

# Investigation Report

3X267-02  
August 2012

## Identification

Type of Occurrence: Accident  
Date: 24 November 2002  
Location: Pritzwalk-Sommersberg  
Aircraft: Helicopter  
Manufacturer / Model: Bell Helicopter Textron Canada  
Limited / Bell 412  
Injuries to Persons: 1 fatal, 3 seriously injured  
Damage: Helicopter destroyed  
Other damage: Slight crop damage  
Source of information: Investigation by BFU  
State File Number: BFU 3x267-02

## Factual Information

### History of the Flight

The helicopter took off from Berlin-Tempelhof at 2145 hrs <sup>1</sup> during the night with the pilot, co-pilot, doctor and rescue assistant on board for a flight to Pritzwalk. The intention was to pick up a patient with a life-threatening illness at the destination aerodrome of Pritzwalk-Sommersberg; the patient was from Pritzwalk Hospital, and was to be flown to Potsdam. The flight was conducted under visual flight rules and

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<sup>1</sup> All times local, unless otherwise stated

initially was uneventful. The helicopter cruised at 2,000 ft MSL. The Pilot in Command (PIC) was also the Pilot Flying (PF) and occupied the right hand seat. The co-pilot assisted the PIC by navigating using a GPS moving map display and conducted communications with air traffic services.

The intended night landing site at Pritzwalk-Sommersberg aerodrome was illuminated by rescue service vehicle headlights, which were awaiting the helicopter's arrival.

When the helicopter was about 2.5 nm southeast of the aerodrome, the PIC asked the rescue vehicle crew to switch on their blue lights; the rescue crew subsequently stated that at this time their blue lights had already been switched on. The PIC stated that he was able to see the lights shortly afterwards. He then descended from the cruise altitude and aided by directions from the co-pilot flew west around the airfield before adopting a heading of about 100° towards the landing zone. At this point the helicopter was flying at about 110 kt and about 350 ft above ground (650 ft AMSL; see reconstructed flight track in Appendix). The PIC subsequently reported that he had not perceived the airspeed as being that high. His sole intention had been to keep the speed above 60 kt as long as possible, because the autopilot can only be engaged above this speed. As the helicopter approached the landing zone more closely, the PIC determined that a landing was not possible because of the high forward speed and therefore decided to fly a 360° turn to the right and allow speed to decrease. After having completed a turn through approximately 180°, the helicopter overflew the rescue vehicle at low altitude. The PIC stated that at this moment, the helicopter entered a fog bank that had not been previously observed. A number of witnesses subsequently stated that the helicopter's landing lights were not switched on during the approach. Using the artificial horizon, the PIC immediately returned the helicopter from the banked attitude to the normal level attitude and attempted to arrest the descent by combined use of increased power and pitch, and initiate a climb. The helicopter continued to fly straight ahead on a heading of 260° for a distance of about 300 m at high forward speed. At 2216 hrs the aircraft made contact with the ground and turned over. On impact, the PIC was thrown out of the helicopter together with his seat. The doctor and rescue assistant were able to escape from the wreck unaided. The co-pilot was fatally injured by the impact.

## Personnel Information

The 44 year-old PIC had worked as a helicopter pilot for the helicopter operator since March 1996. He had worked for several civil operators from 1987 to 1996. During this latter period he had also made many air ambulance flights. He was a military helicopter pilot from 1977 to 1987. He obtained an Air Transport Pilot's Licence (ATPL-B) with instrument rating for helicopters in 1997 (minimum decision height for instrument approaches 60 m) and type ratings for the Bell 412 and 212. His total helicopter flight time was about 5,600 hours.

The BFU has gotten different information as to the spread of the flight time. His instrument flight time was about 110 hours, of which 47 to 69 hours were on helicopters. His night flying experience was between 787 and 829 hours. In the last 90 days prior to the accident he had flown 59 hours; within the previous seven days he had flown between four and seven hours, and within the previous 24 hours he had flown between two hours and 25 minutes and four hours and 17 minutes of which between 40 minutes and one hour and 22 minutes were at night. He had been on standby duty for three days prior to the accident.

Witnesses stated that, by reason of his lengthy service as an air ambulance pilot, the PIC had considerable medical knowledge.

The co-pilot was 53 years old and had worked for the operator since May 2002 as a so-called freelance pilot. He began flying in 1968 with the military and had been qualified as a military instructor with Instrument Rating and was a maintenance test pilot. He also had type ratings for the UH-1D, CH-53 and AL-II. He retired from the military in March 2002. Since then he held a Commercial Pilot's Licence (CPL-B) for helicopters with type ratings as second pilot for the Bell 212 and 412. His total helicopter flight time was approximately 5,200 hours, of which about 270 hours in accordance with Instrument Flight Rules (IFR). He had more than 300 hours night flying experience. In the 30 days prior to the accident he had flown about 30 hours; within the previous seven days he had flown eight hours, and three hours within the previous 24 hours. At the time of the accident he had been on standby duty for five days.

The two pilots had flown a total of seven air ambulance flights together on four different days with 6.5 hours flight time.

## Aircraft Information

The Bell 212 was powered by two gas turbine engines and had a maximum take-off mass of 5,400 kg. It was built in 1993 and had flown a total of about 3,800 hours with 11,200 landings. The last maintenance check was completed on 18 January 2002. There were no open points on the Hold Item List.

The helicopter was equipped and approved for flights in accordance with Instrument Flight Rules. In addition to the normal equipment for instrument approaches, the helicopter was further equipped with a GPS, a three-axis autopilot (Sperry SHZ 412), a radar altimeter, a second COM transceiver, a BOS transceiver (official network for authorities and security functions) and weather radar. The radar altimeter was coupled to displays for both pilots.

## Meteorological Information

Prior to the flight the PIC had obtained an individual flight weather briefing by telephone at 2120 hrs from the DWD (German Weather Service) at Berlin-Tempelhof for the flight from Berlin Tempelhof to Pritzwalk, and the planned onward flight to Potsdam. The Pritzwalk weather situation inferred from this briefing is presented in an Appendix.

At the request of the BFU, the DWD provided the following weather expertise for the accident location:

"On the day of the accident, the airspace in question was on the southwest flank of a high pressure zone centred over Russia. The pressure gradient was low and there was a weak, generally east to southeast airflow. During the evening, the high-pressure weather conditions continued with no changes in some places. However, in northeast Germany there were areas of moist mist, fog and stratus cloud. Combined with an occlusion, which was present west of the River Elbe at the time of the accident, this airspace had widespread cloud at medium and high altitudes. East of the River Elbe there was occasional but very slight precipitation during the evening. At the time of the accident, the surface wind in the vicinity of Pritzwalk was 080 to 130 degrees at 0 to 6 kt. The wind at 1,000 ft was 130 to 160 degrees at 10 to 15 kt; at 2,000 ft it was 140 to 170 degrees at 15 to 20 kt. The air temperature and dew point at ground level (measured 2 m above ground) was about 5 to 6°C. The air pressure measured by the Berlin-Tempelhof weather station was 1,013 hPa QNH. On the route to Pritzwalk, there was little (FEW) and scattered (SCT) stratocumulus cloud between 3,000 and 3,500 ft above ground, while the main cloud base (5 to 6 oktas) was between 8,000 ft and 12,000 ft above ground. In addition, there were areas of high cirrus cloud. At the time of the accident, areas of fog occurred in the vicinity of Pritzwalk. The horizontal visibility on the ground was between 500 and 1,000 m,

though in places was less than 500 m. The fog bank maximum altitude varied from place to place and was probably between 100 to 500 m above ground, though the presence of thin surface fog cannot be excluded.”

At the time of the accident the moon was 19.4 days old, and was thus in the phase between full moon and the last quarter. The azimuth was 77° and height 21°.

The rescue vehicle crew subsequently reported that conditions had been foggy. Various estimates were made of the horizontal visibility of between 50 m and more than 100 m.

## Aids to Navigation

The approach to the landing zone was made using visual references. The aids to navigation included a permanently installed GPS receiver (Trimble TNL 2000 Appr. Plus) that could be coupled to the autopilot and a further GPS with a portable Moving Map Display. The PIC said that this equipment was used to assist in navigation.

The air traffic control radar trace of the approach recorded at the time is presented in an Appendix. The indicated speeds were calculated by the radar system of the ATC provider. The altitude indications were calculated based on the values transmitted by the transponder of the helicopter under consideration of the prevailing air pressure.

## Communications

During the flight from Berlin-Tempelhof to Pritzwalk the crew maintained contact with Berlin Departure on 120.625 MHz. Neither prior to nor during the approach to Pritzwalk, the crew did not advise Berlin-Departure that they were leaving the frequency. Radio communications were recorded and the recording was made available to the BFU as a transcription.

The flight crew established contact with the emergency rescue services in Pritzwalk via the BOS network. These communications were conducted by the PIC, who stated the co-pilot was not familiar with operation of the BOS system. No recording of these exchanges is available.

## Aerodrome Information

Pritzwalk Special Airfield is 2 nm north of the town of Pritzwalk and 289 ft above MSL. It was licensed for use by aircraft up to 2 tons, self-launching motor gliders and sailplanes. It had an 830 m east/west (06/26) grass runway. There was a hard surface marked with an H southeast of the threshold to runway 26. The airfield had no night approach lighting. The airfield was in frequent use for air ambulance flights because Pritzwalk Hospital had no suitable landing area for helicopters.

The appended drawing of Pritzwalk-Sommersberg Special Airfield is the visual approach chart for daytime approaches in accordance with Visual Flight Rules.

The landing pad was illuminated by rescue vehicle headlights during the helicopter approach. There was no other lighting on the airfield or the immediate vicinity. The rescue vehicle had its blue emergency lights switched on.

## Flight Recorders

The helicopter was not fitted with a Flight Data Recorder or Cockpit Voice Recorder; there was no legal requirement for such equipment to be fitted.

## Wreckage and Impact Information

The point of impact was about 300 m west of the planned landing point and 100 m south of the runway centreline. The wreckage was spread along a track of 260° about 80 m long and 15 m wide.



Wreckage Area (looking towards the southwest)

Photo: BFU

The helicopter right landing skid made first contact with the ground, and then tore off. A few metres behind the landing skid, investigators found impact traces from the fuselage nose and main rotor. Parts of the fuselage nose had penetrated up to one metre into the soil. The scattered wreckage main axis continued to the west with undercarriage cross-tubes, doors and windows, aircraft documents, headsets and other fragments. The PIC's seat was found just in front of the fuselage at the western end of the scattered wreckage. The co-pilot's body was found within the wreck in the vicinity of the cockpit.



View from the front of the burned-out wreck

Photo: BFU

Inspection of the wreckage and witness interviews gave no indication that the helicopter had suffered from a technical defect.

## Medical and Pathological Information

There was no indication of any physiological or health problems on the part of the crew.

The pathological report said the co-pilot died immediately following the crash, in which he received a fatal blow to the skull central forehead.

## Fire

Immediately after impact, the helicopter caught fire and burned out completely.

## Survival Aspects

The rescue services vehicle crew at the airfield passed the first report of the accident to the Prignitz district emergency services headquarters, which was received immediately after the accident at 2218 hrs. The emergency doctor and ambulance reached the accident site about five minutes later. A further rescue vehicle arrived from Putlitz at 2254 hrs.

The three survivors left the wreck unaided.

## Organisational and Management Information

The operator was established in 1972 and had several Bell 412 critical care transport helicopters distributed over a number of locations in Germany. The accident helicopter was based at Berlin-Tempelhof. The operator was responsible for the provision of cockpit crew and helicopter technical readiness, while the medical crew was provided by a specialist organisation working with the official rescue services. This specialist organisation was responsible for payment of rescue call-out charges.

At the Berlin-Tempelhof base pilots generally had seven successive days on duty followed by seven successive days off. During their seven days, they were on standby call for 24 hours a day and occupied accommodation within the base. The days of the week when pilots came on and off duty varied, in order to ensure a continual exchange of information between different crew members. Generally, the specialist medical crew members were on duty for only 24 hours at a time and were only on standby in the base during the day. At night, they were on 30 minutes standby at home. Specialist medical crew members who lived too far away to meet the 30-minute standby requirement could spend the night at the helicopter base.

In Berlin the helicopter was called to action by the Fire Service, though given the possibility of technical or meteorological problems the call-out generally followed a telephone call from the originator to the pilot to enquire whether the mission was possible. This telephone call would advise the pilot of the medical reasons for the proposed call-out. If the pilot assessed the mission as possible, the doctor in charge of the patient would contact the emergency doctor on call to clarify the detailed medical transport requirements.

The request for the flight in question originated from Pritzwalk Hospital via the Senftenberg emergency services coordination centre for the State of Brandenburg. The staff at Senftenberg used a cost calculation computer program to determine

which of the helicopters based at Berlin-Tempelhof was most suited to the proposed mission.

### Flight Operations Handbook

The operator's Flight Operations Handbook defined the minimum requirements for Helicopter Emergency Medical Service (HEMS) flights in accordance with Visual Flight Rules (VFR) at night. In addition to the minimum legal requirements it gave the minimum weather requirements as 5,000 m horizontal visibility and a minimum main cloud base of 1,500 ft. For short periods, the cloud base could reduce to 1,000 ft. If both pilots were in possession of a valid instrument rating, the requirement was reduced to a minimum horizontal visibility of 3,000 m.

The Flight Operations Handbook made no stipulations for VFR approaches. Chapter 4.8 IFR Approach Procedures, Section 4.8.6 stated that noise must be reduced to an unavoidable minimum during VFR approaches, and that helicopters should avoid flying over built-up areas. Chapter 4.9 Landing only stipulated the calculation of landing lengths and power requirements.

### Training Handbook

The operator's Training Handbook, Chapter 6.4 Approaches; Item 6.4.1 General, stated that the PF must plan the approach in good time and must familiarise himself with the approach and missed approach procedures; also that he must conduct an approach briefing as defined under item 5.3.3 of the Training Handbook. This item repeated the instruction to avoid unnecessary noise. In addition, under 300 ft GND the PF should not allow a sink rate in excess of 500 ft/min. For VFR approaches to an unknown landing site Section 6.4.3. instructed that the site should be inspected from the air prior to the approach, which should be chosen in accordance with the following criteria: wind direction, emergency landing sites under the approach path, available power, obstacles and noise abatement.

The approach briefing procedure was set out in Chapter 5.3.3 and required the PF to conduct an approach briefing for all approaches, whether IFR or VFR. The approach briefing was to be issued in good time before over-flying the Initial Approach Fix (IAF)<sup>1</sup> and cover the following points: Type of Approach and RWY, Minimum Sector Altitude, Final Approach Course and Descent Point, Check Altitudes, Inbound

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<sup>1</sup> Point where the approach begins; abbreviation was not explained in the handbook

Timing, Decision Height, Minimum Descent Altitude, Missed Approach Point and Missed Approach Procedure.

Chapter 6.5 Landing stated that whenever possible, VFR landings were to be conducted in accordance with Category A Normal Profile or Vertical Type procedures (see graphic presentation in Appendix). The pre-landing check should be completed at the latest before descending through 500 ft GND. By the time the helicopter was descending through 300 ft above ground, the sink rate was to be a maximum of 500 ft/min.

Chapter 6.7 Night Flying specified that the radar altimeter is to be set to at least 500 ft during night flying. The chapter further specified that should the weather situation deteriorate, the helicopter was to return to base or continue the flight in accordance with Instrument Flight Rules; prior to departure, the crew was to ensure that where a landing was intended other than at an aerodrome, adequate lighting would be guaranteed. Arrivals and departures to and from landing sites outside aerodromes were to be flown as steeply as possible; shallow climbs were to be kept to the minimum necessary. In such cases, it was the duty of the PNF to verbally report the power settings and sink rate and to illuminate the approach and departure sectors with the spotlight.

In addition to the items mentioned above, Chapter 5 Crew Coordination Concept and Checklist Philosophy of the Training Handbook defined the division of tasks and general rules of communication between the pilots. For example, it is the responsibility of the PNF to advise the PF of deviation from planned parameters, and if necessary to assume control of the helicopter if a dangerous situation should occur. The Handbook distinguishes further between standard, procedure and deviation calls. Most of the examples cited relate to flights in accordance with IFR.

## Additional Information

As a result of the accident, the helicopter was unavailable to complete the mission and the patient was transported by road. He died during the journey.

# Analysis

## General

The helicopter impacted the ground at a very shallow angle in a straight line at a relatively high forward speed. This indicates that the helicopter was at this time under the control of the pilot. Post-crash examination of the helicopter and the pilot's statement gave no indication that there had been a technical defect. The inference is that the helicopter was in faultless operation at the time of the accident. A technical problem is thus excluded as a contributory cause to the accident.

## Flight Operations

### Flight Crew Qualifications

Both members of the flight crew were adequately qualified and experienced for the planned flight. Both pilots had more than 5,000 hours flight time, an above-average level. Both pilots also had sufficient night flying experience.

The PIC's post-crash statement indicated that the co-pilot was not sufficiently familiar with operation of the BOS communications network. This statement stands in contradiction with the division of tasks laid down in the operator's Training Handbook, under which the PNF should undertake the communications tasks. The conclusion is that the operator had not ensured that all flight crew members had been adequately prepared for all their tasks.

### Operational Procedures

In the absence of further reference points such as runway lights or approach lights, helicopter night time visual approaches (VFR-Night) to a poorly illuminated landing surface represent a challenge to the crew which is at least as demanding as an instrument approach in IMC. The most important requirement for a safe landing is a stable approach within the helicopter's power parameters and the use of all available cockpit aids. It is necessary to set down an exact and detailed description of the procedure and to define clear limits for possible deviations (e.g. from the approach speed, the rate of descent, yaw and pitch) which necessitate the initiation of a missed approach procedure. This is the only means by which mistakes can be recognised in good time and avoided. This is even more important in HEMS missions, in which the

helicopter crew is frequently asked to land at off-licensed airfields, and for which the adoption of standard operating approach procedures provides the crew with additional safety margins. The operator did not take these factors into account when laying down the operational procedures. There was no clear procedure set down for the establishment of a stable approach under VFR conditions, nor clear criteria for the initiation of a missed approach, or clear requirements for the practicable implementation of the crew coordination concept. Although the Training Handbook specified an approach briefing for VFR flights, the subsequent list of points adopted almost exclusively IFR terminology, thereby giving the impression that a briefing of this kind was required primarily for IFR approaches. The description of approach briefings completely overlooked the particular difficulties associated with Night VFR operations. Further, no call out was specified for a VFR missed approach.

The BFU is of the opinion that for safe flight operations of an operator it is required that all operating situations which can arise regularly will be extensively and in detail described in the flight operations handbook. The result is that the crews have all information and procedures necessary for a particular situation available to them, all situations can be completed in the same way, different crew members can still work together in an optimal manner and safety-relevant deviations become obvious a lot faster. It is not sufficient that the crews have to find the information about an operating situation in different paragraphs of various documents. The BFU is of the opinion that a VFR-Night approach to a sparsely lit landing site is such an operating situation which should be described in detail.

The fewer the number of optical reference points; the more difficult it is for the crew to achieve a stable approach. Chapter 6.7 of the operator's Training Handbook stated that, prior to a flight to a landing site outside an aerodrome, enquiries must be made to ensure that adequate lighting would be guaranteed. The Training Handbook did not say whose responsibility it was and how this was to be communicated to the flight crew, so that prior to the flight they would be certain of finding satisfactory landing arrangements on arrival at the landing site. Nor did the Handbook define what was regarded as adequate lighting. The BFU is of the opinion that such an undefined requirement for adequate lighting contradicts the object and purpose of a flight operations handbook and is therefore not sufficient. The minimum suitable night time lighting requirements for a helicopter are given in the German Armed Forces Search and Rescue Handbook (see appendix). The Handbook states that the minimum requirement is for two vehicles that must be so positioned that their headlights illuminate the landing terrain, while the vehicle rear lights should point towards the helicopter approach path.

The procedures described in the operator's handbooks envisaged preparation of the helicopter's approach to land by an approach briefing; in the case of unknown terrain, the approach was to follow an inspection of the terrain from the air. These two elements were intended to give the flight crew an awareness of any special hazards associated with the approach, to determine the options and clearly identify possible alternatives should any changes become necessary.

The radar trace record and wreckage distribution clearly show that the helicopter approach speed was very fast. There can be no doubt that the speed at the Landing Decision Point (LDP) was not reduced to the required 40 kt. The initiation of a 360° turn to the right in order to decelerate the helicopter demonstrates that the flight crew was aware of this situation. However, the decision to fly a 360° turn when close to the ground with a helicopter of this size was inappropriate under the meteorological conditions then pertaining. The only option to complete the flight safely under these conditions, would have been to abandon the approach and climb to a safe altitude to make a new assessment of the entire situation.

### Weather

At the time the helicopter departed the general weather pattern did not make it possible to know with any certainty if the conditions at the destination would meet the minimum requirements for the mission. Stratus cloud was developing north of the destination area but the exact cloud boundary was unknown. However, there were good visual flight conditions south of this boundary and the flight crew decision to make the flight is not open to question.

It was not possible to determine the exact weather situation at the time of the accident with absolute certainty. The DWD expertise stated that horizontal visibility below 300 ft GND was between 500 and 1,000 m, which was clearly less than the required minimum of 5,000 m. In addition, the rescue crew on the ground described the surface weather as foggy. It is thus certain that horizontal visibility was less than the required minimum of 5,000 m at the time of the helicopter's approach. Also, a number of witnesses stated that the helicopter had approached without the use of landing lights; this is further confirmation that the horizontal visibility was limited, and that the flight crew had not switched on the searchlight in order to prevent reflected glare. Under these circumstances, an approach could not be made without increased risk for the helicopter and its crew.

### Communications

During the approach to land, communication was possible between the helicopter and the rescue vehicle at the landing site via the official BOS network. This communications link was not used to ask for a report of the ground weather conditions. It is very probable that one reason for this was that the PIC was fully occupied with flying the approach, and that the co-pilot was not totally familiar with operation of the BOS transceiver.

### Aids to Navigation

The helicopter was well equipped to make an approach in conditions of poor visibility. However, the history of the flight does not indicate that the equipment available was used to maximise safety and stability of the approach.

### Aerodrome

The Appendix includes a circuit diagram for Pritzwalk Special Airfield; the circuit pattern is not legally binding for night approaches by helicopters, nor is it designed for use by helicopters. Nevertheless, the circuit diagram represents a good basis upon which to plan an approach. It can safely be assumed that the published track around the circuit is free of obstacles. This is true both of the approach and departure sectors. However, an approach should always be flown into the wind and along the chosen track where obstacle clearance was given. Fundamentally, the airfield was suitable as a landing site for this mission. However, under the circumstances, illumination of the landing zone by headlights from a single vehicle only was not optimal.

### Human Factors

Under the overall conditions then pertaining, the PIC's decision to make the flight was understandable. Although he could not have known with total certainty that a landing was possible at the destination, he was aware that the patient was suffering from a life-threatening condition. On the basis of his considerable medical knowledge it can be assumed that the PIC was well aware of the urgency of the situation and mission. Given that the transport of patients with life-threatening conditions is the operator's regular business, not too much emphasis should be placed on the importance of the associated pressures to succeed in completing the mission. Normally, during pre-

flight preparation the importance of the mission should call for the selection of one or more alternate landing sites should the weather at the preferred landing site, as in this case, be below the safe minimum. However, in this case no alternates were selected. When the weather deteriorated during the flight to below the minima, the flight crew was then faced with the choice of either abandoning the flight and subjecting the patient to the increased risk of transport by road, or to continue the flight in spite of very critical weather conditions. It is highly probable that this was not an exceptional situation for the crew. The problem was made more difficult by the fact that, during the flight, the actual visibility could only be estimated. It is fair to assume that when in doubt the estimate would be a generous one in the interests of the patient, and that the crew would therefore frequently operate below the safe minima laid down. In order that a helicopter can operate safely within these extended limits, this type of operation requires detailed procedures adapted to the type of operation; these procedures must be self-evident and always implemented. However, such procedures were absent from the operator's handbooks.

The history of the accident flight indicates that, without any self-evident need, the crew deviated from the existing, very limited, set of requirements and procedures, which indicates that the crew did not regard them as binding and forming part of the normal routine. The existing Crew Coordination Concept was not effectively implemented; in other words the usual procedure- and deviation calls did not result in timely analysis of the situation and rectification, or abandonment of the flight.

### Survival Aspects

The co-pilot died immediately after impact from a skull injury to the centre of the forehead, probably caused by contact with a projection within the helicopter's interior.

## Conclusions

### Findings

- The operating procedures contained in the operator's handbooks did not adequately cover the actual circumstances or requirements of VFR operations.
- The operator's handbooks did not lay down who was responsible for the provision of adequate illumination of a night landing site, and how the lighting was to be arranged.
- The operator did not have a functioning Crew Coordination Concept.
- The maintenance records show that the aircraft was maintained in accordance with the existing regulations and approved procedures, and was properly maintained.
- There was no indication of a structural failure or system failure prior to the accident.
- Both pilots were highly experienced.
- Members of the flight crew were licensed and properly qualified for the flight in accordance with the existing legal requirements.
- At the start of the mission the weather situation was good enough for the intended flight; however, at this point the crew was already in possession of information indicating that a landing at the destination might not be possible.
- Radio communications were not handled consistently by the PNF.
- The flight was not abandoned when it became clear that the conditions for safe continuation of the flight no longer existed.
- The weather at the destination did not meet the minimum requirements for the mission. Therefore, the weather at the destination did not meet the requirements for the mission.
- Illumination of the landing site by one emergency vehicle was not optimal.
- The crew continued the approach although the framework conditions did not meet the requirements.
- The approach was not flown to a profile that would result in a stabilised final approach.
- Insufficient use was made of available aids to navigation, to guide the helicopter to a stabilised final approach.
- At no time was the approach stabilised to within the prescribed limits.
- The approach was not abandoned when it became clear that a stabilised direct approach was not possible.
- The crew continued the approach although the required criteria had not been met on arrival at the LDP.
- The 360° turn initiated by the crew to decelerate the helicopter was unsuitable for completion of the flight on a sufficiently high safety level.
- The available cockpit resources were not used in full.
- The flight crew was overwhelmed by resulting situation.

## Causes

The accident was caused by

- a not stabilised approach due to insufficient use of the helicopter's technical equipment and insufficient Crew Resource Management
- the decision to continue the visual approach to land in the presence of inadequate weather conditions and insufficient illumination of the landing area
- insufficient operating requirements or procedures in the operator's flight operations handbook for Night VFR operations, or implementation of the Multi Crew Concept.

## Safety Recommendations

Recommendation No. 25/2012

The LBA (German Civil Aviation Authority) should ensure that Operators conducting VFR-Night approaches to sparsely lit landing sites, should specify practical and detailed procedures in their handbooks that are appropriate to the special demands of this type of operation, and which specify systematic, consistent and comprehensive use of the resources available to the conduct of the flight.

Investigator in charge Kostrzewa  
Assistance Schöneberg  
Rokohl  
Severin

This investigation was conducted in accordance with the Federal German Law Relating to the Investigation into Accidents and Incidents Associated with the Operation of Civil Aircraft (*Flugunfall-Untersuchungs-Gesetz - FIUUG*) of 26 August 1998.

The sole objective of the investigation is to prevent future accidents and incidents. The investigation does not seek to ascertain blame or apportion legal liability for any claims that may arise.

The present document is the translation of the German Investigation Report. Although efforts were made to translate it as accurate as possible, discrepancies may occur. In this case the German version is authentic.

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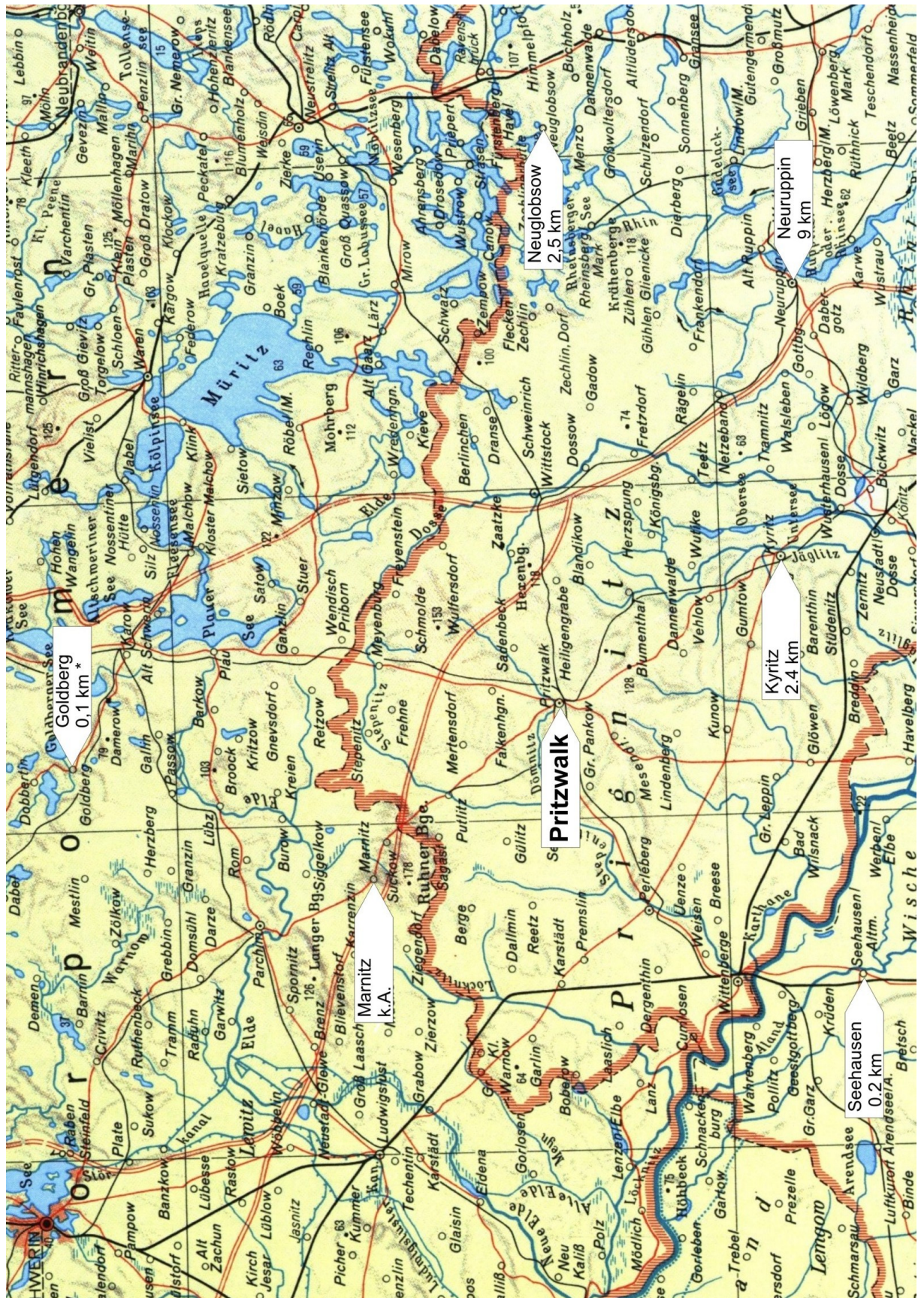
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Appendices

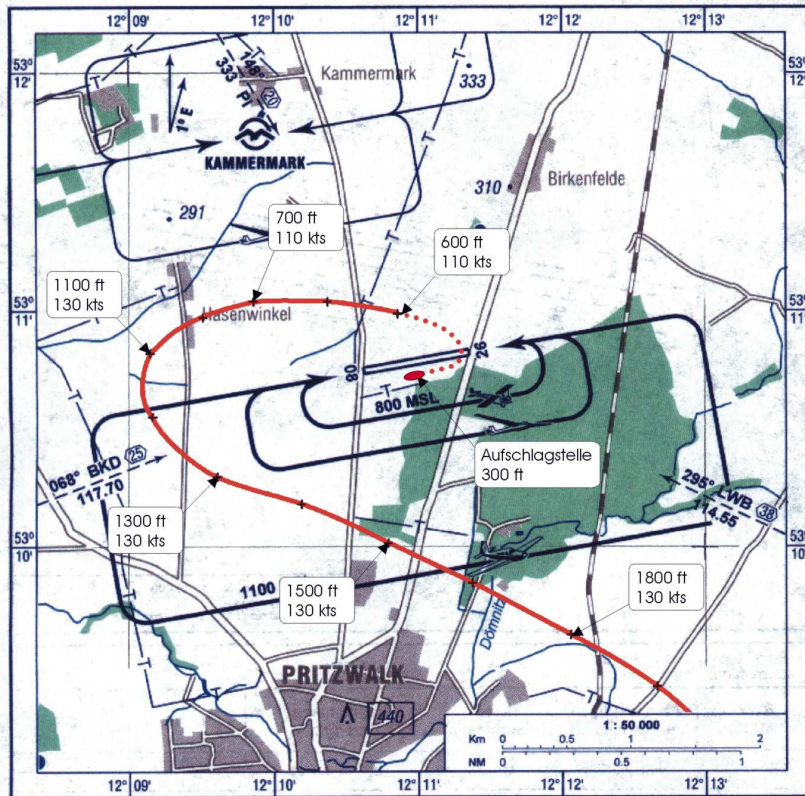
Weather situation before the flight



Surface Visibility measured at 22:00 (\*at 21:00)



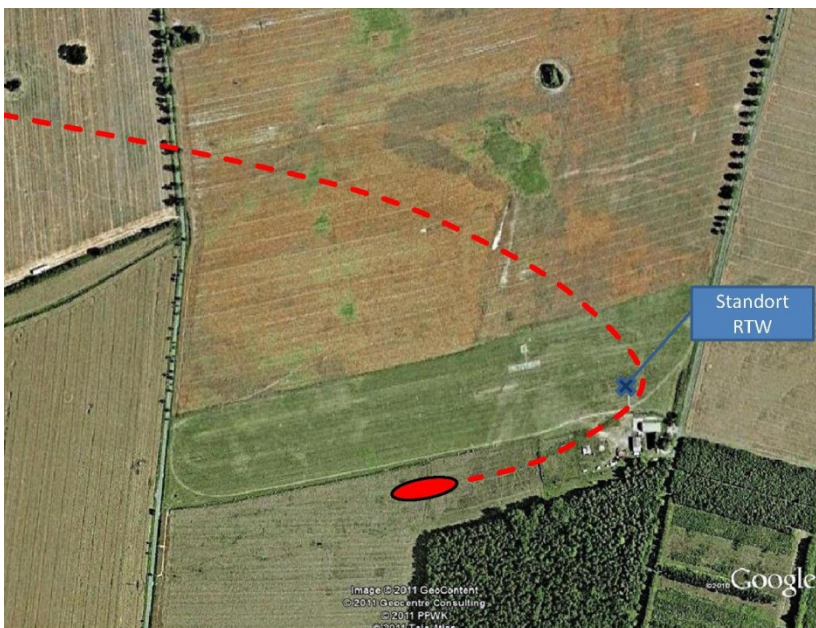
Flight Track



- Flugweg gemäß RADAR-Aufzeichnung
- ..... Flugweg gemäß Zeugenaussagen

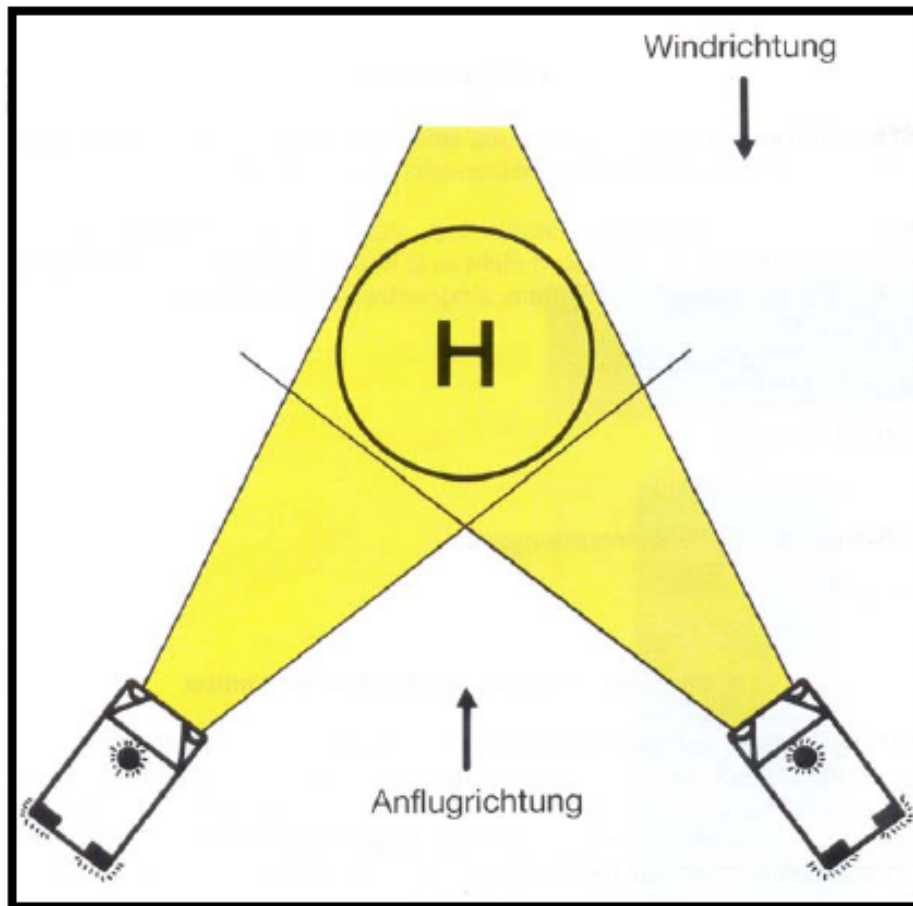
The speeds stated were calculated based on the radar trace record provided by Air Traffic Control services. The height information is based upon transponder responses from the helicopter and corrected for the current air pressure.

Picture to illustrate the approach



## Illumination of Night Landing Terrain

## 814. Notbefeuern von Nachtlandeplätzen

**Landerichtung**

wird durch Aufstellung von zwei Fahrzeugen gekennzeichnet. Der Anflug erfolgt zwischen beiden Kfz hindurch.

**Beleuchtung**

zwei Kraftfahrzeuge mit aufgeblendetem Fahrlicht, die aus sicherem Abstand die Landefläche ausleuchten.

**Anmerkung:**

Vorhandene Rundumleuchten (z.B. Polizei- und Krankenwagen) sollten zum besseren Auffinden des Landeplatzes eingeschaltet, beim Abflug des Hubschraubers jedoch wieder ausgeschaltet werden, um eine Blendung des Piloten zu vermeiden.

## LEGENDS

SAR Handbuch	Search and Rescue handbook
Notbefeuern von Nachtlandeplätzen	Emergency Illumination of Night Landing Terrain
Windrichtung	Wind Direction
Anflugrichtung	Approach Direction

**Landerichtung** wird von zwei Fahrzeugen gekennzeichnet. Der Anflug erfolgt zwischen den beiden Fahrzeugen hindurch.

**Landing direction** is marked by two vehicles. The approach is between the two vehicles.

**Beleuchtung** zwei Kraftfahrzeuge mit aufgeblendeten Fahrlicht, die aus sicherem Abstand die Landefläche ausleuchten.

**Illumination** two vehicles with headlamps switched to main beam, illuminating the landing terrain from a safe distance.

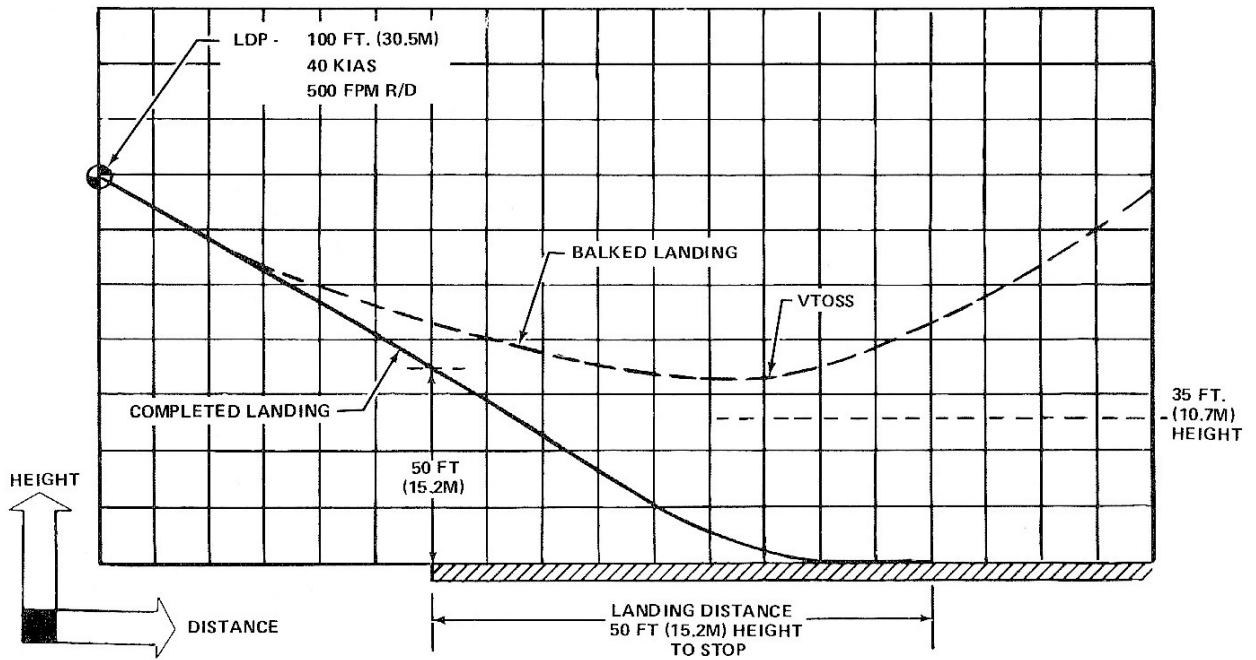
**Anmerkung:** Vorhandene Rundumleuchten (z.B. Polizei- und Krankenwagen) sollten zum besseren Auffinden des Landeplatzes eingeschaltet, beim Abflug des Hubschraubers jedoch wieder ausgeschaltet werden, um eine Blendung des Piloten zu vermeiden.

**Note:** Any available lighting around the landing zone (e.g. police cars or ambulances) should turn on their lights to help with identification of the landing zone; these lights should be switched off prior to the helicopter departure to avoid dazzling the pilot.

Extract from Flight Manual Supplement BHT-412-FMS-10.3

Category A Operation, Standard Type Landing

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Extract from Flight Manual Supplement BHT-412-FMS-22.3

Category A Operation, Vertical Type Landing

