Yemenia Flight 626 - A310 - Yemen to Moroni, Comoros – 30 Jun 2009 - LOC

The crash occurred off the north coast of Grande Comore, Comoros, in the Indian Ocean several minutes from the airport. There had been several days of inclement weather in the region at the time of the accident. An unseasonably strong cold front had moved through the Comoros Islands, bringing winds gusting to 64 km/h (40 mp) and conditions favorable for light to moderate turbulence. Yemeni civil aviation deputy chief said the wind speed was 61 km/h at the time the aircraft was landing. All but one of the 153 passengers and crew on board were killed. The sole survivor, 12-year-old Bahia Bakari, was found clinging to wreckage, after floating in the ocean for 13 hours. The final report on the incident concluded that crew's inappropriate flight control inputs led to an aerodynamic stall. The report also noted that the crew did not react to the warnings being issued by the aircraft.

Caribbean Airlines Flight 523 – June 30 2011

The report concluded the following, “The cause of the accident was the aircraft touching down far beyond the touchdown zone due to the captain maintaining excess power during the flare and not using the airplane’s full deceleration capacity, resulting in the aircraft over running the pavement and fracturing the fuselage.” The B737-800 crash landed at the Cheddi Jagan International Airport (CJIA) at 01:32hrs on July 30, 2011. The aircraft, which overshot the runway, stopped short of a ravine, its nose cone segment breaking off. In what was deemed “a miracle landing,” all 163 people aboard including 6 crew members survived. Most of those injuries occurred when passengers attempted to flee the aircraft which broke in two after coming to a halt several hundred meters off of the main runway apron. Several passengers filed lawsuits against the airline for compensation.

Northwest Airlink Jetstream 31 - Flight 5719 – 1 Dec 1993 - Minnesota

All 18 people (2 crew + 16) on board the J31 were killed. The Flight was scheduled from Minneapolis to Falls International in Minnesota with a scheduled stop in Hibbing, Minnesota and crashed into 2 ridges just east of Hibbing. The Flight took off over 40 mins late from Minneapolis due to a late arrival and the replacement of landing light bulbs. It was further delayed when it was deemed overweight for departure, causing a passenger to be offloaded. Other than that, the flight was uneventful until moments before the crash. No distress signal was ever sent.

The Flight was cleared for a landing on runway 3, but the crew requested an approach to runway 13 instead because there was a tailwind on the approach to 31 and 31 was covered with precipitation. The crew initiated the approach procedure by joining the HIB 20 DME arc from the HIB VOR and intercepting the localizer at 8000 ft MSL. This delayed the start of the descent and thus required an excessive rate of descent.

The aircraft descended at 2250 ft/min and was 1200 ft above the minimum altitude when overhead the KINNY final approach fix. The aircraft continued its descent through the 2040 ft step down altitude. The aircraft struck the top of a tree, continued for 634 ft, and then struck a group of trees. Finally, the plane collided with 2 ridges and came to rest inverted and lying on its right side. The investigation revealed:

- Capt. Falitz (age 42) had failed 3 semi-annual prof. checks over the last 5 yrs,
- Had a reputation for following SOP's and being meticulous with flight check lists.
- Three FO’s accused him of being deliberately rough on the flight controls.
• A chief pilot described him as competent but intimidating and provocative with colleagues.
• Falitz was accused of once slapping a co-pilot's headphones in anger.

The probable cause for the crash: "The Capt.'s actions that led to a breakdown in crew coordination and the loss of altitude awareness by the flight crew during an unstabilized approach in night IMC. Contributing to the accident were:
• The failure of the company to adequately address the previously identified deficiencies in airmanship and CRM of the Capt.;
• The failure of the company to identify and correct a widespread, unapproved practice during instrument approach procedures;
• and the FAA’s inadequate surveillance and oversight of the air carrier.

Neither the Capt. nor the FO were scheduled to take this trip sequence. The crew had flown together on Oct 11, and on Nov 22, 1993. The Capt. was informed that he was to fly this sequence on Nov 30, 1993, and the FO was notified on Nov 27, 1993. Witnesses reported that the Capt. told them he was unhappy with the trip schedule change because he would be working on Dec 2, a day that he was scheduled to be off. After the accident, a completed ALPA grievance form concerning working on Dec 2, was found in the Captain’s residence.

The Captain: 6yrs with the company, ALTP, Flight Instructor certificate, Total time was 7,852.6 hrs, 2,266.7 hrs on type (all as Captain), his medical certificate had a limitation (correcting lenses should be worn and there was evidence he did not wear correcting lenses on the day of the accident. Check airmen comments about Falitz from prof checks included:
• unsatisfactory "crew coordination", command-judgment, holding, approach to stalls, and stall warning, not properly verify his FO's actions during a simulated engine fire, entering a holding pattern with excessive entry speed (which the FO did not point out), approach to stalls and stall warnings unsatisfactory because the Capt. did not know the proper recovery procedure;
• unsatisfactory "crew coordination, powerplant failure, rapid depressurization emergency descent, "Capt. seemed rushed on emergency descent - did not fly proper profile, Capt. allowed FO to bring engine to feather - engine ran through landing, crew coordination weak - most contributing factor to problems during flight."
• Unsatisfactory "judgment, take-off with a simulated powerplant failure, emergency procedures, and NDB/ADF instrument approach procedures."
• "Poor communication with ~the PNF ~, "I enjoyed working with the Capt. but that he was difficult to train because he was "head strong, argumentative, and thought that he was always right. His OCRM skills are weak."

Other errors/comments recorded during training included:
• Shutting down the incorrect engine
• Shutting off the incorrect generator because of poor crew coordination.
• Not responsive to inputs from the FO.
• The FO seemed to be intimidated by the Captain
• Extremely overbearing, took 3 sim sessions for the FO to get used to him.
• Had to be trained to slow down and work with the FO.
• Appeared to be receptive to crew coordination.
• Not sure if the training was to "cooperate & graduate" or if the training "would stick."

On Tues Nov 30, the Capt. attended a company grievance arbitration hearing. Afterwards, he had lunch with a friend, another Capt. who had attended the hearing, and they were joined by the union lawyer. The friend indicated the Capt. seemed unusually upset. The Capt. suggested that he had been targeted heavily for attention by company management in the past 2 months and gave examples of problems he had recently experienced with the company. He indicated that he was pursuing jobs with other companies and would consider leaving aviation if conditions did not improve. A pilot, who was present in the pilot lounge at the airport on the day of the accident said that the Capt. was unhappy when he arrived, and that he stated loudly, "they violated my contract again."
The FO (age 25), was hired in Sep, 1993. He had an ALTP & a flight instructor certificate. His total time was 2,019 hrs, (65 hrs were on type). He had a Bachelor of Science degree in Aeronautical Studies. Training records indicate that he was the only candidate out of 6 (in his class) at FSI St Louis doing the ground school and initial simulator training ST Louis pass the simulator check ride on the first attempt. The FO's initial operating experience (IOE) was on Oct 6 and 7, 1993. The check airman, said that he flew the BA-3100 very well and that he was familiar with line operating procedures, even though he was new. A review of the 72-hr history of the FO did not reveal any activities that would have affected his performance on the flight. An acquaintance of the FO, who was also a pilot, stated that the FO was excited about his upcoming trip. He described the FO's mood as cheerful, noting that the FO was happy to fly since he had flown only 10 to 12 hrs in the past several weeks.

**Air Methods Corporation - Eurocopter - Missouri - Fuel Exhaustion - 26 Aug 2011**

On Aug 26, 2011, about 18:40, the Eurocopter AS350 B2 crashed following a loss of engine power as a result of fuel exhaustion in 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. Day VMC conditions prevailed at the time of the accident, and a company VFR 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 18:11 and was en route to GPH to refuel. After refueling, the pilot planned to proceed to Liberty Hospital, Liberty, Missouri, which was located about 7 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 SOP 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 on board 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 NTSB determined that the probable causes of this accident were the pilot's failure to confirm that the helicopter had adequate fuel on board 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.
2013 Glasgow Helicopter Crash - Eurocopter EC135 – 29 Nov 2013

On 29 Nov 2013, a police helicopter crashed into the Clutha Vaults, a pub on the north bank of the River Clyde in central Glasgow. The aircraft was operated by Bond Air Services for Police Scotland and was being crewed by a civilian pilot and 2 police officers. 10 people died in the accident: all 3 who were on board the helicopter and 6 on the ground, with another person dying 2 weeks later from injuries received in the pub. The helicopter operated from Glasgow City Heliport, approximately 2 miles to the west of the crash site, and had been involved in the search for a suspected trespasser on railway lines around Eglinton Toll, around 1 mile south of the crash site. A few minutes before the crash, the pilot had received ATC clearance to return to Glasgow City Heliport.

There were reports there were around 120 people in the building. Reports indicate that the roof of the pub collapsed upon impact, trapping some people inside. The building is a former tenement which used to have multiple storeys, but after a fire in the 1960s the upper storeys were removed. The walls were therefore much thicker than would be expected for a building of this height, and the complex construction of the roof complicated the search and rescue operation. One witness said he did not see a fireball or hear an explosion, and that the engine seemed to be misfiring. 32 people were taken for treatment to local hospitals, 12 of them with injuries classed as serious.

A preliminary report stated the aircraft was not fitted with FDR's but the electronics fitted to the aircraft could contain data helpful in determining the cause of the accident. No distress call was made. The rotor blades were attached, but neither they nor the fenestron tail rotor were rotating at the time of impact. No evidence of engine or gearbox failure was found and there were around 95 litres of fuel still on board. The aircraft struck the building with "a high rate of descent and low/negligible forward speed" and no part of it detached in flight. It came to rest approximately upright.

Bond Air Services were forced to suspend flights of its 22-strong Eurocopter fleet (including the Police Scotland helicopter) in May 2012 when cracks were discovered in the main rotor hub of an EC135 operated by Bond for the Scottish Ambulance Service. Flights were allowed to resume when Eurocopter was able to advise on a series of increased daily inspections. On 12 Dec 2013, Bond suspended flights of helicopters, after one of the fleet "experienced an indication defect that requires further technical investigation." The fault was found in a helicopter used for the North West Air Ambulance service.


The Eurocopter crashed on a hill, killing all 6 people on board. Among the fatalities were Kenya's Interior Security Minister and his Assistant Minister. The Eurocopter had departed Wilson Airport in Nairobi for a flight to Ndhiwa with a full complement of 2 senior Kenya Police officers as pilots and 4 passengers on board: the 2 government officials and 2 Kenya Police officers acting as their bodyguards. The last radio contact with the helicopter was 5 mins after it departed Wilson Airport at 8:32 am local time; and the aircraft then disappeared from radar another 5 mins later at 8:42 am. It had crashed into the Kibiku area of the Ngong Forest just outside Nairobi and caught fire. The aircraft was completely destroyed by the accident; a post-crash fire burnt the victims "beyond recognition". The weather was reported to be "normal" at the time of the crash with visibility of 8 km. The helicopter manufactured in 2011, had flown for less than 100 hours when it entered service with the Kenya Police in Jan 2012 and had accumulated a further 240 hrs' flying time since then. It had been bought to replace old Mil Mi-17 helicopters of the Kenya Police Air Wing. The investigation found that the probable cause of the accident was that the crew lost control of the helicopter in conditions of poor visibility.
On Dec 7, 2011, about 1630, the Sundance Eurocopter AS350-B2, operating as a "Twilight tour" sightseeing trip, crashed in mountainous terrain about 14 miles east of Las Vegas, Nevada. The pilot and 4 passengers were killed, and the helicopter was destroyed by impact forces and postimpact fire. Visual meteorological conditions with good visibility and dusk light prevailed at the time of the accident, and the flight operated under visual flight rules. The helicopter originated from Las Vegas McCarran International Airport, Las Vegas, Nevada, about 1621 with an intended route of flight to the Hoover Dam area and return to the airport. The helicopter was not equipped, and was not required to be equipped, with any on-board recording devices.

The helicopter unexpectedly climbed about 600 feet, turned about 90° to the left, and then descended about 800 feet, entered a left turn, and descended at a rate of at least 2,500 ft/minute to impact. During examination of the wreckage, the main rotor fore/aft servo, one of the three hydraulic servos that provide inputs to the main rotor, was found with its flight control input rod not connected. The bolt, washer, self-locking nut, and split pin (sometimes referred to as a "cotter pin" or "cotter key") that normally secure the input rod to the main rotor fore/aft servo were not found. The investigation revealed that the hardware was improperly secured during maintenance that had been conducted the day before the accident. The nut became loose (likely because it was degraded) and, without the split pin, the nut separated from the bolt, the bolt disconnected, and the input rod separated from the linkage while the helicopter was in flight, at which point the helicopter became uncontrollable and crashed.

The safety issues identified in this accident (which also brought about recommendations by the NTSB to the FAA) include the following:

- **Improper reuse of degraded self-locking nuts.** The investigation revealed that maintenance personnel were reusing nuts that did not meet the criteria specified by Eurocopter and FAA guidance. Regulations require that any removable fastener whose loss could jeopardize the safe operation of the helicopter must incorporate two separate locking devices. For the Eurocopter AS350-B2 helicopter, the first locking device is the self-locking nut and the second one is the split pin. The improper reuse of a degraded self-locking nut on critical flight control components is a safety hazard because it negates the safety benefits of one of the two required locking devices. Reinforcing the importance of maintenance personnel properly following manufacturer and FAA self-locking nut reuse guidance would help ensure that nuts without locking ability are not being reused.

- **Maintenance personnel fatigue.** Both the mechanic and the quality control inspector, who inspected the maintenance work completed the day before the accident, were likely fatigued during the Dec 6 shift, in part, because they had insufficient time to adjust to working an earlier shift than normal. The mechanic and inspector's performance was degraded by fatigue, which contributed to the improper securing of the fore/aft servo connection hardware, the improper installation of the hydraulic belt, and the inadequate post-maintenance inspection of the accident helicopter, respectively. If the work shifts of the maintenance personnel had been consistent, a major source of their fatigue could have been mitigated.

- **Need for work cards with delineated steps.** In addition to the effects of fatigue, the maintenance documentation did not clearly delineate specific inspection steps, which can allow these tasks to be more vulnerable to error through human factors. Using work cards that clearly delineate the steps to be performed and critical areas to be inspected to support both the maintenance and inspection tasks is one way to mitigate inadvertent errors of omission in the performance and verification of maintenance tasks, especially tasks involving critical flight controls.

- **Lack of human factors training for maintenance personnel.** Although the FAA has developed substantial guidance for the industry about maintenance human factors and has repeatedly stressed the importance of human factors training, there is still no requirement for human factors training for maintenance personnel involved in air carrier operations. This investigation has shown that providing human factors training, including training on the causes of fatigue, its effects on performance, and actions individuals can take to prevent the development of fatigue, to all maintenance personnel would help reduce the likelihood of human error in aviation maintenance.
The NTSB determines that the probable cause of this accident was inadequate maintenance of the helicopter, including:

1) the improper reuse of a degraded self-locking nut,
2) the improper or lack of installation of a split pin, and
3) inadequate post-maintenance inspections, which resulted in the in-flight separation of the servo control input rod from the fore/aft servo and rendered the helicopter uncontrollable.

Contributing to the improper or lack of installation of the split pin was the mechanic's fatigue and the lack of clearly delineated maintenance task steps to follow. Contributing to the inadequate post-maintenance inspection was the inspector's fatigue and the lack of clearly delineated inspection steps to follow.

Carson Helicopters - Sikorsky S-61N - Firefighting Helicopter - 5 Aug 2008 - California

On 5 Aug, 2008, about 19:4,1 a Sikorsky S-61N helicopter impacted trees and terrain during the initial climb after takeoff from Helispot located at an elevation of about 6,000 ft in mountainous terrain near Weaverville, California. The PIC, the safety crewmember, and 7 firefighters were fatally injured; the copilot and 3 firefighters were seriously injured. Impact forces and a postcrash fire destroyed the helicopter, which was being operated by the U.S. Forest Service (USFS) as a public flight to transport firefighters. VMC conditions prevailed at the time of the accident, and a company visual flight rules flight plan had been filed.

The NTSB determined that the probable causes of this accident were the following actions by Carson Helicopters:
1) the intentional understatement of the helicopter's empty weight,
2) the alteration of the power available chart to exaggerate the helicopter's lift capability, and
3) the practice of using unapproved above-minimum specification torque in performance calculations that, collectively, resulted in the pilots relying on performance calculations that significantly overestimated the helicopter's load-carrying capacity and did not provide an adequate performance margin for a successful takeoff; and insufficient oversight by the USFS and the FAA.

Contributing to the accident was the failure of the crew to address the fact that the helicopter had approached its maximum performance capability on their two prior departures from the accident site because they were accustomed to operating at the limit of the helicopter's performance.

Contributing to the fatalities were the immediate, intense fire that resulted from the spillage of fuel upon impact from the fuel tanks that were not crash resistant, the separation from the floor of the cabin seats that were not crash resistant, and the use of an inappropriate release mechanism on the cabin seat restraints.

The safety issues discussed in this report involve the accuracy of hover performance charts, USFS and FAA oversight, flight crew performance, accident survivability, weather observations at helisports, fuel contamination, flight recorder requirements, and certification of seat supplemental type certificates. Safety recommendations concerning these issues are addressed to the FAA and the USFS. After the investigation, the NTSB makes the following safety recommendations to the FAA:

- Require that the hover performance charts published by helicopter manufacturers reflect the true performance of the helicopter in all conditions for which the charts are applicable, including light and variable wind conditions.
- Develop and implement a surveillance program specifically for Part 135 operators with aircraft that can operate both as public aircraft and as civil aircraft to maintain continual oversight ensuring compliance with Part 135 requirements.
- Take appropriate actions to clarify Federal Aviation Administration (FAA) authority over public aircraft, as well as identify and document where such oversight responsibilities reside in the absence of FAA authority.
• Require the installation of fuel tanks that meet the requirements of Regulations helicopters that are used for passenger transport.
• Require that S-61 helicopters that are used for passenger transport be equipped with passenger seats and seat mounting structures that provide substantial improvement over the requirements of Civil Air Regulations.
• Require operators of transport-category helicopters to equip all passenger seats with restraints that have an appropriate release mechanism that can be released with minimal difficulty under emergency conditions.
• Require that Advisory Circular 21-34 be used to evaluate all shoulder harness retrofit installations and to determine that the installations reduce the risk of occupant injury.
• Require operators of Sikorsky S-61 helicopters with General Electric model CT58-140 engines to install 10-micron airframe fuel filters.
• Require Carson Helicopters, to put a conspicuous notification on the title page of the Instructions for Continuing Airworthiness that accompany its supplemental type certificate for installing side-mounted seats indicating that the installation does not provide enhanced occupant protection over that provided by the originally installed seats and meets CAA Regulation standards.
• Require all applicants for supplemental type certificate (STC) seat installations in any type of aircraft to put a conspicuous notification on the title page of the Instructions for Continuing Airworthiness that accompany the STC indicating whether the installation provides enhanced occupant protection over that provided by the originally installed seats and the certification standard level met by the seating system.
• Require supplemental type certificate (STC) applicants to improve the crashworthiness design of the seating system when granting STC approval for older transport-category rotorcraft.

After the investigation, the NTSB makes the following safety recommendations to the U.S. Forest Service:

• Develop mission-specific operating standards for firefighter transport operations that include procedures for completing load calculations and verifying that actual aircraft performance matches predicted performance, require adherence to aircraft operating limitations, and detail the specific Part 135 regulations that are to be complied with by its contractors.
• Require its contractors to conduct firefighter transport operations in accordance with the mission-specific operating standards specified in Safety Recommendation A-10-159.
• Create an oversight program that can reliably monitor and ensure that contractors comply with the mission-specific operating requirements specified in Safety Recommendation A-10-159.
• Provide specific training to inspector pilots on performance calculations and operating procedures for the types of aircraft in which they give evaluations.
• Require a hover-out-of-ground effect power check to be performed before every takeoff carrying passengers from helispots in confined areas, pinnacles and ridgelines.
• Review and revise policies regarding the type and use of gloves by firefighting personnel during transport operations, including but not limited to, compatibility with passenger restraints and opening emergency exits.
• Review and revise your contract requirements for passenger transport by aircraft so that the requirement to install shoulder harnesses on passenger seats provides improved occupant crashworthiness protection consistent with the seat design.
• Require that helispots have basic weather instrumentation that has the capability to measure wind speed and direction, temperature, and pressure and provide training to helitack personnel in the proper use of this instrumentation.
• Modify your standard manifest form to provide a place to record basic weather information and require that this information be recorded for each flight.
• Require all contracted transport-category helicopters to be equipped with a cockpit voice recorder and a flight data recorder or a cockpit image recorder with the capability of recording cockpit audio, crew communications, and aircraft parametric data.
On Aug 8, 2009, at 1153:14 eastern daylight time, a Piper PA-32R-300 and a Eurocopter AS350BA helicopter, operated by Liberty Helicopters, collided over the Hudson River near Hoboken, New Jersey. The pilot and 2 passengers aboard the piper and the pilot and 5 passengers aboard the helicopter were killed, and both aircraft received substantial damage from the impact. The airplane flight was operating under CFR Part 91, and the helicopter flight was operating under CFR Parts 135 and 136. No flight plans were filed or were required for either flight, and VMC conditions prevailed at the time of the accident. The NTSB determines that the probable cause of this accident was (1) the inherent limitations of the see-and-avoid concept, which made it difficult for the airplane pilot to see the helicopter until the final seconds before the collision, and (2) the Teterboro Airport local controller's non-pertinent telephone conversation, which distracted him from his ATC duties, including correcting the airplane pilot's read back of the Newark Liberty International Airport (EWR) tower frequency and the timely transfer of communications for the accident airplane to the EWR tower.

Contributing to this accident were:
(1) both pilots' ineffective use of available electronic traffic information to maintain awareness of nearby aircraft,
(2) inadequate FAA procedures for transfer of communications among ATC facilities near the Hudson River area, and
(3) FAA regulations that did not provide adequate vertical separation for aircraft operating in the Hudson River area.

Previous safety recommendations issued to the FAA addressed SOP’s for the Hudson River Class B exclusion area, ATC performance deficiencies, the designation of a special flight rules area (SFRA) for the Hudson River Class B exclusion area and surrounding areas, and SOP’s within and training for SFRA’s. The safety issues discussed in this report address changes within the recently designated SFRA surrounding the Hudson River corridor, vertical separation, the see-and-avoid concept, and helicopter electronic traffic advisory systems. NTSB safety recommendations to the FAA include a number of improvements including:

- redefining boundaries of the common traffic advisory frequency (CTAF) revising regulations regarding altitude operating in Special flight rules, Updating the National Airspace System and airspace classifications, guidance on the use of electronic traffic advisory systems for pilots operating under the see-and-avoid concept, developing standards for helicopter cockpit electronic traffic advisory systems that address a number of flight characteristics such as hover, low altitude flight, slower speeds, nuisance alerts.
- Once standards for helicopter electronic traffic advisory systems are developed, require operators of helicopters used for passenger revenue flights to install this equipment.

The NTSB issued the following recommendations to the FAA:

- Revise SOP’s for all ATC facilities, including those at Teterboro, LaGuardia airport, and Newark airports, adjoining the Hudson River Class B exclusion area in the following ways:
  a) establish procedures for coordination among ATC facilities so that aircraft operating under VFR and requesting a route that would require entry into Class B airspace receive ATC clearance to enter the airspace as soon as traffic permits,
  b) require controllers to instruct pilots with whom they are communicating and whose flight will operate in the Hudson River Class B exclusion area to switch from ATC communications to the common traffic advisory frequency (CTAF) and to self-announce before entering the area,
  c) add an advisory to the ATIS broadcast, reminding pilots of the need to use the CTAF while operating in the Hudson River Class B exclusion area and to self-announce before entering the area, and
  d) in any situation where, despite the above procedures, controllers are in contact with an aircraft operating within or approaching the Hudson River Class B exclusion area, ensure that the pilot is provided with traffic advisories and safety alerts at least until exiting the area.
Brief all ATC’s and supervisors on the ATC performance deficiencies evident in the circumstances of this accident and emphasize the requirement to be attentive and conscientious when performing ATC duties.

Amend Regulations to establish a special flight rules area (SFRA) including the Hudson River Class B exclusion area, and others; define operational procedures for use within the SFRA; and require that pilots complete specific training on the SFRA requirements before flight within the area.

As part of the special flight rules area procedures requested in Safety Recommendation, require vertical separation between helicopters and airplanes by requiring that helicopters operate at a lower altitude than airplanes do, thus minimizing the effect of performance differences between helicopters and airplanes on the ability of pilots to see and avoid other traffic.

Conduct a review of all Class B airspace to identify any other airspace configurations where specific pilot training and familiarization would improve safety, and, as appropriate, develop special flight rules areas and associated training for pilots operating within those areas.

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.

Once standards for helicopter cockpit electronic traffic advisory systems are developed, require electronic news gathering operators to install this equipment on their aircraft.

### Tajik National Guard Helicopter Crash – 6 Oct 2010 - CFIT

The Tajik National Guard Helicopter crash was an accident that occurred on 6 Oct 2010 when a Mil Mi-8 military helicopter crashed in the Rasht Valley close to Esgand and Tavildara. The helicopter became caught in power lines and crashed while attempting to land, leaving no survivors. All 28 crew on board were killed. This is the deadliest accident in Tajik aviation since 1997.


On 16 Jan 2013, at 07:59 GMT, a helicopter crashed in Vauxhall, London, after it collided with the jib of a construction crane attached to St George Wharf Tower. Two people died in the incident: the pilot, Captain Pete Barnes, 50, and a pedestrian, Matthew Wood, 39. 5 people were taken to hospital and 7 more were treated at the scene. Cpt. Barnes had been en route from Redhill Airport to Elstree Airfield to collect a passenger, businessman Richard Caring, and then fly onwards to Yorkshire. Before Barnes had taken off, Caring called him twice on his mobile phone to suggest either delaying or cancelling the flight. However, Barnes chose to proceed with the flight across London, in low cloud and freezing temperatures. After being unable to land at Elstree at 07:46, whilst returning south to Redhill, Barnes had asked ATC at 07:56 for a change of route and permission to land at the London Heliport in Battersea.

Shortly before 08:00 GMT, the helicopter collided with the jib of a construction crane attached to St George Wharf Tower in Vauxhall. The impact sent the helicopter plunging towards the ground, where it exploded. The BBC reported that the crash happened "in heavy mist". The location of the incident was near Vauxhall bus station, where eyewitnesses reported seeing a "ball of flame". An eyewitness told the BBC that he had heard a "very unusual buzzing sound" just after 08:00.
A preliminary report published by the AAIB indicated that Caring, the client Barnes was to collect, had expressed concerns about the weather and twice suggested he delay take-off. But Barnes stated that he had already started his engine, and chose to proceed with the flight across London in weather later described by the Met Office as prone to widespread low cloud, poor visibility and patches of freezing fog. After being unable to land at Elstree at 07:46, Barnes decided to return to Redhill. After being put under radar control, having entered the London CTR at 07:55, at 07:56 Barnes asked ATC for clearance to divert to the London Heliport. The ATC controller placed Barnes in a hold over the River Thames between Vauxhall Bridge and Westminster Bridge, while checking with controllers at Battersea as to whether they could accept the helicopter.

The report stated that at 07:59, just 15 seconds before hitting the crane, the final exchange between ATC and the helicopter, call sign Rocket 2, was:

- ATC: Rocket 2, yeah Battersea diversion approved; you're cleared to Battersea.
- Barnes: Lovely thanks; Rocket 2.
- ATC: Rocket 2, contact Battersea 122.9.
- Barnes: 229, thanks a lot.

After the exchange ended at 07:59:18, when the helicopter was about 150 m south-west of Vauxhall Bridge, it immediately afterwards began to turn right. At 07:59:25, it struck the crane on the south side of the river 275 m from the south-west end of Vauxhall Bridge.

The AAIB report also stated that:

- Calculations suggest that the collision happened at about 208 m AGL. The total height from the ground to the top of the crane's jib was 219 m.
- The main rotor head, gearbox, and a section of one of the four rotor blades from the helicopter, which had all separated from the fuselage as an immediate result of the initial collision with the jib, landed in the loading bay of New Covent Garden Market in Nine Elms, where they hit a delivery van.
- The solar-powered red warning lights on top of the crane were not switched on during the crash, because the official requirement was that "the obstacle be lit at night only." An official NOTAM warning had been issued about the structure.