air, Native Air, and Wyoming Life Flight).

The company headquarters, including the OCC, is in Greenwood Village, Colorado. At the time of the accident, the OCC was located at the Centennial Airport (APA), Centennial, Colorado. AMC operates in accordance with FAA-issued Operations Specifications for 14 *CFR* Part 135, under certificate number QMLA253U. AMC has an FAA-accepted General Operations Manual (GOM), which identifies management policies and responsibilities, training/currency policies, and the procedures under which flights are to be conducted. The GOM also contains the organizational structure of AMC as shown below in figure 15. The Chief Executive Officer, President of Domestic Air Medical Services, Vice President of Safety, Chief Pilot, Director of Operations, Director of Maintenance, and the Director of Flight Safety all reside in the Denver, Colorado area. The AMC pilot training program, including both ground academics and inflight training, is approved by the FAA.

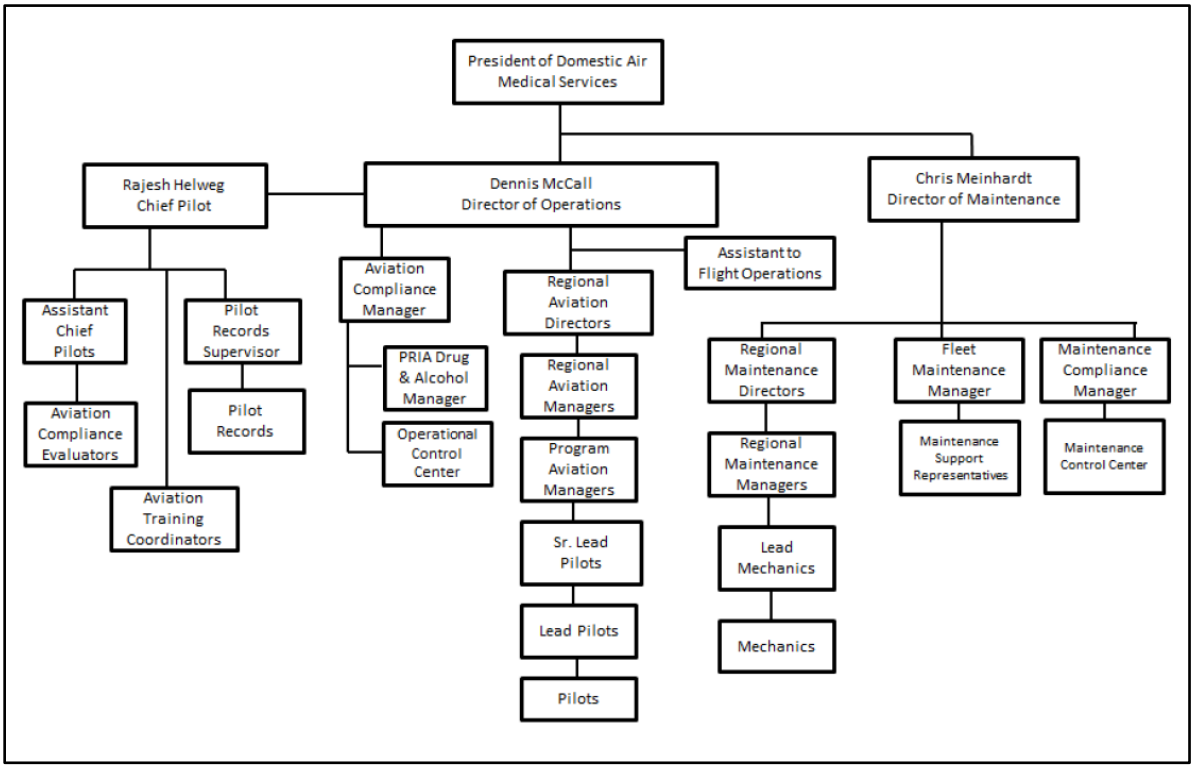


Figure 15 – AMC organizational chart at the time of the accident (courtesy of AMC).

The relationship between AMC and DLF is hospital-based model, wherein AMC acts as a vendor providing pilots and mechanics. AMC receives a monthly service fee for their contacted services.

DLF owns the helicopters and provides the medical crews. In addition to the monthly service fee, hospital-based revenue comes from flight fees billed directly to patients, their insurers, or to governmental entities.

AMC has three divisions; healthcare, aerospace, and tourism. In addition to air medical services in the healthcare division, Direct Patient Logistics (headquartered in Omaha, Nebraska) coordinates transfers between hospitals and referring centers. The aerospace division, United Rotorcraft (headquartered in Englewood, Colorado) designs, integrates and installs medical equipment, avionics, and vehicle accessories for emergency medical series, medevac, firefighting, airborne law enforcement, and search and rescue operators. The tourism division consists of Blue Hawaiian Helicopters (headquartered in Kahului, Hawaii) and Sundance Helicopters (headquartered in Las Vegas, Nevada). Both companies conduct 14 *CFR* Part 135 commercial sightseeing tour flights in various makes and models of helicopters.

7.1.1 Safety Program

The AMC GOM provided information about the company's safety program.[15] The manual indicated that AMC was committed to attaining "the highest level of safety" in accomplishing the company's mission. The manual also indicated the core elements that comprised the AMC safety program, which included the company's Safety Management System (SMS) Policy Manual, management-leadership commitment, accident, incident, damage, malfunction, and operations reports (AIDMOR), "Y or Z" work order costs, base safety audits, accident/incident reporting, accident/incident investigation, and safety communication and awareness.

When fully staffed, the AMC safety department comprised a Vice President of Safety, a Director of Flight Safety, six Regional Safety Directors, a Flight Operational Quality Assurance (FOQA) Manager, an "Excellence Through Quality" Manager, an Aviation Safety Action Program/Maintenance Safety Action Program (ASAP/MSAP) Manager, and various field-based safety representatives.

Pilots are required to complete and submit a formal risk assessment for every flight that is conducted at AMC. The risk assessment provides both the pilot and the OCC the total risk value for the flight that is conducted. Once the risk assessment is completed by the pilot, it is electronically submitted to the OCC for review and approval.

AMC participates in several safety programs (in addition to SMS, AIDMOR, ASAP/MSAP, and FOQA), including the line operational safety audit program, the internal evaluation program, and the AlertLine application.[16] Pilots could also communicate safety-related information with AMC management in person or via e-mail or telephone.

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[15] The AMC GOM also provided information about the company's operational risk assessment program. The manual indicated that this program assists pilots "in identifying, assessing, and managing risks and then ensuring that they are mitigated, deferred, or accepted." Pilots are required to use the company's risk assessment tool before deciding whether to accept or decline a flight assignment.

[16] The AMC SMS Policy Manual stated the following regarding the AlertLine application: "If working with a supervisor or manager does not resolve issues or concerns, employees are encouraged to report issues and concerns – without reprisal – using the AlertLine application."

AMC had an established safety program in place at the time of the accident. The company's SMS, which was implemented in 2009, reached level 4 compliance in May 2013. Level 4 compliance is the final level of SMS maturity for an operator.

AMC also actively participates in helicopter industry safety initiatives with the U.S. Helicopter Safety Team and Helicopter Association International.

7.1.2 OCC

The OCC at the time of the accident, was located at APA and consisted of three workstations that had various computer monitors, in addition to, various wall-based monitors that provided situation awareness to the personnel (communication specialists and supervisors) that provided dispatch and operational control functions. The OCC was primarily responsible for ongoing risk assessment while providing advisory/alert information affecting AMC aircraft using a flight management system that monitors the aircraft position. Advisories/alerts may include, but are not limited to, flying in the vicinity of marginal or deteriorating weather conditions, temporary flight restrictions, ground proximity, or any other circumstance that could become a hazard to flight. The OCC was able to communicate to AMC aircraft directly through the Honeywell Sky Connect Tracker II system or through the aircraft radios. The OCC was also responsible for initiating and managing the AMC post-accident/incident response plan.
At the time of the accident, there were two communication specialists and one supervisor on duty.

No deficiencies were noted with the operational control aspects over the accident flight by AMC.

7.2 DLF

DLF is a CAMTS accredited critical and emergency air and ground transport agency. DLF is headquartered in Durham, North Carolina. DLF provides services to North Carolina and several surrounding states providing transportation to critically ill or injured adult, neonatal, and pediatric patients.

In addition to the accident helicopter, N145DU, a Eurocopter Deutschland GMBH MBB-BK 117 C-2 is part of the DLF program. A fleet of critical care, advanced life support, and basic life support ground ambulances are operated by DLF.

According to DLF, patient transport by helicopter accounts for nearly 20 percent of the overall volume for DLF. DLF flies over 800 critical care transport cases a year.

7.2.1 Communications Center

The DLF communications center is based at the program headquarters. The communications center consisted of three workstations that has various computer monitors, in addition to, various wall-based monitors that provide situation awareness to the personnel (communication specialists and supervisors) that provided communication functions. The communications center is staffed by individuals who determine the most appropriate mode of transport to be deployed for the patient,

mobilize the transport teams, coordinate with various first responders for helicopter scene calls, and continuously monitor weather conditions and relay updates to the pilots.

At the time of the accident, there were three communication specialists and one supervisor on duty.

No deficiencies were noted with the communication aspects with the accident flight by DLF.

7.2.2 Smithfield Base Operations

The accident helicopter and crew were based in JNX, which is referred to as Smithfield Base by AMC and DLF. JNX is a publicly owned airport by the Johnston County Airport Authority. Fueling services are available for DLF helicopters at JNX.

In addition to the pilots and medical crew being based at JNX, an AMC mechanic is based at JNX to perform airframe and powerplant inspections and maintenance on the DLF helicopters.

The JNX shift change occurred at 0800 and 2000 local.

8.0 Pervious AMC Events

The engine “FIRE” warning lights are mounted on the caution and warning unit as shown below in figure 16, figure 17, and figure 18. Both warning lights are housed in a clear and red outlined guard, that can be flipped upwards to press an illuminated warning light button as part of an emergency procedure, which activates the respective engine fire suppression system (for example, pressing the left side button will activate the engine fire suppression system for the left engine). The Eurocopter Deutschland GMBH MBB-BK 117 C-2 has six fire sensors stationed in the engine compartment (three on each engine side), that based off a certain temperature reading, will send a signal to the cockpit, which will cause a “FIRE” warning light to illuminate for the respective engine side. In addition to the warning light illumination, a subsequent audio warning is also heard by the pilot. For additional information on the fire sensor system, refer to the NTSB Airworthiness Group report.

Figure 16 – Exemplar right seat view of the caution and warning unit in N145DU.

Figure 17 – Exemplar view of the caution and warning unit in N145DU.

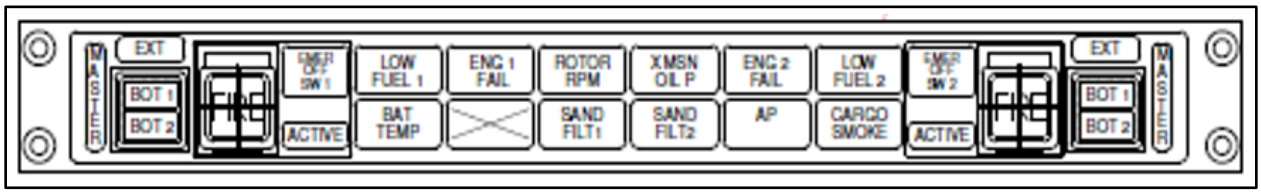


Figure 18 – Drawing of the Eurocopter Deutschland GMBH MBB-BK 117 C-2 caution and warning unit (courtesy of Airbus).

A recovered portion of the caution and warning unit was submitted to the NTSB Materials Laboratory for examination. The four light bulbs for the number 2 engine fire indicator were x-rayed to examine the filament in each bulb. The radiographs for the "FIRE" annunciator bulbs showed that the filaments for all the light bulbs were stretched. The radiographs also showed that all but one of the bulb filaments were intact. The bulb 1 filament was broken and stretched while bulbs 2-4 filaments were intact and stretched. The bulb numbering is arbitrary because the bulb positioning could not be determined due to fire damage. Radiograph images of all four bulbs are

contained in the official docket. No light bulbs were identified by radiograph in the "BOT 1" and "BOT 2" button located next to the "FIRE" light/button. The number 1 engine "FIRE" light/button was not located during the wreckage examination, and therefore the light bulbs on that side were not available to be examined. For additional information on the various component examinations, refer to the NTSB Airworthiness Group report.

A review of previous AIDMORs[17] identified two events (non-accidents and non-reportable incidents to the NTSB[18]) involving the inflight activation of a cockpit-based engine "FIRE" warning light.

The first event occurred on July 10, 2017 (about two months prior to the accident) about 2245 EDT near Durham, North Carolina. The AMC pilot was flying N145DU and had two DLF medical crew members onboard as a 14 *CFR* Part 135 repositioning flight (return to base) utilizing NVGs in night VMC. No patient was onboard. AIDMOR #32947, as reported by the pilot, states:

> *Upon lift off from a hospital, we got an intermittent FIRE light and audio. There were zero cockpit indications, or any other signs that a fire might be present. The light was intermittent, going bright and dim, and flickering as though it had a short. I felt that it was a faulty indication. We were also on lift off, in a phase of flight that requires hands on, so I opted to land back on the pad rather than push the FIRE button and turn off the engine.*

The second event occurred on October 17, 2017 (about one month after the accident) about 1200 CDT near Sparta, Illinois. The AMC pilot was flying N345KF (a 2013 Eurocopter Deutschland GMBH MBB-BK 117 C-2) with two ARCH Air Medical Service medical crew members onboard as a 14 *CFR* Part 135 repositioning flight (travel to a public relations event) in day VMC. No patient was onboard. AIDMOR #33932, as reported by the pilot, states:

> *While enroute to a PR event, the aircraft chimed one time. Then 2 minutes later it started chiming continuously for 30 seconds to a minute. The associated Fire light was illuminated. I slowed the aircraft to 90 knots and started a left hand turn. There was no training smoke. The Chiming stopped and the light went out. I determined that it was a faulty indication when the light went out. The closest place to land, that was accessible to anyone, was an airport 4 miles away. I checked the engine parameters. They were all normal. We landed on the ramp. I told the medical crew to evacuate and go to the building. I quickly shut down the aircraft and evacuated myself. I walked around to confirm that there was no fire. There was no indication of a fire.*

Both AIDMORs were completed and submitted by each respective pilot. Both AIDMORs were processed and reviewed by AMC management in accordance with their SMS. AMC reported that maintenance actions were taken after both AIDMORs were reviewed.

[17] See attachment 4: AMC AIDMOR #32947 and AIDMOR #33932.
[18] Refer to 14 *CFR* Part 830 for what constitutes an accident and what incidents are required to be reported to the NTSB.

AMC reported that for the Eurocopter Deutschland GMBH MBB-BK 117 C-2 helicopters, it utilizes the Airbus-issued/FAA-approved checklist for emergency procedures. The Eurocopter Deutschland GMBH MBB-BK 117 C-2 RFM discusses the emergency procedure for an engine "FIRE" warning light activation (inflight) and is shown below in figure 19 and figure 20.

WARNING LIGHT INDICATIONS

FIRE	or	FIRE
(ENGINE 1)		(ENGINE 2)

Conditions/Indications

Overtemperature in engine compartment

– Warning bell will be activated

Procedure

Figure 19 – Eurocopter Deutschland GMBH MBB-BK 117 C-2 engine fire warning light inflight activation emergency procedure (courtesy of Airbus).

● **IN FLIGHT**

1.	**OEI flight condition**	**– Establish**
2.	**Airspeed**	**– Reduce if IAS is exceeding 100 kts**
3.	**FIRE sw (affected engine)**	**– Raise guard, press**

NOTE Affected engine will shut down automatically, ACTIVE indicatior light, BOT 1 legend (both EMER OFF SW pnl), and F VALVE CL caution indication (CAD) come on. FIRE legend remains on as long as overheat condition exists.

4.	**BOT 1/BOT 2 pb**	**– Press; bottle 1 activated;** **– EXT indicator light comes on (EMER OFF SW pnl)**

NOTE Extinguisher bottle will begin discharging when $N_1 < 50\%$. After discharge of bottle contents, BOT 1 legend and EXT indicatior light go off; BOT 2pb legend comes on.

5.	**Clock stop watch**	**– Start (after BOT 1 legend and EXT indicator light go off (EMER OFF SW pnl)**
6.	**Affected engine**	**– Identify**
7.	**Single engine emergency shutdown**	**– Perform**
8.	Passengers	– Alert
9.	**LAND AS SOON AS POSSIBLE**	

If FIRE warning is still on after 1 minute:

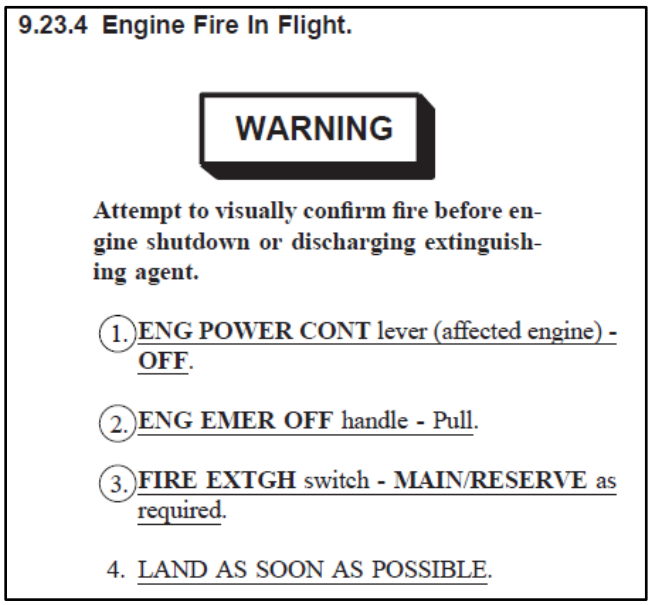
10.	**BOT 1/BOT 2 pb**	**– Press; bottle 2 activated;** **– EXT indicator light comes on (EMER OFF SW pnl)**

If FIRE warning remains on:

11. LAND IMMEDIATELY

Figure 20 – Eurocopter Deutschland GMBH MBB-BK 117 C-2 engine fire warning light inflight activation emergency procedure (courtesy of Airbus).

An interview with the pilot from the N145DU event revealed that she served as a U.S. Army UH-60 pilot prior to employment with AMC. The emergency procedure for an engine fire inflight for the U.S. Army H-60 series is shown below in figure 21.



9.23.4 Engine Fire In Flight.

WARNING

Attempt to visually confirm fire before engine shutdown or discharging extinguishing agent.

1. **ENG POWER CONT** lever (affected engine) - **OFF**.
2. **ENG EMER OFF** handle - Pull.
3. **FIRE EXTGH** switch - **MAIN/RESERVE** as required.
4. LAND AS SOON AS POSSIBLE.

Figure 21 – U.S. Army H-60 series engine fire inflight emergency procedure (courtesy of the U.S. Army).

A review of the employment records from the pilot[19] with the N345KF event determined that he served as a U.S. Air Force HH-60[20] pilot prior to employment with AMC. The emergency procedure for an engine fire inflight for the U.S. Air Force H-60 series is shown below in figure 22.

[19] The pilot from the N345KF event sustained fatal injuries from a 14 *CFR* Part 91 personal flight accident on September 20, 2018 near Festus, Missouri. The pilot was flying a Cessna 150H airplane. At the time of the accident, the pilot was not employed with AMC. See CEN18FA384 for additional information.
[20] HH-60s utilized by the U.S. Air Force are known as Pavehawks.

ENGINE COMPARTMENT FIRE (INFLIGHT/GROUND)

Engine compartment fires are usually the result of an engine malfunction or failure of one of its component systems. Ruptured fuel and oil lines will usually be reflected in engine instrument indications. If the master FIRE warning lights and an ENG Thandle illuminate, a crew member should look for fire or smoke from that engine compartment. In flight, an opposite yaw will facilitate this conformation, adjust for single engine conditions. With a visual confirmation:

1. THROTTLE (affected engine) – OFF.
2. T-HANDLE (affected engine) – PULL.
3. FIRE EXTINGUISHER SWITCH – MAIN/ RESERVE.

WARNING

If AC electrical power is not available, only the #1 engine compartment has fire protection.
Additionally only the reserve fire bottle is capable of being discharged.

INFLIGHT:

4. Engine Anti-Ice – As Required.
5. Cabin Heater – OFF.
6. Air Source Heat/Start Switch – APU.
7. Fuel Boost Pump Switch (affected engine) – OFF.

WARNING

When operating in crossfeed, ensure the affected engine boost pump is correctly identified and turned off or the operating engine may flameout.

8. TGT – Monitor. If TGT rises above 538° C, or excessive smoke is observed from the engine exhaust, refer to POST ENGINE SHUTDOWN FIRE checklist.
9. Land as soon as practical.

Figure 22 – U.S. Air Force H-60 series engine fire inflight emergency procedure (courtesy of the U.S. Air Force).

The AMC POI, who is a former U.S. Army UH-60 pilot, reported that he has observed the engine fire inflight emergency procedure trained as “turn to confirm” while he served in the U.S. Army. The AMC POI provided a U.S. Army UH-60 series emergency procedure flashcard reference as show in below figure 23.

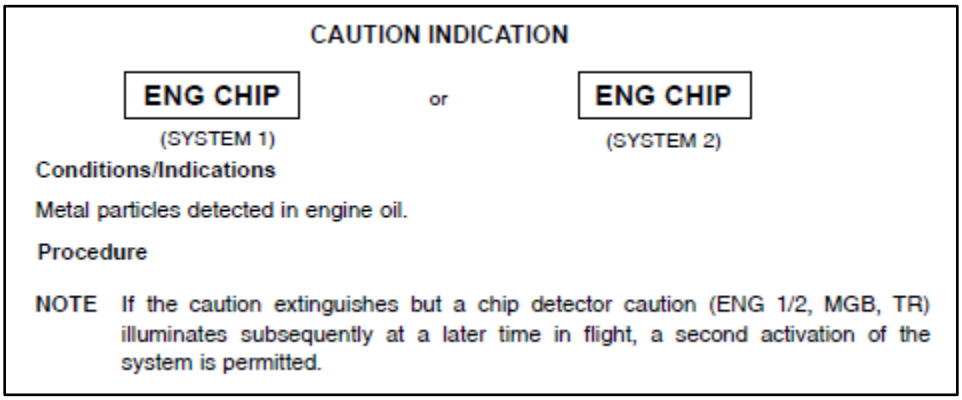
Engine FIRE in Flight	WARNING: Attempt to visually confirm fire before engine shutdown or discharging extinguishing agent. (Turn to confirm) →1. Establish single engine airspeed. →⊕2. ENG POWER CONT lever (affected engine) – OFF. →⊕3. ENG EMER OFF handle – Pull. →⊕4. FIRE EXTGH switch – MAIN/RESERVE as required. →5. LAND AS SOON AS POSSIBLE.

Figure 23 – U.S. Army UH-60 series engine fire inflight emergency procedure flashcard (courtesy of the FAA).

9.0 Number 2 Engine Chip Detector

During the examination of the number 2 engine by the NTSB, the rear bearing strainer/chip detector housing was removed and disassembled (TU208). Black carbon like debris and particles were emptied on to clean paper and collected. Some of the particles reacted to a magnet that was placed near the debris. For additional information on the number 2 engine examination, refer to the NTSB Airworthiness Group report and the NTSB Maintenance Records and Powerplant Group report.

AMC had the Airbus Pulsed Chip Detector (fuzz burn) system installed on every Eurocopter Deutschland GMBH MBB-BK 117 C-2, including the accident helicopter. The Eurocopter Deutschland GMBH MBB-BK 117 C-2 RFM supplement discusses the emergency procedure for an "ENG CHIP" caution light activation (inflight) and is shown below in figure 24 and figure 25. The procedures listed in the RFM are located in figure 26 and figure 27. With the system installed and if a "ENG CHIP" caution light activates, the pilot would follow the procedures listed in the RFM supplement, and then if needed, follow the procedures listed in the RFM.



CAUTION INDICATION

ENG CHIP (SYSTEM 1) or **ENG CHIP** (SYSTEM 2)

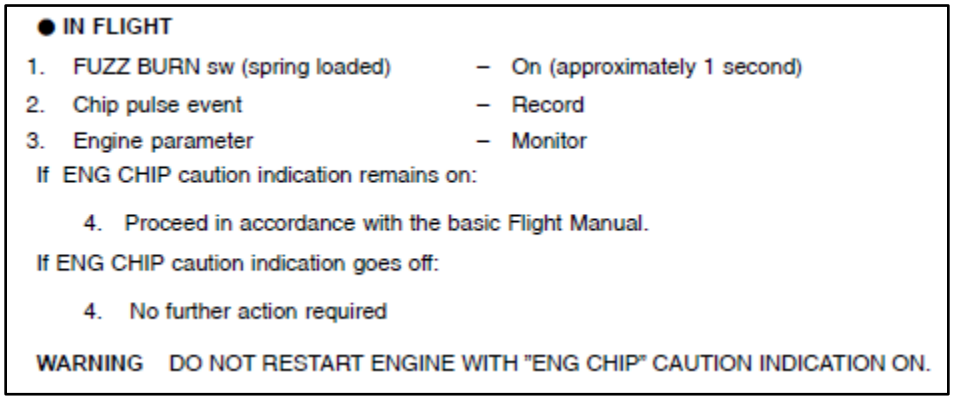
Conditions/Indications

Metal particles detected in engine oil.

Procedure

NOTE If the caution extinguishes but a chip detector caution (ENG 1/2, MGB, TR) illuminates subsequently at a later time in flight, a second activation of the system is permitted.

Figure 24 – Eurocopter Deutschland GMBH MBB-BK 117 C-2 "ENG CHIP" caution light inflight activation emergency procedure, from the RFM supplement (courtesy of Airbus).



● **IN FLIGHT**

1. FUZZ BURN sw (spring loaded) – On (approximately 1 second)
2. Chip pulse event – Record
3. Engine parameter – Monitor

If ENG CHIP caution indication remains on:

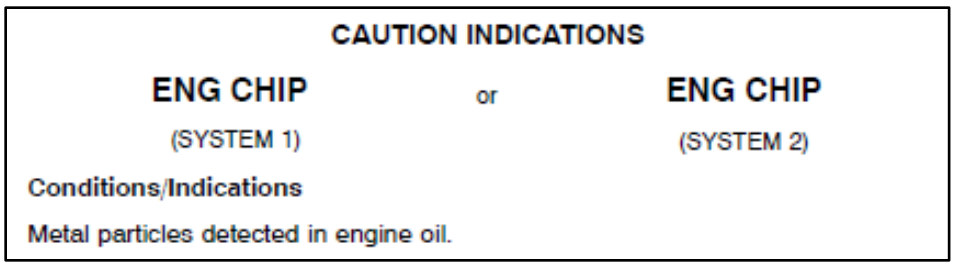
4. Proceed in accordance with the basic Flight Manual.

If ENG CHIP caution indication goes off:

4. No further action required

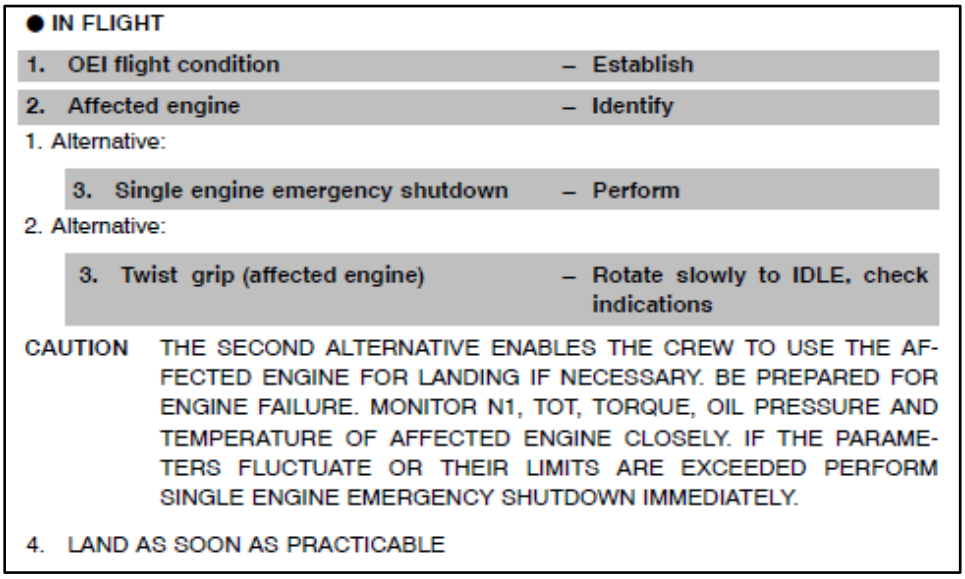
WARNING DO NOT RESTART ENGINE WITH "ENG CHIP" CAUTION INDICATION ON.

Figure 25 – Eurocopter Deutschland GMBH MBB-BK 117 C-2 "ENG CHIP" caution light inflight activation emergency procedure, from the RFM supplement (courtesy of Airbus).



CAUTION INDICATIONS		
ENG CHIP (SYSTEM 1)	or	**ENG CHIP** (SYSTEM 2)
Conditions/Indications		
Metal particles detected in engine oil.		

Figure 26 - Eurocopter Deutschland GMBH MBB-BK 117 C-2 “ENG CHIP” caution light inflight activation emergency procedure, from the RFM (courtesy of Airbus).



● **IN FLIGHT**

1. OEI flight condition	**– Establish**
2. Affected engine	**– Identify**

1. Alternative:

3. Single engine emergency shutdown	**– Perform**

2. Alternative:

3. Twist grip (affected engine)	**– Rotate slowly to IDLE, check indications**

CAUTION THE SECOND ALTERNATIVE ENABLES THE CREW TO USE THE AFFECTED ENGINE FOR LANDING IF NECESSARY. BE PREPARED FOR ENGINE FAILURE. MONITOR N1, TOT, TORQUE, OIL PRESSURE AND TEMPERATURE OF AFFECTED ENGINE CLOSELY. IF THE PARAMETERS FLUCTUATE OR THEIR LIMITS ARE EXCEEDED PERFORM SINGLE ENGINE EMERGENCY SHUTDOWN IMMEDIATELY.

4. LAND AS SOON AS PRACTICABLE

Figure 27 - Eurocopter Deutschland GMBH MBB-BK 117 C-2 “ENG CHIP” caution light inflight activation emergency procedure, from the RFM supplement (courtesy of Airbus).

10.0 FAA Oversight

10.1 FAA Denver FSDO

The POI in the Denver FSDO who was assigned to oversee AMC had been employed with the FAA since December 2008. At the time of the accident, he had been the POI for AMC for about three years but had been assigned to the AMC certificate for about 10 years.

The POI stated in an interview that for operations, there are six operations inspectors assigned to the certificate. Of those inspectors, four qualified inspectors are current in the flight program for the FAA, which allows them to go out and administer check rides to AMC pilots. The certificate is authorized a dedicated assistant POI; however, the POI reported that since his assignment to the certificate there has not been an assistant POI. He further reported that he felt he could use additional inspectors to be more effective with regards to certificate management functions.

The POI was asked if he had any major operational concerns with AMC and he reported that his biggest concern was AMC trying to get their SMS program up and running over the years. He

added that the SMS would help facilitate them as far as integrating their systems to prevent some of the occurrences he has seen.

The POI described the relationship between AMC and the FAA as a good relationship. He classified AMC as having a strong organization safety culture that could benefit from some structure. He felt AMC had adequate personnel, facilities, and equipment to do their mission.

The FLM in the Denver FSDO who supervised the CMT, has been employed with the FAA since September 1991. At the time of the accident, he had been the FLM that oversaw the CMT since May 2017.

The FLM was asked if he had any major operational concerns with AMC and he reported none.

The FLM described the relationship between AMC and the FAA as amicable. He classified AMC as having a positive safety culture. He felt AMC had adequate personnel, facilities, and equipment to do their mission.

10.2 FAA Records Review

The Safety Assurance Systems (SAS) is a risk-based, data-supported oversight system utilized by the FAA for 14 *CFR* Part 135 operators. SAS provides data collection tools to help the POI asses the certificate holder's performance. For certificate holders, SAS encompasses certification, surveillance, and certificate management processes. SAS assesses the safety of the certificate holder using system safety principles, safety attributes, risk management, and structured system engineer practices.

The operations group reviewed various SAS data for AMC. During the year prior to the date of the accident, no issues of concern were found in the SAS data for AMC, the accident helicopter, and the accident pilot.

The Enforcement Information System (EIS) is the FAA's primary database for tracking and reporting information about enforcement actions for statutory or regulatory violations.

The operations group searched EIS data relating to AMC. During the year prior to the date of the accident, no issues of concern were found in the EIS data for AMC, the accident helicopter, and the accident pilot.

No deficiencies were noted with the FAA's oversight of AMC prior to the accident.

11.0 FAA Service Difficulty Reporting System

Both events referenced with N145DU and N345KF were filed by AMC as a service difficulty report (SDR) with the FAA.

A review of SDR data five years prior to the date of the accident found 11 SDRs regarding the engine "FIRE" warning lights for the Eurocopter Deutschland GMBH MBB-BK 117.

SDRs are utilized in conjunction with various operations such as 14 *CFR* Part 91, 14 *CFR* Part 135, 14 *CFR* Part 121, amongst others. Federal Register Volume 65 Number 180 for September 15, 2000, discusses a final ruling on FAA SDRs. This document discusses how the FAA Service Difficulty Reporting System (SDRS) is used in various ways, and states in part:

- FAA analysis of SDR data.
- To rapidly disseminate defect trends, problems, and alert information that could pertain to future aviation safety issues to appropriate segments of the aviation community and the FAA.
- To inform engineering offices within the FAA for evaluation of problems for potential use in preparing Airworthiness Directives (AD).
- FAA personnel requests for SDRS data.
- Using SDR data as part of aircraft safety inspections.
- Whenever there is an accident, the Office of Accident Investigation draws on this data.
- Supporting investigations into accidents and incidents.
- Disseminate safety data to the aviation industry, multiple government organizations, the public, the media, and legal communities.
- Used in aviation safety/accident prevention programs.
- NTSB personnel request data from the SDRS to assist in their accident investigations.
- There are numerous requests, from the media and legal community, for the SDR data.
- Foreign countries and branches of the U.S. military services use the SDR data for research.

The NTSB inquired with the FAA if a commercial operator (with a 14 *CFR* Part 135 operating certificate), submits an SDR for whatever reason to the FAA, does the SDR automatically get submitted right away to the assigned POI/PMI for situation awareness purposes? The FAA responded that when a 14 *CFR* Part 135 operator has submitted an SDR, the POI/PMI does not receive any sort of immediate notification.

The POI/PMI does not receive an email or any other type of official notification about the SDR, as the onus is on the POI/PMI to check the SDRS for surveillance purposes. The FAA added that "generally" the SDR will show up in the Safety Performance Analysis System within the week it is inputted. The SDRS is developed and run off an older computer operating system.

The FAA further reported that when an SDR is submitted on a component (airframe, engine, or avionics), the original equipment manufacturer (OEM)/type certificate (TC) holder is not automatically notified. The onus is on the OEM/TC holder to search the public SDR database for information.

F. LIST OF ATTACHMENTS

Attachment 1: Interview Transcripts (AMC, DLF, and the FAA)
Attachment 2: AMC Personnel Records
Attachment 3: AMC Flight and Duty Records
Attachment 4: AMC AIDMOR #32947 and AMC AIDMOR #33932

Submitted by: Mike Hodges
Air Safety Investigator