Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION OCCURRENCE REPORT

A98Q0069

FUEL EXHAUSTION

AVIONAIR INC.

PIPER NAVAJO PA-31-350 C-GUVK

LA GRANDE 3 AIRPORT, QUEBEC, 4 NM SE

14 MAY 1998

Canada

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Summary

At 0525 eastern daylight time, a Piper Navajo PA-31, registration C-GUVK, serial number 31-7405451, with two pilots on board, took off from Dorval Airport, Quebec, on a three-day charter flight. Two passengers boarded at Rouyn, Quebec, travelling to La Grande Rivière, Quebec. All flight segments over the three-day period were planned in accordance with instrument flight rules. At La Grande Rivière, the aircraft completed a VOR/DME approach to runway 31, but could not land due to weather. A missed approach was executed, and the aircraft proceeded toward the alternate airport, La Grande 4. About 15 nautical miles north of La Grande 3, the engines misfired. The fuel selector lever was reselected, and the engines operated normally for about five minutes, and then stopped. The pilot-in-command declared an emergency and proceeded toward La Grande 3 Airport for an LOC/DME approach to runway 29. The aircraft broke through the cloud layer at approximately 300 feet above ground level and the pilot set the aircraft down in some trees beside a small lake, four nautical miles southeast of La Grande 3 Airport. The accident occurred at 0957. One of the two passengers sustained minor leg injuries. The other occupants were uninjured. They were rescued by helicopter approximately 45 minutes later. The aircraft sustained substantial damage.

Ce rapport est également disponible en français.

Other Factual Information

Records indicate that the crew was certified and qualified for the flight in accordance with existing regulations. The pilot-in-command held a Commercial Pilot Licence—Aeroplane (since 1996), and had about 1560 hours' total flying time, including 60 hours on the Piper Navajo PA-31. He also held an Instructor Rating. He had been employed by the company for a few weeks. This was his first flight for the company as pilot-in-command, and his first flight as pilot-in-command with a co-pilot. The co-pilot held a Commercial Pilot Licence—Aeroplane (since June 1997). He had about 265 hours' total flying time, including about 15 hours on type. He was on his fourth flight for the company and his first in northern Quebec.

The company does not provide cockpit resource management courses, which allow flight crews to learn teamwork and discuss decisions and actions amongst themselves. Third-level operators are not required by law to provide cockpit resource management courses. Also, the crew had not received training on the Standard Operating Procedures (SOPs) detailing the duties of each member of the crew. The work and rest schedules of the pilot-in-command and co-pilot were examined, and there was no indication that either crew member was tired.

Records indicate that the aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. It had accumulated 7776 hours' total flying time and was inspected on 07 May 1998. The weight and centre of gravity were within the prescribed limits.

The day before the accident, the pilot-in-command was advised by the company that he was going to northern Quebec for three days. He was given the details of the trip, and the acting chief pilot showed him how to prepare for the flight using *FliteStar* software. The pilot-in-command seemed to understand the software, and he prepared each segment of the route that he was to follow over the three days. He said he was comfortable with the software and appreciated the fact that it made flight planning easier. The acting chief pilot helped the pilot-in-command to prepare the first three route segments and told him to be sure to enter the data for refuellings at Rouyn, La Grande Rivière, and Kuujjuaq. The pilot did not have to check the aeronautical charts when preparing the flight, since the software computes the length of each segment, time en route, magnetic headings, and fuel consumption. Planning with the software generated an output similar to a conventional plan.

The co-pilot was off duty the day before the flight and was not present when the pilot-in-command prepared the flight plan. He leafed through the flight itinerary briefly when he arrived early in the morning, and he understood the route they were to follow. He then made the secondary preparations and completed them before the departure. The company operations manual states that the pilot-in-command is responsible for flight planning, and therefore must ensure that the fuel carried on the aircraft is sufficient for the flight. However, the company operations manual also states that the co-pilot is responsible for ensuring that the flight is completed safely.

The flight from Dorval to Rouyn was completed without difficulty. At destination, the crew allowed the passengers to board, but did not refuel as planned before taking off for La Grande. En route, the weather provided to the crew was as follows: sky obscured at 300 feet, visibility 1¼ nautical miles (nm) in light drizzle and haze, and winds from 250° magnetic at 7 knots.

On the approach to La Grande, the weather was as follows: sky partly obscured, ceiling 200 feet, visibility 1 nm in light drizzle and haze, temperature and dew point 14° Celsius, and winds from the west at 10 knots.

At the minimum descent altitude for the VOR/DME approach to runway 31 at La Grande, the pilot-in-command executed a missed approach and advised air traffic control that he was proceeding to La Grande 4, his alternate airport. About 15 nm north of La Grande 3 Airport, the engines misfired. The crew realized for the first time that the aircraft was going to run out of fuel. The fuel selector lever was reselected, an emergency was declared, and the pilots radioed La Grande to request the nearest airport, which was La Grande 3. The flight continued for about five minutes, at which time the engines came to a complete stop. The pilot-in-command attempted to line up the aircraft for an approach to runway 29 at La Grande 3. The aircraft broke through the cloud layer at 300 feet above ground level and struck some trees beside a small lake at latitude 53°33'94" N longitude 076°04'61" W, 4 nm southeast of La Grande 3 Airport.

According to the company, the maximum endurance of the aircraft is approximately 4½ hours. The fuel exhaustion occurred after 4 hours 39 minutes of flight. The total time includes cruising flight, time on the ground (where fuel consumption is lower), the two take-offs, and the missed approach (where consumption is significantly higher than in cruising flight).

Aviation regulations require that the quantity of fuel carried on propeller-driven aircraft on instrument flight rules flights must be sufficient to fly to the destination aerodrome, execute an approach or missed approach, continue flying to the alternate aerodrome, and land with 45 minutes of fuel in reserve. The pilot-in-command did not refuel the aircraft at Rouyn as planned. He was sure he had enough fuel to fly to La Grande and, if necessary, to his alternate airport La Grande 4. After take-off, neither crew member checked the flight itinerary prepared by the pilot-in-command the day before. They did not calculate en route fuel consumption as required by company directives. In addition, the *Flight Supplement* does not indicate that 100LL (low-lead) fuel is available at La Grande 3 and La Grande 4 Airports. The Navajo uses 100LL fuel.

The checklist that comes with the aircraft is not only an *aide-mémoire,* it also serves to standardize work practices methods. Checking the fuel level, fuel tank selector position, and fuel pumps is mentioned in the checklist 12 times, starting with the cockpit preparation and ending with the pre-landing checklist.

The pilot-in-command said that he noticed before departing Dorval that the fuel gauges were reading slightly below full, although the aircraft had just been fuelled. He thought the fuel gauges were defective. He said that while working for other companies he had had occasion to fly aircraft with unserviceable fuel gauges. Although the gauges indicated a steady decrease in fuel level throughout the trip, the pilot-in-command continued to suppose that they were defective and were indicating less than the actual fuel level. The crew did not calculate their fuel consumption to confirm the quantity used.

Analysis

The crew had the knowledge and experience to manage and complete the flight safely. The pilot-in-command had taught these same fundamentals as a flight instructor.

During the planning of the flight, the acting chief pilot helped the pilot-in-command enter the data in the flight planning software without referring to the aeronautical charts. Although the acting chief pilot mentioned several times that the data for refuelling at Rouyn, La Grande and Kuujjuaq should be entered, the pilot-in-command apparently did not make the association between the exercise on the computer, assimilating the information, and using that information in the overall management of the flight; the aircraft was not refuelled at Rouyn. On departing Dorval, he still had not checked the actual distances that he had to travel. As a result, he was unaware that he was not in compliance with the regulatory minimum fuel requirement when he departed Dorval. Good management also includes complying with aviation regulations and determining what services are available at various airports. Also, flying in northern Quebec demands more careful planning because the airports are far apart and 100LL fuel is not available at all airports. If the pilot-in-command had followed the flight plan, the aircraft would have had ample fuel to complete all segments of the route safely and in compliance with regulations.

The co-pilot, who was not present for the flight planning, leafed through the flight plan documents briefly before departure, but he was preoccupied with secondary duties not related to the management of the flight. He took off from Dorval without really understanding the details of the trip and subsequently did not look at the flight itinerary.

The pilot-in-command was on his first flight for the company as pilot-in-command and his first flight as pilot-in-command with a co-pilot. This was the co-pilot's fourth flight for the company, his first flight with this pilot-in-command, and his first flight in northern Quebec. The company did not consider it necessary to assign the pilot-in-command to fly with a co-pilot who had more experience flying in northern Quebec. The crew had not received training on the SOPs that detailed their individual duties.

During the flight, the crew did not use the checklist or the other flight plan documents. If the crew had used them, they would have seen that fuel-related items appear 12 times on the checklist. Further, after each flight segment the crew should have noted and recorded the fuel status on the flight plan documents. All flight plan documents are tools that standardize practices and serve as *aides-mémoire.* The crew demonstrated casual work habits. The crew should have been more cautious, considering that the pilot-in-command believed the fuel gauges were not working properly.

When the engines misfired shortly after the missed approach at La Grande, the pilot-in-command realized that the aircraft was going to runout of fuel. He then attempted to land at La Grande 3, but crashed in the woods.

Findings

1. The pilot-in-command was on his first flight for the company as pilot-in-command and his first flight as pilot-in-command with a co-pilot.

2. The co-pilot was on his fourth flight for the company, his first flight with this pilot-in-command, and his first flight in northern Quebec.

3. Flight planning was done on computer software without checking aeronautical charts.

4. The aircraft was not refuelled at Rouyn as the pilot-in-command had planned.

5. During the flight the crew did not refer to the flight plan documents, which clearly indicated refuelling at Rouyn.

6. The crew did not calculate fuel consumption en route.

7. The crew realized they would run out of fuel shortly after the missed approach at La Grande, when the engines misfired.

8. The pilot-in-command did not believe that the fuel gauges indicated the actual fuel level.

Causes and Contributing Factors

The crew did not refuel at Rouyn as planned, and did not have sufficient fuel to complete the segment. Contributing to the accident were the following: the crew did not fully understand the flight plan documents and did not calculate fuel consumption en route.

Safety Action

Prior to the accident, the company had decided to appoint a pilot as aviation safety officer, which it subsequently did. One of the company pilots took the company aviation safety officer course offered by Transport Canada, although under existing regulations this program is not mandatory for this type of operation.

The company places less emphasis on the co-pilot's secondary duties; it places greater emphasis on flight management.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles H. Simpson and W.A. Tadros, authorized the release of this report on 20 July 1999.