NATIONAL TRANSPORTATION SAFETY BOARD
Public Meeting of April 9, 2013
(Information subject to editing)

Medical Helicopter Operated by LifeNet Crash near Midwest National Airport Mosby, Missouri, August 26, 2011 NTSB/AAR-13/02

This is a synopsis from the Safety Board's report and does not include the Board's rationale for the conclusions, probable cause, and safety recommendations. Safety Board staff is currently making final revisions to the report from which the attached conclusions and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing.

SUMMARY

On August 26, 2011, about 1841 central daylight time, a Eurocopter AS350 B2 helicopter, N352LN, crashed following a loss of engine power as a result of fuel exhaustion near the Midwest National Air Center (GPH), Mosby, Missouri. The pilot, flight nurse, flight paramedic, and patient were killed, and the helicopter was substantially damaged by impact forces. The emergency medical services (EMS) helicopter was registered to Key Equipment Finance, Inc., and operated by Air Methods Corporation, doing business as LifeNet in the Heartland, as a 14 *Code of Federal Regulations* Part 135 medical flight. Visual meteorological conditions prevailed at the time of the accident, and a company visual flight rules flight plan was filed. The helicopter was not equipped, and was not required to be equipped, with any onboard recording devices. The flight originated from Harrison County Community Hospital, Bethany, Missouri, about 1811 and was en route to GPH to refuel. After refueling, the pilot planned to proceed to Liberty Hospital, Liberty, Missouri, which is located about 7 nautical miles (nm) from GPH.

The helicopter impacted the ground in about a 40° nose-down attitude at a high rate of descent with a low rotor rpm. Wreckage examination determined that the engine lost power due to fuel exhaustion and that the fuel system was operating properly. The investigation revealed that the pilot did not comply with several company standard operating procedures that, if followed, would have led him to detect the helicopter's low fuel state before beginning the first leg of the mission (from the helicopter's base in St. Joseph, Missouri, to Harrison County Community Hospital). After reaching the hospital, the pilot reported to the company's EMS communication center that he did not have enough fuel to fly to Liberty Hospital and requested help locating a nearby fuel option. During their conversation, the pilot did not report and the communication specialist did not ask how much fuel was onboard the helicopter, and neither of them considered canceling the mission and having fuel brought to the helicopter. After determining that GPH was the only airport with Jet-A fuel along the route of flight to Liberty Hospital, the pilot decided to proceed to GPH, although the estimated flight time to GPH was

only 2 minutes shorter than that to Liberty Hospital. The engine lost power about 1 nm short of the airport, and the pilot did not make the flight control inputs necessary to enter an autorotation, which resulted in a rapid decay in rotor rpm.

The safety issues identified in this accident include the following:

- **Distraction due to non-operational use of personal electronic devices during flight and ground operations.** Review of cell phone records indicated that the pilot sent and received multiple personal text messages throughout the day, including during time periods when the helicopter was in flight and while it was on the ground at Harrison County Community Hospital. The pilot's texting, which occurred 1) while flying, 2) while the helicopter was being prepared for return to service, and 3) during his telephone call to the communication specialist when making his decision to continue the mission, was a self-induced distraction that took his attention away from his primary responsibility to ensure safe flight operations. Further, although there is no evidence that the pilot was texting at the time of the engine failure, his texting while airborne violated the company's cell phone use policy.

- **Lack of Air Methods Operational Control Center (OCC) involvement in decision-making.** Although the pilot reported his low fuel situation to the communication specialist, he did not request and was not referred to the company's OCC or to someone such as the chief pilot who would likely have asked how much fuel was on board the helicopter and proposed canceling the mission. If the communication specialist or the pilot had notified operationally qualified personnel about the low fuel situation, the accident might have been averted. Both the Federal Aviation Administration (FAA) and the National Transportation Safety Board (NTSB) have emphasized the importance of having someone outside the immediate situation with operational experience provide an independent judgment on the safety of a launch in air medical operations.

- **Inadequate guidance on autorotation entry procedures.** The simulator flight tests conducted after this accident showed that when a loss of engine power occurs in the Eurocopter AS350 B2 at cruise airspeeds, the pilot must simultaneously apply aft cyclic and down collective in order to maintain rotor rpm and execute a successful autorotation. However, the pilot's autorotation training was done at airspeeds below cruise where less aft cyclic is needed to enter an autorotation. Further, FAA guidance on performing autorotations stresses lowering the collective as the initial step in entering an autorotation, does not emphasize the importance of other flight control inputs, and provides minimal information on the critical entry phase of autorotations.

- **Need for simulator training of helicopter emergency medical services (HEMS) pilots.** The pilot had not received any flight training in a simulator. Simulators enable pilots to train in skills that are too risky to perform in a helicopter, such as the low altitude engine failure in this accident, and a simulator can accurately replicate the symptoms of an actual engine flameout. If the pilot had received autorotation training in a simulator rather than a helicopter, he would have been better prepared and might

have effectively responded to the engine failure during the accident flight. This accident highlights the value of using simulators and flight training devices for HEMS pilot training.

- **Lack of a flight recorder.** The helicopter was not required to have any type of crash-resistant recorder installed. If a recorder system that captured cockpit audio, images, and parametric data had been installed, it would have enabled NTSB investigators to reconstruct the final moments of the accident flight and determine why the pilot did not successfully enter an autorotation.

Findings

1. The pilot and the helicopter were properly certified for the 14 *Code of Federal Regulations* Part 135 helicopter emergency medical services flight.

2. Wreckage examination determined that the helicopter's engine lost power due to fuel exhaustion. Testing also determined that the helicopter's fuel system, including the fuel quantity gauge and the low fuel level light, were operating properly.

3. Although the helicopter's low fuel state was clearly indicated, the pilot missed three opportunities to detect the condition: 1) before departing on the first leg of the mission as a result of his inadequate preflight inspection, 2) before takeoff by failing to properly complete the before-takeoff confirmation checklist, and 3) after takeoff when he erroneously reported the fuel level.

4. The pilot departed on the second leg of the mission despite knowing that the helicopter had insufficient fuel reserves likely in order to avoid delays and other possible negative outcomes that could have resulted from aborting the mission.

5. Self-induced pressure likely caused the pilot to fixate on his intended refueling point and continue the flight rather than make a precautionary landing as the fuel gauge indication approached zero.

6. The pilot's texting, which occurred 1) while flying, 2) while the helicopter was being prepared for return to service, and 3) during his telephone call to the communication specialist when making his decision to continue the mission, was a self-induced distraction that took his attention away from his primary responsibility to ensure safe flight operations. Further, although there is no evidence that the pilot was texting at the time of the engine failure, his texting while airborne violated the company's cell phone use policy.

7. Because of restricted sleep the night before the accident, the timing of his operational activities, and the nature of the pilot's errors, which were uncharacteristic of his performance, the pilot was experiencing fatigue, which likely degraded his performance.

8. Because there was no policy requiring that the Air Methods Operational Control Center be notified of abnormal fuel situations, available operationally qualified personnel outside the

situation who would likely have recognized the pilot's decision to continue the mission as inappropriate were not consulted.

9. Although a successful autorotation was possible, the pilot failed to make the flight control inputs necessary to enter an autorotation when the engine lost power, which resulted in a rapid decay in rotor rpm and impact with terrain.

10. The autorotation training that the pilot received in the Eurocopter AS350 B2 was not representative of an actual engine failure at cruise airspeed and likely contributed to the pilot's failure to execute a successful autorotation.

11. Without specific guidance regarding the appropriate control inputs for entering an autorotation at cruise airspeeds, the pilots of helicopters with low inertia rotor systems may not be aware that aft cyclic must be applied when collective is lowered to maintain control of the helicopter and perform a successful autorotation.

12. Because of the lack of information about the entry phase of autorotations in the Federal Aviation Administration's *Helicopter Flying Handbook*, helicopter pilots may not be aware that there are flight conditions in which immediate and simultaneous control inputs, not only lowering collective, are required to enter an autorotation.

13. If the pilot had received autorotation training in a simulator rather than in a helicopter, he would have been better prepared and might have effectively responded to the engine failure during the accident flight.

14. If a recorder system that captured cockpit audio, images, and parametric data had been installed, it would have enabled National Transportation Safety Board investigators to reconstruct the final moments of the accident flight and determine why the pilot did not successfully enter an autorotation.

Probable Cause

The National Transportation Safety Board determines that the probable causes of this accident were the pilot's failure to confirm that the helicopter had adequate fuel onboard to complete the mission before making the first departure, his improper decision to continue the mission and make a second departure after he became aware of a critically low fuel level, and his failure to successfully enter an autorotation when the engine lost power due to fuel exhaustion. Contributing to the accident were (1) the pilot's distracted attention due to personal texting during safety-critical ground and flight operations, (2) his degraded performance due to fatigue, (3) the operator's lack of a policy requiring that an operational control center specialist be notified of abnormal fuel situations, and (4) the lack of practice representative of an actual engine failure at cruise airspeed in the pilot's autorotation training in the accident make and model helicopter.

Recommendations

New Recommendations

As a result of this investigation, the National Transportation Safety Board makes the following safety recommendations:

To the Federal Aviation Administration:

1. Prohibit flight crewmembers in 14 *Code of Federal Regulations* Parts 135 and 91 subpart K operations from using a portable electronic device for non-operational use while at their duty station on the flight deck while the aircraft is being operated. (A-09-XX)

2. Require all 14 *Code of Federal Regulations* Part 121, 135, and 91 subpart K operators to incorporate into their initial and recurrent pilot training programs information on the detrimental effects that distraction due to the non-operational use of portable electronic devices can have on performance of safety-critical ground and flight operations. (A-09-XX)

3. Require all 14 Cod*e of Federal Regulations* Part 121, 135, and 91 subpart K operators to review their respective general operations manuals to ensure that procedures are in place that prohibit the non-operational use of portable electronic devices by operational personnel while in flight and during safety-critical preparatory and planning activities on the ground in advance of flight.

4. Inform pilots of helicopters with low inertia rotor systems about the circumstances of this accident, particularly emphasizing the findings of the simulator flight evaluations, and advise them of the importance of simultaneously applying aft cyclic and down collective to achieve a successful autorotation entry at cruise airspeeds. (A-09-XX)

5. Revise the *Helicopter Flying Handbook* to include a discussion of the entry phase of autorotations that explains the factors affecting rotor rpm decay and informs pilots that immediate and simultaneous control inputs may be required to enter an autorotation. (A-09-XX)

6. Require the installation of a crash-resistant flight recorder system on all newly manufactured turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with a flight data recorder and a cockpit voice recorder and are operating under 14 *Code of Federal Regulations* Parts 91, 121, or 135. The crash-resistant flight recorder system should record cockpit audio and images with a view of the cockpit environment to include as much of the outside view as possible, and parametric data per aircraft and system installation, all as specified

in Technical Standard Order C197, "Information Collection and Monitoring Systems." (A-09-XX)

7. Require all existing turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with a flight data recorder or cockpit voice recorder and are operating under 14 *Code of Federal Regulations* Parts 91, 121, or 135 to be retrofitted with a crash-resistant flight recorder system. The crash-resistant flight recorder system should record cockpit audio and images with a view of the cockpit environment to include as much of the outside view as possible, and parametric data per aircraft and system installation, all as specified in Technical Standard Order C197, "Information Collection and Monitoring Systems." (A-09-XX)

To Air Methods Corporation:

8. Expand your policy on portable electronic devices to prohibit their non-operational use during safety-critical ground activities, such as flight planning and preflight inspection, as well as in flight. (A-09-XX)

9. Revise company procedures so that pilots are no longer solely responsible for nonroutine operational decisions but are required to consult with the Air Methods Operational Control Center for approval to accept or continue a mission when confronted with elevated risk situations, such as fuel-related issues and unplanned deviations. (A-09-XX)

Previously Issued Recommendations Reiterated in This Report

The National Transportation Safety Board reiterates the following safety recommendations to the Federal Aviation Administration:

1. Require emergency medical services operators to use formalized dispatch and flight-following procedures that include up-to-date weather information and assistance in flight risk assessment decisions. (A-06-14)

2. Develop criteria for scenario-based helicopter emergency medical services (HEMS) pilot training that includes inadvertent flight into instrument meteorological conditions and hazards unique to HEMS operations, and determine how frequently this training is required to ensure proficiency. (A-09-87)

Previously Issued Recommendation Reiterated and Reclassified in This Report

The National Transportation Safety Board reiterates and reclassifies from "Open—Acceptable Response" to "Open—Unacceptable Response" the following safety recommendation to the Federal Aviation Administration:

> Once the actions recommended in Safety Recommendation A-09-87 are completed, require helicopter emergency medical services pilots to undergo periodic FAA-approved scenario-based simulator training, including training that makes use of simulators or flight training devices. (A-09-88)