



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

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In reply refer to: A-09-02 through -11
A-03-62,-64 and -65
(Superseded)

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Washington, DC 20591

On July 27, 2007, about 1246 mountain standard time, two electronic news gathering (ENG) helicopters, N613TV and N215TV, collided in midair while maneuvering in Phoenix, Arizona. The Eurocopter AS350B2 helicopters, from local channels 3 and 15, had been covering a police pursuit. N613TV, the channel 3 helicopter, was operated by KTVK-TV, and N215TV, the channel 15 helicopter, was operated by U.S. Helicopters, Inc., under contract to KNXV-TV. Each helicopter had a pilot-reporter and a photographer on board. The occupants on board both helicopters were killed, and the helicopters were destroyed by impact forces and postcrash fire. The helicopters were operating under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91. No flight plans had been filed. Visual meteorological conditions prevailed at the time of the accident.

The National Transportation Safety Board determined that the probable cause of this accident was both pilots' failure to see and avoid the other helicopter. Contributing to this failure was the pilots' responsibility to perform reporting and visual tracking duties to support their station's ENG operation. Contributing to the accident was the lack of formal procedures for Phoenix-area ENG pilots to follow regarding the conduct of these operations.¹

See-and-Avoid Concept

Advisory Circular (AC) 90-48C, *Pilots' Role in Collision Avoidance*, states that Part 91 flight rules set forth the concept of "see and avoid," which requires vigilance at all times by each person operating an aircraft. The AC further states that pilots should remain constantly alert to all traffic movement within their field of vision and that they should scan the entire visual field outside of their aircraft to ensure that conflicting traffic would be detected. However, there are inherent limitations associated with the see-and-avoid concept as the primary method for

¹ National Transportation Safety Board, *Midair Collision of Electronic News Gathering Helicopters, KTVK-TV, Eurocopter AS350B2, N613TV, and U.S. Helicopters, Inc., Eurocopter AS350B2, N215TV, Phoenix, Arizona, July 27, 2007*, Aircraft Accident Report NTSB/AAR-09/02 (Washington, DC: NTSB, 2009).

separation used during high-density traffic operations, including ENG operations.² These limitations include the pilot's ability to perform systematic scans, competing operational task demands, and blind spots associated with an aircraft structure. After the accident, channels 3 and 15 took steps to mitigate these limitations by modifying their flight operations. For channel 3, two pilots are now present in the cockpit for reporting assignments—one with flying duties and one with reporting duties. For channel 15, the pilot no longer has reporting duties along with flying duties; the ENG helicopter provides the station with film footage only.

It can be difficult for pilots to adequately ensure separation from several other aircraft while the pilots are also conducting ENG-related duties.³ Further, although there were informal procedures that the Phoenix-area ENG pilots were expected to follow regarding communications (announcing positions and intentions on an air-to-air frequency) with other ENG pilots,⁴ evidence indicated that these procedures were not rigorously followed on the day of the accident,⁵ possibly because of the pilots' additional responsibilities to provide coverage of the ongoing situation on the ground.

The Safety Board notes that, even though most ENG operations are conducted under Part 91, Part 135 operators are required to establish minimum flight crew requirements based on anticipated workload, including collision avoidance activities and communications. The circumstances of this accident demonstrate that Part 91 ENG operators should be held to a similar standard, even though joint flying and reporting duties are not inherently unsafe under some conditions and joint pilot duties are not uncommon (for example, joint flying and briefing duties). The Safety Board concludes that this accident demonstrates the limitations of the see-and-avoid concept for reliably ensuring separation of aircraft during high-density traffic operations, especially when the pilot is conducting other nonflying duties as part of the operation. Therefore, the Safety Board believes that the Federal Aviation Administration (FAA) should require ENG operators to assign reporting responsibilities to someone other than the flying pilot unless it can be determined that the pilot's workload would remain manageable under all conditions.

² These limitations also apply to non-ENG operations. For example, in the November 17, 1999, nonfatal midair collision between a Bell 206L-3 helicopter and a Bell 206B helicopter in Seattle, Washington, neither pilot saw the other helicopter before the collision, even though no visual restrictions would have prevented either pilot from seeing the other helicopter. Although an ENG helicopter was involved in the collision, the pilot was not performing any ENG duties at the time. (Additional information about this accident, SEA00FA021A/B, can be found on the Safety Board's website at <<http://www.nts.gov/ntsb/query.asp>>.) Also, on June 29, 2008, two Bell 407 helicopters collided in midair while approaching the helipad at Flagstaff Medical Center, Flagstaff, Arizona, resulting in seven fatalities. The pilots of these helicopters were supporting emergency medical services operations. (For more information about this ongoing investigation, see DEN08MA116A/B on the Board's website.)

³ To support their station's ENG operations, the channel 3 and 15 pilots were responsible for reporting, communicating with their station's news department on a dedicated radio, communicating with the station's photographer via an intercom, scanning the monitor that showed the station broadcast and the video leaving the helicopter, and monitoring police radio communications for information about the pursuit. These tasks placed additional demands on the pilots' attention.

⁴ In addition to pilots from channels 3 and 15, three other ENG pilots were operating in the area at the time, and a police helicopter was operating below the ENG helicopters.

⁵ The channel 3 and 15 helicopters were equipped with an on-board system that recorded audio and video.

Methods for Improved Situational Awareness

Visual Indications

The ENG helicopters were maneuvering over an urban area with a complex terrain pattern (desert landscape and vegetation), which might have made it difficult for the pilots to distinguish between the shape of an airborne object operating below them and the surrounding terrain. In fact, during a postaccident group interview, Phoenix-area ENG pilots stated that they occasionally lose sight of other helicopters when flying over the city because the helicopters tend to blend in with the terrain.

The Phoenix-area ENG pilots suggested that light emitting diode (LED) anticollision lights would help them better discern other helicopters. The *Federal Aviation Regulations* address standard anticollision light systems. Specifically, 14 CFR 27.1401, Anticollision Light System, states that such systems are to consist of one or more approved anticollision lights located so that their emitted light will not impair the pilot's vision or detract from the conspicuity of the position lights. These systems are also expected to meet the field of coverage, flashing characteristics, color, light intensity, and minimum effective intensities that are specified in the regulation. Even though the anticollision light system requirements apply only to those rotorcraft that are certificated for night operations, most ENG helicopters have been certificated for these operations. The accident helicopters were both equipped with an anticollision light system that met the requirements of the regulation, and the lights were likely on during the flights (per standard procedures) and were likely visible, even with the daytime visual flight rules (VFR) conditions at the time.⁶

However, other anticollision lights, including the LED anticollision lights mentioned by the Phoenix-area pilots, are brighter than those currently required by 14 CFR 27.1401. Specifically, the regulation requires a minimum effective intensity equivalent to the light emitted by 150 candles (referred to as candela), but there are anticollision lights that emit 400 candela. ENG pilots whose helicopters are equipped with these high-intensity anticollision lights (and who have operated along with other helicopters equipped with these lights) indicated that the lights are more visible to other ENG pilots than the standard anticollision lights.

The Phoenix-area ENG pilots also suggested that high-visibility main rotor and tail rotor blades would help them better discern other helicopters. The *Federal Aviation Regulations* do not address the conspicuity of main rotor and tail rotor blades. The Civil Aeromedical Institute conducted a study to determine the conspicuity on the ground of three paint schemes for airplane propellers and two paint schemes for tail rotor blades.⁷ The propeller and tail rotor paint schemes that were judged to be the most conspicuous (by 30 volunteer subjects with normal vision, at

⁶ One of the three other ENG pilots operating in the area stated that she thought she saw the channel 15 helicopter with its lights on. This pilot did not provide information about the channel 3 helicopter's lights, likely because the helicopter had entered the airspace after hers and she was focusing on the situation on the ground at the time.

⁷ Civil Aeromedical Institute, Federal Aviation Administration, *Conspicuity Assessment of Selected Propeller and Tail Rotor Paint Schemes*, FAA-AM-78-29 (Oklahoma City, Oklahoma: FAA, 1978).

three different viewing angles, and under bright sunlight conditions) were the ones with black and white asymmetrical stripes because they provided a “flickering” sensation.

The U.S. Forest Service (USFS) acknowledged the importance of helicopter visibility in its December 2005 document detailing requirements for contractors providing helicopters to the USFS for firefighting. The USFS requires one or more independently switched anticollision light(s) mounted on top of the helicopter or in another location that would be visible from above the helicopter. The USFS also requires high-visibility markings on the helicopters’ main rotor blades and provides a listing of acceptable paint schemes.

Also, helicopter air tour operators recognized that aircraft visibility was essential in helping to avoid collisions during these operations. In January 1996, the operators voluntarily established a safety program for air tour operations. The February 2007 document describing this program, the Tour Operators Program of Safety (better known as TOPS), indicated that high-visibility rotor blades and at least one anticollision light were required to be used at all times (except when the pilot deems it inappropriate for safety reasons).

In addition, in its report on the September 1992 midair collision of two sightseeing helicopters over Niagara Falls, Ontario, Canada, the Transportation Safety Board of Canada (TSB) stated that the cause of the accident was that neither helicopter pilot saw the other helicopter in time to avoid the collision.⁸ In its report, the TSB indicated that two safety measures that had already been implemented as a result of the accident were (1) air tour flights operating in the Niagara Falls area were required to operate with anticollision lights illuminated and (2) all helicopters were to have approved conspicuous paint schemes on the upper surface of their blades.⁹

The main rotor blades of the channel 3 and 15 helicopters were blue-gray on the top and black on the bottom. Enhanced coloration of the main rotor blades could have increased the conspicuity of these helicopters for airborne observers either looking down on the helicopters (because rotor blades are painted on their top) or in another position in which the top of the blades would be visible. The circular area resulting from the movement of the main rotor blades appears much larger in surface area than the helicopter’s fuselage (as viewed from any angle); thus, painting main rotor blades would increase the conspicuity of an entire helicopter. In addition, high-intensity anticollision lights would help pilots detect the presence of other helicopters because these lights could capture a pilot’s attention, especially when the flashes occur in the pilot’s peripheral vision, and would help under viewing conditions in which blade paint might not be visible.

⁸ Transportation Safety Board of Canada, *Mid-Air Collision Between Niagara Helicopters Limited, Bell Helicopter Textron 206B Jetranger, C-GFXX, and Rainbow Helicopters Incorporated, McDonnell Douglas MD369E, N588DB, Niagara Falls, Ontario, Canada, 29 September 1992*, Aviation Occurrence Report A92H0029 (Quebec, Canada: Transportation Safety Board, 1993).

⁹ An official from Transport Canada (TC)—the FAA’s counterpart in Canada—indicated that the authorization to conduct flight operations in the Niagara Falls area includes a requirement for alternating bands of contrasting color on helicopter blades. The TC official further indicated that, according to the acting operations manager for one of these operators, this equipment was especially effective when looking out for aircraft operating at lower altitudes.

Just before the time of the collision, the accident pilots and the on-board photographers were likely focusing on the ground because of the events occurring there. However, the Safety Board concludes that a high-visibility paint scheme on the helicopters' main rotor blades or high-visibility anticollision lights could have facilitated the detection of the impending collision risk. Therefore, because of the close-in nature of ENG operations, the Safety Board believes that the FAA should require ENG operators to use high-visibility blade paint schemes and high-visibility anticollision lights on their aircraft.

Cockpit Systems

The channel 3 helicopter had a SkyWatch SKY497 traffic advisory system installed. The system provided an aural warning and displayed targets on the helicopter's Garmin GNS 430 navigation unit. The Safety Board reviewed the SkyWatch system's capabilities and found that the system (1) had an alerting envelope with a horizontal radius of 0.2 nautical mile (nm) (1,216 feet) and a height of ± 600 feet, (2) computed an aircraft's range with 0.05-nm (304 feet) accuracy, and (3) was capable of tracking up to 30 aircraft at the same time. The Board also found that the system was developed for business and general aviation aircraft, including helicopters, but that the system was not specifically designed according to helicopter flight characteristics.¹⁰

The channel 3 chief pilot stated that, when helicopters were maneuvering closely to one another, the aural alert "traffic, traffic" would frequently sound over the pilot's headset. Also, any time a helicopter went out of and then reentered the system's 0.2-nm range, the alert would again sound. The chief pilot also stated that, when "a lot of traffic [was] in close," the volume on the aural alert would be turned down so that it would not obscure the communications frequency. Thus, it is possible that the channel 3 pilot had turned down the volume on the aural alert during the accident flight, preventing the pilot from hearing the "traffic, traffic" alert and recognizing the proximity of his helicopter to the channel 15 helicopter. (The channel 3 audio recording was not designed to record sounds over the pilot's headset.)

In addition to aural annunciations, most traffic advisory systems (including SkyWatch) have visual displays of nearby traffic showing an aircraft's relative altitude and an indication of its direction of travel, including whether the aircraft is climbing or descending. This additional information can facilitate a pilot's efforts to maintain awareness of and visual contact with nearby aircraft to reduce the likelihood of collision. The Safety Board recognizes that a scan of visual traffic displays could increase a pilot's workload, but an ENG pilot with a helicopter equipped with such a system stated that the extra scanning was offset by the additional safety benefit provided by the system. The Board acknowledges the benefits of traffic advisory systems but notes, however, that these systems are not a substitute for the see-and-avoid concept. In fact, the manufacturer of the SkyWatch system issued guidance stating, "information on the display is

¹⁰ The Safety Board reviewed the operating characteristics of six available traffic advisory systems (including SkyWatch) and noted that their range sensitivity and altitude discrimination were best suited for fixed-wing airplanes. Helicopter flight characteristics require closer range dimensions and closer altitude discrimination because helicopters are more maneuverable and operate at slower speeds. Staff is not aware of any current traffic advisory systems that meet these criteria.

provided to the flight crew as an aid in visually acquiring traffic; it is not a replacement for ... See & Avoid Techniques.”

The channel 3 helicopter’s SkyWatch system would have aided the pilot as he entered the scene by indicating the direction of the other helicopters already on scene, including channel 15, and their altitudes. Also, although the alert should have sounded once the channel 15 helicopter was inside the system’s 0.2-nm range, the system would have been less useful at that range as a position locator because of the nuisance alerts, so the channel 3 pilot should have been communicating with the channel 15 pilot and verifying the helicopter’s location. The channel 15 helicopter did not have a traffic advisory system, and two of the three other ENG helicopters that were also operating in the area were not equipped with this system. Regardless, all of the ENG pilots were responsible for communicating with each other, paying attention to each helicopter’s position for collision avoidance, and not relying solely on a traffic advisory system for position information for helicopters.

The Safety Board concludes that a traffic advisory system would enhance an ENG pilot’s capability to detect other aircraft operating in the same area by providing aural annunciations and visual displays of the traffic and that a system designed specifically for helicopters could help eliminate the nuisance warnings that ENG pilots can receive when other aircraft are operating near the system’s alerting envelope. Therefore, the Safety Board believes that the FAA should develop standards for helicopter cockpit electronic traffic advisory systems so that pilots can be alerted to the presence of other aircraft operating in the same area regardless of their position. The Safety Board further believes that, once standards for helicopter cockpit electronic traffic advisory systems are developed, as requested in Safety Recommendation A-09-04, the FAA should require ENG operators to install this equipment on their aircraft.

Electronic News Gathering Conferences

Phoenix-area ENG pilots stated that they attend an annual meeting with local law enforcement and USFS personnel to discuss procedures for standardizing operations. Also, the president of the National Broadcast Pilots Association (NBPA)¹¹ stated that several ENG pilot groups hold meetings with local public use pilots and air traffic control tower personnel to discuss the local operating area procedures, review any problems that may have arisen, and devise ways to mitigate future problems. However, these meetings did not involve all ENG-related personnel in the local area and did not have fixed agendas to ensure that all pertinent topics would be discussed. Further, according to a Helicopter Association International (HAI) ENG committee member, local ENG meetings are not held in each metropolitan area with ENG operations.

In its report on the Niagara Falls accident, the TSB indicated that interested parties, operators, and regulatory officials from both Canada (Transport Canada [TC]) and the United States (FAA) would review flying operations at Niagara Falls on a semiannual basis. An FAA

¹¹ In January 2009, NBPA was reorganized so that its full membership would include other ENG industry personnel, including photographers, reporters, aircraft mechanics, and engineers. The new organization is known as the National ENG Helicopter Association.

inspector from the Rochester, New York, Flight Standards District Office (FSDO)¹² reported that FAA inspectors, TC officials, and U.S. and Canadian companies with flight operations in the Niagara Falls area participate in annual meetings that are hosted by TC. The FAA inspector indicated that the meetings were beneficial and that they provided a forum to discuss any deviations from the regulations and clarify any misinterpretations of the regulations. According to an official from TC, these annual meetings, which have been held since 1993, are a mandatory requirement of the authorization to conduct flight operations in the Niagara Falls area. He also stated that the meetings “greatly” benefit flight safety because operators can discuss operational and safety issues in a proactive environment. The TC official further stated that, between the annual meetings, TC and the FAA are in “regular contact” to discuss any operational or safety issues.

According to HAI, about 140 ENG helicopters operate daily in the United States. At HAI’s February 2008 Heli-Expo, participants at an ENG helicopter safety roundtable (which included FAA, Safety Board, HAI, NBPA, and ENG operator officials) identified the need for safety meetings to directly discuss pertinent ENG issues. These issues included radio communications among pilots, risk assessment, safety audits, operating altitudes, air traffic control (ATC) frequency usage, and separation standards. The circumstances of this accident demonstrate that these and other related issues need the attention of the entire ENG community.

The Safety Board recognizes the necessity for annual meetings of FAA and ENG helicopter personnel to provide a forum for ENG helicopter operators to meet and become familiar with the others’ operations, discuss ENG helicopter operational and safety issues, and manage risk by identifying hazards and ways to mitigate them. The Board notes that the importance of some issues, such as the number of ENG helicopters operating in a metropolitan area as well as weather, obstacle, and terrain considerations, may depend on the specific region of operation. It would also be beneficial to hold such conferences by region rather than by state because local news affects specific regions rather than entire states.

The Safety Board concludes that annual meetings with local ENG helicopter and local FAA personnel would help improve the safety of ENG operations by facilitating a proactive exchange of information among the participants. Therefore, the Safety Board believes that the FAA should host annual ENG helicopter conferences by major metropolitan region to discuss operational and safety issues affecting all ENG operations as well as those issues that pertain to the specific region. The Safety Board further believes that, on the basis of the safety issues identified at the regional conferences discussed in Safety Recommendation A-09-06, the FAA should develop letters of agreement (LOAs) or amend existing LOAs to specify minimum horizontal and vertical aircraft separation requirements.¹³

¹² The Rochester FSDO provides oversight of U.S. companies with flight operations in the Niagara Falls area.

¹³ The accident helicopters were operating in Phoenix Sky Harbor International Airport (PHX) class B airspace and were required to enter the airspace according to the provisions of an LOA with PHX designated “Sharp Echo.” The LOA specified responsibilities, defined terms, and established procedures for the control and operation of VFR helicopters within the airspace.

Electronic News Gathering Guidelines

In August 2008, HAI's ENG committee issued a draft ENG aviation safety manual that contained recommended safety management procedures and guidelines for ENG operations. Many of the subjects presented in the ENG manual were also discussed at the ENG helicopter safety roundtable held during HAI's February 2008 Heli-Expo.

The ENG manual stated that, before entering the airspace over a scene and while operating in that airspace, pilots needed to establish and maintain at all times positive communication and visual contact with other aircraft operating in the area. The Safety Board notes that the actions detailed in Safety Recommendations A-09-02 and -05 would enable continuous communication and visual contact, especially when multiple aircraft are operating in the same area.

The manual also stated that careful attention was required for scenes with moving targets because the scene could rapidly change, necessitating sufficient airspace in which to maneuver, and that wide separation between public use helicopters (including law enforcement) and other aircraft operating over such scenes was crucial. In addition, the manual recommended that the minimum horizontal and vertical separation between ENG aircraft be 500 and 200 feet (or 1,000 feet and 400 feet if possible), respectively. Most importantly, the manual strongly expressed that an ENG pilot's primary responsibility was to fly the aircraft safely and that all other duties would be secondary.

In addition, the manual recommended that ENG helicopters be equipped with high-intensity anticollision lights, a traffic advisory system, and high-visibility main and tail rotor blades because of the proximity in which ENG flights operate. The manual further recommended that cockpit/flight data recording systems be installed on ENG helicopters.

The Safety Board notes that HAI's draft ENG Aviation Safety Manual contains valuable information for ENG pilots, photographers, and other station personnel that was based on practical experiences and that the manual recommends, as part of several different topics, the need for local coordination meetings to discuss pertinent operational issues. Given the number of ENG helicopters that operate each day, it is also important that the FAA take additional actions to promote ENG flight safety. Safety Recommendation A-09-06 addresses the need for the FAA to host local ENG conferences, but the FAA also needs to issue ENG guidance because HAI's manual may not reach all ENG operators, including those that operate fixed-wing airplanes. The Safety Board concludes that best practice guidelines would provide ENG pilots with practical knowledge to apply during these operations. Therefore, the Safety Board believes that the FAA should incorporate pertinent information from HAI's ENG Aviation Safety Manual into an AC detailing best practices for ENG operations.

Flight Recorder Systems for Smaller Aircraft

ATC radar data were available to the Safety Board to determine the altitudes and flightpaths of the accident helicopters. However, one limitation with this information was that both helicopters (as well as the other three ENG helicopters operating in the area) were using the same transponder beacon code, which impeded efforts to distinguish individual helicopters.

Another limitation was that the mode C information provided by some radar returns could have possibly been distorted because of the proximity with which the helicopters were operating at the time.

Although the Safety Board was able to use the audio/video streams that were recorded for both helicopters, the amount of useful information for the investigation was limited. For example, each helicopter's position could only be determined at locations where the camera view was in a favorable position (showing sufficient ground references) and detailed geographical information system data existed. Also, the audio/video streams could not be used to estimate altitude information for either helicopter and did not include parametric data related to the engines and other systems. In addition, the audio was recorded only from the pilots' microphones; audio from their headsets was not recorded. As a result, only one-sided conversations were available. These conversations were difficult to understand in context because the pilots could have been talking to a pilot of another ENG helicopter, the law enforcement pilot, news station personnel, or the on-board photographer, among others.

The Safety Board notes that the accident helicopters were not required to have a cockpit voice recorder (CVR) or a flight data recorder (FDR) installed but that they would have been subject to the requirements for a cockpit image recorder that were included in Safety Recommendation A-03-64 (which was issued on December 22, 2003, along with Safety Recommendations A-03-62 and -65) if the FAA had implemented this recommendation.

The Safety Board notes that government and industry representatives have been participating since 2007 in a European Organization for Civil Aviation Equipment (EUROCAE) working group to develop a flight recorder specification titled, "Minimum Operational Performance Specification for Lightweight Flight Recorder Systems" (ED-155). (Both the Board and the FAA are members of this working group.) When finalized, ED-155 is expected to address recent improvements in technology by establishing the minimum performance requirements for flight recorder systems that could be used on board smaller aircraft (such as the accident helicopter models). This specification targets a more affordable flight recorder option for smaller aircraft than traditional CVRs or FDRs and addresses the recording of audio, image, and parametric information. As currently written, ED-155 identifies parameters that should be recorded according to the type of aircraft (that is, airplane or helicopter). Also, ED-155 accommodates variations in aircraft complexity by identifying parameters that should always be recorded and parameters that should be recorded if an information source for the parameter is used by aircraft systems and/or the flight crew to operate the aircraft. ED-155 is expected to be issued by June 2009.

It is also important to note that Bell Helicopter Textron and American Eurocopter have been developing digital imaging recorders as FAA "nonrequired safety-enhancing equipment hardware." According to the safety department managers at Bell Helicopter Textron and American Eurocopter, the recorders (which are not required under Parts 27, 29, 91, or 135) are expected to provide digital imaging of the cockpit and its instruments at a sampling rate of between one and eight frames per second. The recorders are also expected to record ambient cockpit noise and flight data.

Both companies have developed prototype recorders that contain internal global positioning system receivers and inertial sensing electronics. Although these recorders are not being designed to meet the crash-protection requirements stipulated in the FAA's current technical standard orders (TSO) for CVRs and FDRs, the safety department managers indicated that the recorders would have a level of crash protection that meets many of the industry criteria stipulated in the December 2004 RTCA, Inc., document DO-160E, "Environmental Conditions and Test Procedures for Airborne Equipment," including moisture tolerance, temperature extremes, vibration, and electromagnetic interference. The companies expected to deliver and install these recorders on new-production helicopters in early 2009. The companies also expected to make kits available for retrofitting older helicopters with the recorders.

If recorder systems that captured cockpit audio, images, and parametric data had been installed on the accident helicopters, the recorders would have enabled Safety Board investigators to determine additional information about the accident scenario, including the helicopters' precise locations, altitudes, headings, airspeeds, engine performance, and other systems information. It is also possible that recorded images could have shown the proximity of one helicopter to another and any obstruction that might have prevented a pilot from seeing another helicopter. The Safety Board concludes that recorder systems that capture cockpit audio, images, and parametric data would have significantly aided investigators in determining the circumstances that led to this accident.

With the anticipated completion of EUROCAE specification ED-155 and the proactive development of digital imaging recorders by Bell Helicopter Textron and American Eurocopter, technology will soon be in place for the implementation of flight recorder systems for smaller aircraft that are not currently equipped with a CVR or an FDR. (It is important to note the Safety Board's position that such flight recorder systems should never take the place of a crash-protected CVR, per TSO-C123B, for those aircraft so equipped.) These developments in incorporating data recording, as well as audio and image recording, into more affordable flight recorder systems for smaller aircraft are significant. The technology to record flight data in an affordable flight recording system for smaller aircraft was not available at the time that the Board issued its previous image recorder recommendations. As a result of the development of this more advanced technology, and because the FAA has not taken timely action with regard to the Board's image recorder recommendations,¹⁴ the Safety Board classifies Safety Recommendations A-03-62, -64 and -65 "Closed—Unacceptable Action/Superseded."

The Safety Board believes that the FAA should 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 an FDR and are operating under

¹⁴ The initial image recorder recommendation, A-99-60, was issued on February 8, 2000. The recommendation was classified "Open—Unacceptable Response" because the FAA could not commit to the time frame proposed by the Safety Board. Instead, the FAA wanted to refer the recommendation to an industry committee, but that committee had no immediate plans to address the use of image recorders in the near term. Safety Recommendation A-99-60 was superseded by Safety Recommendation A-03-64 so that the recommendation could be expanded to include Parts 91 and 121 in addition to Part 135. However, Safety Recommendation A-03-64 was also classified "Open—Unacceptable Response" because the FAA had not prepared and issued the recommended regulation. In addition, the FAA's report on image recorder system tests, conducted in response to Safety Recommendations A-03-62, -64, and -65, was expected in December 2005 but has not yet been issued.

14 CFR Parts 91, 121, or 135. The crash-resistant flight recorder system should record cockpit audio (if a CVR is not installed), 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 to be specified in EUROCAE document ED-155, “Minimum Operational Performance Specification for Lightweight Flight Recorder Systems,” when the document is finalized and issued.

The Safety Board also believes that the FAA should require all existing turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with a CVR and are operating under 14 CFR 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, 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 to be specified in EUROCAE document ED-155, “Minimum Operational Performance Specification for Lightweight Flight Recorder Systems,” when the document is finalized and issued.

In addition, the Safety Board believes that the FAA should require all existing turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with an FDR and are operating under 14 CFR 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 (if a CVR is not installed), 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 to be specified in EUROCAE document ED-155, “Minimum Operational Performance Specification for Lightweight Flight Recorder Systems,” when the document is finalized and issued.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require electronic news gathering operators to assign reporting responsibilities to someone other than the flying pilot unless it can be determined that the pilot’s workload would remain manageable under all conditions. (A-09-02)

Require electronic news gathering operators to use high-visibility blade paint schemes and high-visibility anticollision lights on their aircraft. (A-09-03)

Develop standards for helicopter cockpit electronic traffic advisory systems so that pilots can be alerted to the presence of other aircraft operating in the same area regardless of their position. (A-09-04)

Once standards for helicopter cockpit electronic traffic advisory systems are developed, as requested in Safety Recommendation A-09-04, require electronic news gathering operators to install this equipment on their aircraft. (A-09-05)

Host annual electronic news gathering (ENG) helicopter conferences by major metropolitan region to discuss operational and safety issues affecting all ENG operations as well as those issues that pertain to the specific region. (A-09-06)

On the basis of the safety issues identified at the regional conferences discussed in Safety Recommendation A-09-06, develop letters of agreement (LOAs) or amend existing LOAs to specify minimum horizontal and vertical aircraft separation requirements. (A-09-07)

Incorporate pertinent information from Helicopter Association International's ENG [electronic news gathering] Aviation Safety Manual into an advisory circular detailing best practices for ENG operations. (A-09-08)

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 are operating under 14 *Code of Federal Regulations* Parts 91, 121, or 135. The crash-resistant flight recorder system should record cockpit audio (if a cockpit voice recorder is not installed), 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 to be specified in European Organization for Civil Aviation Equipment document ED-155, "Minimum Operational Performance Specification for Lightweight Flight Recorder Systems," when the document is finalized and issued. (A-09-09) (Supersedes Safety Recommendation A-03-62)

Require all existing turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with a 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, 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 to be specified in European Organization for Civil Aviation Equipment document ED-155, "Minimum Operational Performance Specification for Lightweight Flight Recorder Systems," when the document is finalized and issued. (A-09-10) (Supersedes Safety Recommendation A-03-64)

Require all existing turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with a flight data 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 (if a cockpit voice recorder is not installed), 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 to be specified in European Organization for Civil Aviation Equipment document ED-155, "Minimum Operational Performance Specification for Lightweight Flight Recorder Systems," when the document is finalized and issued. (A-09-11) (Supersedes Safety Recommendation A-03-65)

Also, the following previously issued recommendations to the Federal Aviation Administration are classified “Closed—Unacceptable Action/Superseded”:

Require the installation of a crash-protected image recording system on all turbine-powered, nonexperimental, nonrestricted-category aircraft that are manufactured after January 1, 2007, that are not equipped with a flight data recorder, and that are operating under 14 *Code of Federal Regulations* Parts 135 and 121 or that are being operated full-time or part-time for commercial or corporate purposes under Part 91. (A-03-62) (Superseded by Safety Recommendation A-09-09)

Require all turbine-powered, nonexperimental, nonrestricted-category aircraft that are manufactured prior to January 1, 2007, that are not equipped with a cockpit voice recorder, and that are operating under 14 *Code of Federal Regulations* Parts 91, 135, and 121 to be retrofitted with a crash-protected image recording system by January 1, 2007. (A-03-64) (Superseded by Safety Recommendation A-09-10)

Require all turbine-powered, nonexperimental, nonrestricted-category aircraft that are manufactured prior to January 1, 2007, that are not equipped with a flight data recorder, and that are operating under 14 *Code of Federal Regulations* Parts 135 and 121 or that are being used full-time or part-time for commercial or corporate purposes under Part 91 to be retrofitted with a crash-protected image recording system by January 1, 2010. (A-03-65) (Superseded by Safety Recommendation A-09-11)

In response to the recommendations in this letter, please refer to Safety Recommendations A-09-02 through -11. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our Tumbleweed secure mailbox procedures. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Acting Chairman ROSENKER and Members HERSMAN, HIGGINS, SUMWALT, and CHEALANDER concurred with these recommendations.

[Original Signed]

By: Mark V. Rosenker
Acting Chairman