

AVIATION INVESTIGATION REPORT

A03W0074

LOSS OF CONTROL—INADEQUATE ROTOR RPM

TREK ENTERPRISES INC.

ROBINSON R44 HELICOPTER C-GRDI

PEACE RIVER, ALBERTA 10 NM SE

09 APRIL 2003

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

## Aviation Investigation Report

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### *Summary*

On 09 April 2003, a Robinson R44 helicopter, registration C-GRDI, serial number 0900, departed on a local familiarization flight from the Trek Enterprises facility, approximately 10 nautical miles southeast of Peace River, Alberta. The pilot-in-command was accompanied by the company's chief pilot designate, who was on-board to acquaint himself with the pilot and the aircraft. After a series of circuits, the helicopter was flown to the company's practice area where a number of practice autorotations with power-on recoveries were conducted. At least twice during these exercises, the engine rpm was allowed to exceed the prescribed limit. During the fourth autorotation, while the helicopter was being flown by the pilot-in-command, the airspeed and rotor rpm decreased to such a point that the helicopter could not maintain flight and subsequently crashed into a treed area. The helicopter was substantially damaged; there was no post-impact fire. Both pilots suffered severe injuries to their lower extremities. The accident occurred at approximately 1515 mountain daylight time.

The search and rescue satellite system reported an emergency locator transmitter activation and was able to calculate an accurate site location on the second sweep. The helicopter was found by the owner at about 2000 mountain daylight time using a neighbouring company's helicopter. The pilots were evacuated to the Peace River hospital, and then to facilities in Edmonton, Alberta.

*Ce rapport est également disponible en français.*

## *Other Factual Information*

The occurrence flight was preceded earlier in the morning by a familiarization flight with the pilot and the company owner/operations manager, a non-pilot, on-board. This flight lasted approximately one-half hour and consisted of circuit practice and local area flying. After lunch, the pilot-in-command (PIC) departed with the chief pilot designate (CPD) on another familiarization flight. The PIC had been operational with the company the previous year and was scheduled to begin operational flying again within the next two days. CPD, for his impending position as chief pilot and training pilot, was a passenger on the flight, getting to know the PIC and gaining some experience on the R44 helicopter.

The flight was not intended to be a training flight, and neither pilot engaged in a pre-flight briefing to discuss flight training concepts and procedures. During the flight, the CPD asked to see some flight demonstrations, particularly, autorotation exercises with power-on recoveries. The PIC had some misgivings about conducting the exercises, but his perception was that the CPD possessed sufficient helicopter experience to ensure the safety of the flight. He was also cognizant of the CPD's impending appointment as chief pilot.

The CPD proceeded to demonstrate the first autorotation with the PIC following through on the controls. During the power-on recovery, the CPD asked that the power be checked. The PIC noted that the throttle was not fully open and proceeded to apply full throttle. At this time, an engine overspeed condition in excess of 114% was observed, with corresponding main rotor overspeed (the gauge limit is 114). A subsequent autorotation resulted in the PIC inducing a second overspeed condition of about 110%.

On the fourth autorotation, with the PIC flying, the helicopter's airspeed was allowed to decrease to approximately 50 knots during a right-hand turn toward the practice field. At this time, the low rotor rpm horn sounded, and the cyclic and collective controls began to move erratically. The CPD did not intervene, as he was unfamiliar with the helicopter, and he assumed that the PIC had the helicopter under control. The helicopter then descended into a wooded area adjacent to the practice field and struck the ground.

The R44 possesses a low-inertia main rotor system, and the *Aircraft Flight Manual (AFM)* recommends that practice autorotations be conducted at 70 knots indicated airspeed. There is also the caution that "during simulated engine failures, a rapid decrease in rotor rpm will occur, requiring immediate lowering of collective control to avoid dangerously low rotor rpm". *Robinson Safety Notices (SN) SN10, SN20, & SN24* address the issues of low rpm rotor stall in R44 helicopters.

No reference was found regarding overspeed restrictions in the AFM, with the maximum allowable engine rpm of 102% (2692 rpm) being specified in the limitations section. The *Robinson Maintenance Manual Model R44 (MMR44)*, Section 2.540, refers to Textron-Lycoming Service Bulletin 369 which states that for rotary wing aircraft using Textron-Lycoming engines, "no momentary overspeed is allowed". MMR44, Section 2.540, also addresses different levels of rotor system overspeeds and the inspection criteria for each level. The PIC was aware of the restrictions but, in spite of his misgivings, decided to continue with the flight.

The PIC held a valid commercial pilot licence (helicopter), was endorsed on the R22 and R44, and was awaiting endorsement on the Bell 206 (BH06) helicopter. He had a total flight time of approximately 375 hours, of which about 270 hours were on the R44, including 56 hours flown the previous season from April 2002 to September 2002. He had completed a company pilot proficiency check flight on the R44 on 26 April 2002.

From January 2003 to March 2003, the pilot had completed 20 hours of flight training on a BH06 toward a type endorsement. The BH06 differs from the R44 in that it has a high-inertia main rotor system whereby the rotor rpm does not decrease as rapidly with airspeed and power changes as that of the R44. He was scheduled to begin flying operationally on 11 April 2003 and had not been at the controls of an R44 since he left the company at the end of the flying season in September 2002.

Under existing regulations, the PIC met the requirements of *Canadian Aviation Regulations (CARs) 401.05* concerning pilot recency and currency. The flight crew member qualifications under *CARs 703.88* and the *Company Operations Manual (COM) 2.15* were also met, in that the required three take-offs and landings had been completed during the training undertaken on the BH06. Sufficient take-offs and landings in the R44 were accomplished during the previous flight with the operations manager and the subsequent flight prior to the autorotation exercises. Neither the *CARs* nor the *COM* require a review of emergency procedures in order to meet the flight crew qualification beyond the annual pilot proficiency requirement. Annual company recurrent training (*COM section 5.6.8*) refers to the program outlined in the initial pilot training program. No reference is made to the seasonal nature of the work where pilots have not been flying for a considerable period of time.

The CPD held a valid airline transport pilot licence (aeroplane) and a commercial pilot licence (helicopter) with endorsements on 10 different types of helicopters. His total flight time was 8652 hours on fixed-wing aircraft and 6023 hours on helicopters. He had recently returned to helicopter flying after having flown primarily fixed-wing aircraft for the previous 2½ years. In the last year, he had accumulated about 150 hours of flight time, of which 15 hours were on helicopters, including 6.5 hours on the BH06. About four of the hours were flown in the week preceding the occurrence flight while he completed a self-directed training program on the BH06B with the company's former chief pilot. He was hired by Trek Enterprises on 02 April 2003 and was scheduled to conduct a Transport Canada pilot proficiency check ride in the near future for his approval in the position of chief pilot. He had no experience with, nor was he certified on, the R44 helicopter.

Weather conditions reported at 1500 mountain daylight time for the Peace River Airport were as follows: winds 330°T at 13 knots, gusting to 20 knots; visibility 15 statute miles in light rain and snow showers; broken cloud 3000 feet above ground level, temperature 5°C, dew point minus 2°C; altimeter setting 29.68, with an observed rising trend throughout the day. Weather was not considered to be a factor in this occurrence.

## *Analysis*

This analysis will examine pilot recency and currency requirements, pilot qualification to conduct flight training, pilot assertiveness, and the company's operational control of flights.

The PIC met the company's and Transport Canada's recency and currency requirements; however, the training cycle is based on a 12-month period. It is common in the helicopter industry for pilots to have significant gaps in their flying because of the seasonal nature of their employment. This was not recognized in regulations or company procedures. In this case, while the PIC had received extensive training on the BH06 prior to his returning to Trek Enterprises, he had not undergone any normal and emergency training in the R44 since his initial company training flight in April 2002. His relatively low experience level, the limited number of hours flown in 2002, the 7-month gap in flying experience over the winter, and his most recent training in the dissimilar BH06, probably contributed to the PIC not recognizing the onset of a critical flight condition before control was lost.

The PIC felt pressured to continue the flight after the first engine overspeed and, in the presence of the more experienced and higher ranking CPD, reverted, in some respects, to the role of student. As such, he continued the flight, cognizant of the overspeed limitations and inspection requirements.

The CPD was not approved as the chief pilot or qualified as a training pilot, as he was not type endorsed on the R44. Although this flight initially was not intended to be a training flight, it became one for both pilots. Accepted flight practice requires the completion of thorough preparatory ground instruction and a pre-flight briefing prior to conducting a training flight. This will ensure that both pilots understand what the intended exercise/flight is to cover, to review normal and emergency procedures, and to establish command authority.

The company, through the operations manager, did not ensure that both of the pilots were qualified and approved for the flight, and that they both understood the scope and limitations of the "familiarization" flight.

### *Findings as to Causes and Contributing Factors*

1. The helicopter's airspeed and rotor rpm were allowed to decrease to the point at which the helicopter became uncontrollable; the PIC did not recognize that the helicopter was approaching a critical flight condition and did not apply appropriate corrective actions in a timely manner.
2. The CPD was not qualified to fly the R44, and he was unable to assume control when the PIC experienced difficulties with an exercise.

### *Findings as to Risk*

1. The PIC did not have any recent experience with regards to the normal and emergency procedures of the R44 helicopter.
2. Each pilot assumed that the other possessed sufficient experience and/or proficiency in order to provide an adequate level of safety for the flight.

3. The most recent training and experience for both pilots was in the BH06, a helicopter that possesses a high-inertia main rotor system. Therefore, their training was not directly transferrable to the low-inertia rotor system of the R44 helicopter.
4. The PIC was aware of the engine overspeed restrictions and the rotor overspeed inspection requirements; however, he decided to continue the flight after the first engine overspeed.
5. There is no reference in regulations and the company's operating procedures for the training of pilots who meet regulatory requirements but have had a significant gap in flying experience.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 23 June 2004.*

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