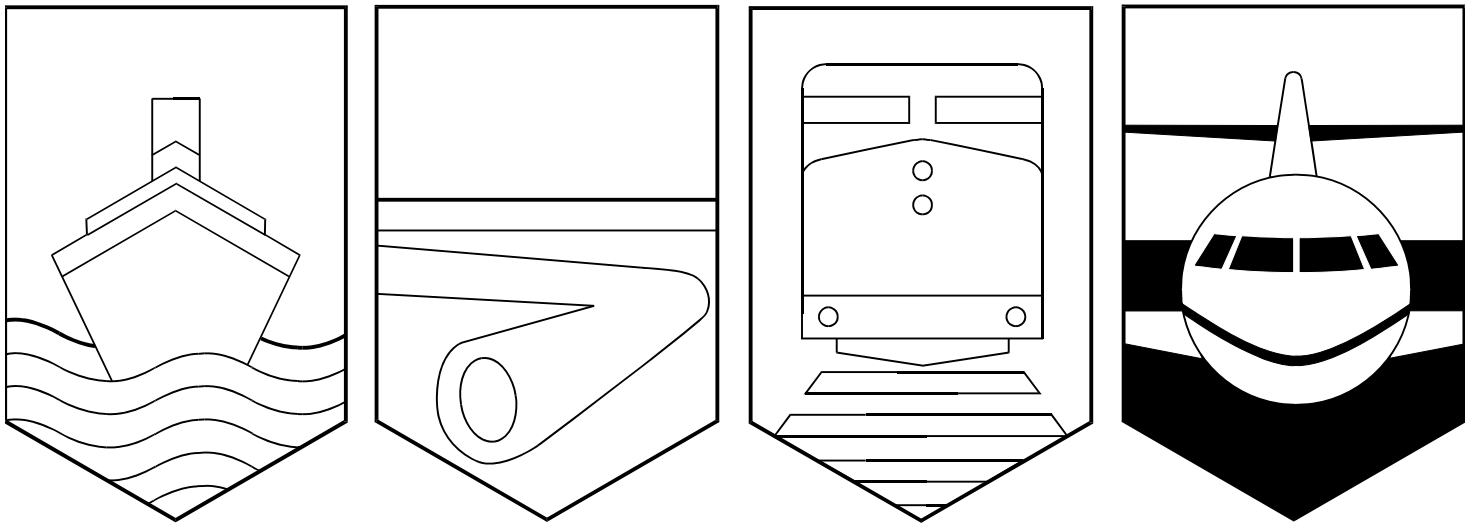
Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada



AVIATION OCCURRENCE REPORT

COLLISION WITH TERRAIN

PIPER PA 32-301T SARATOGA N8337M
RANCHERIA, YUKON TERRITORY 6 nm NNW
12 SEPTEMBER 1994

REPORT NUMBER A94W0169

Canada

MANDATE OF THE TSB

The Canadian Transportation Accident Investigation and Safety Board Act provides the legal framework governing the TSB's activities. Basically, the TSB has a mandate to advance safety in the marine, pipeline, rail, and aviation modes of transportation by:

- conducting independent investigations and, if necessary, public inquiries into transportation occurrences in order to make findings as to their causes and contributing factors;
- reporting publicly on its investigations and public inquiries and on the related findings;
- identifying safety deficiencies as evidenced by transportation occurrences;
- making recommendations designed to eliminate or reduce any such safety deficiencies; and
- conducting special studies and special investigations on transportation safety matters.

It is not the function of the Board to assign fault or determine civil or criminal liability. However, the Board must not refrain from fully reporting on the causes and contributing factors merely because fault or liability might be inferred from the Board's findings.

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Synopsis

The Piper PA 32-301T Saratoga departed Fort Nelson, British Columbia, on a visual flight rules flight to Beaver Creek, Yukon. When the aircraft failed to arrive at the destination, a search was initiated. The missing aircraft was found six days later by a Canadian Forces Search and Rescue aircraft. It had struck a steep, rocky slope in mountainous terrain at 6,000 feet above sea level. The aircraft was destroyed and both occupants had sustained fatal injuries.

The Board determined that the pilot attempted to continue visual flight in adverse weather conditions.

Ce rapport est également disponible en français.

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1.0 Factual Information

1.1 History of the Flight

The pilot and his son were on a cross-country pleasure trip from California to Alaska, via the Alaska Highway route. They departed California on 09 September and arrived in Fort Nelson, British Columbia, on the evening of 11 September. The aircraft departed Fort Nelson the following morning, at 1026 Pacific daylight saving time (PDT)[1], on a visual flight rules (VFR) flight to Beaver Creek, Yukon. At 1213, the pilot contacted Whitehorse Radio via the Watson Lake, Yukon, Remote Communications Outlet (RCO)[2] and reported his position as 24 miles south of Watson Lake at 6,000 feet. He requested and received the current weather conditions for Teslin, Yukon, and was advised of instrument flight rules (IFR) ceilings further to the west, at Whitehorse, Yukon. The aircraft was not heard from again, and, when it failed to arrive at Beaver Creek, a search was initiated. Poor weather conditions hampered the search for several days. The missing aircraft was found on 18 September 1994 by a Canadian Forces Search and Rescue aircraft. The Piper PA-32-301T Saratoga had crashed on a mountain slope six nautical miles (nm) northwest of Rancheria, Yukon. Both occupants had sustained fatal injuries, and the aircraft was destroyed.

The aircraft struck a steep, rocky slope in mountainous terrain at latitude 60°11'N and longitude 130°33'W at approximately 1315 PDT, during daylight hours, at 6,000 feet[3] above sea level (asl).

1 All times are PDT (Coordinated Universal Time [UTC] minus seven hours) unless otherwise stated.

2 See Glossary for all abbreviations and acronyms.

3 Units are consistent with official manuals, documents, reports, and instructions used by or issued to the crew.

1.2 Injuries to Persons

	Crew	Passengers	Others	Total
Fatal	1	1	-	2
Serious	-	-	-	-
Minor/None	-	-	-	-
Total	1	1	-	2

1.3 Damage to Aircraft

The aircraft was destroyed by the impact.

1.4 Other Damage

None.

1.5 Personnel Information

	Captain
Age	69
Pilot Licence	CPL (USA)
Medical Expiry Date	29 Sept 1995
Total Flying Hours	5,000
Hours on Type	400
Hours Last 90 Days	30
Hours on Type Last 90 Days	30
Hours on Duty Prior to Occurrence	5
Hours off Duty Prior to Work Period	12

The 69-year-old pilot was a retired U.S. naval aviator. He had flown Corsairs, and had been engaged in aircraft carrier operations during and following World War II. His military flying experience was reported to be between 3,000 and 5,000 hours of flight.

The pilot was licensed in accordance with existing regulations. He held an American commercial pilot license (CPL) with land, sea, single-engine, multi-engine, instrument, and rotorcraft ratings, and a class III medical certificate. He reported having 350 hours of civilian flying time at his last aviation medical, which was performed on 24 September 1993. His most recent bi-annual flight review had been successfully completed 04 January 1993. Although the pilot held an instrument endorsement, he had reportedly declined to fly IFR in recent years due to lack of instrument currency.

Witnesses who spoke to the pilot in Fort Nelson observed that he was in a talkative mood, and that he appeared excited about his flight to Alaska. He had not flown the Alaska Highway in the past. A Yukon pilot, familiar with the Alaska Highway route, offered to provide the pilot with a pre-flight route briefing in Fort Nelson; however, he declined the offer. The Yukon pilot departed Fort Nelson at approximately 0915 on a VFR flight to Whitehorse, and subsequently landed in Watson Lake due to unfavourable weather.

The pilot flight-planned for an en route time of four hours and five minutes. His flight plan indicated he would fly the V326 airway to Whitehorse and V444 airway to Beaver Creek. The comment "will attempt to follow highway" also appeared on the flight plan. The aircraft departed Fort Nelson with six hours and thirty minutes of fuel on board.

1.6 Aircraft Information

Manufacturer	Piper Aircraft Corporation
Type and Model	PA 32-301T Saratoga
Year of Manufacture	1981
Serial Number	32-8124009
Certificate of Airworthiness (Flight Permit)	Valid
Total Airframe Time	688 hr
Engine Type (number of)	Lycoming TIO-540-S1AD (1)
Propeller/Rotor Type (number of)	Hartzell HC-E3YR-1RF (1)
Maximum Allowable Take-off Weight	3,600 lb
Recommended Fuel Type(s)	100 or 100 LL
Fuel Type Used	100 LL

The pilot had owned the Saratoga since February of 1983. The aircraft had last been inspected and certified in accordance with the annual inspection requirements on 29 December 1993. The aircraft was turbocharged, fitted with an optional oxygen system, and equipped and approved for VFR, IFR, day and night flight in non-icing conditions.

Weight and balance calculations were accomplished using actual weights and estimated positions of the recovered personal gear. It is probable that the weight and centre of gravity were within the prescribed limits.

1.7 Meteorological Information

Weather data indicated a series of trowals were moving eastward across northern British Columbia and the southern Yukon. These systems were producing rain across the area near the crash site.

Weather conditions from Fort Nelson to Watson Lake were expected to be good, with VFR ceilings of 3,000 to 5,000 feet above ground level (agl). The area forecast indicated that the weather between Watson Lake and Teslin would be very marginal for VFR flight, with overcast cloud based as low as 4,000 feet asl. The communities are approximately 120 air miles apart, and are separated by mountainous terrain which rises to above 6,000 feet asl. Visibilities were forecast to be two to five miles in rain and fog. With the very moist air mass through this sector, the overcast cloud layers were expected to be topped at 20,000 feet asl. Freezing levels were forecast to be near 6,000 feet asl with occasional rime or mixed icing in clouds. The conditions were forecast to remain poor throughout the day. Similar marginal VFR weather conditions were forecast for the remainder of the route, from Teslin to Whitehorse and Beaver Creek.

The pilot received a detailed telephone weather briefing from the Fort Nelson Flight Service Station (FSS) at approximately 0945. The briefing pertained to the Alaska Highway

route from Fort Nelson west to Watson Lake, Teslin, Whitehorse, and Burwash, Yukon, and included the latest actual weather observations. The 1600Z (0900 PDT) actual sequence from the Watson Lake Automated Weather Observation System (AWOS) recorded an estimated ceiling of 200 feet agl overcast, 4,000 feet agl overcast, with a visibility of six miles in light rain. The temperature and dew point were three degrees Celsius, and the winds were 330 degrees at three knots.

The 1600Z Teslin weather was 1,800 feet agl thin scattered, estimated ceiling 4,500 feet agl broken, and 5,500 feet agl overcast, with a visibility of 15 miles in light rain. The temperature and dew point were seven degrees Celsius. Burwash is located approximately 85 nm southeast of Beaver Creek. The 1600Z Burwash weather was 1,500 feet agl scattered, estimated ceiling 3,500 feet agl broken, and 9,000 feet agl overcast, with the visibility 20 miles in rain showers. The temperature was four degrees Celsius and the dew point was three degrees Celsius. The visibility to the north was six miles in fog.

The pilot was also advised that a special observation had been issued for Whitehorse at 1630Z (0930 PDT). The observation recorded a partially obscured sky condition, with a measured ceiling of 700 feet agl overcast. The visibility was two miles in light rain and fog, and the temperature and dew point were both seven degrees Celsius. The winds were 330 degrees at seven knots and the altimeter setting was 29.58.

At the end of the weather briefing, the pilot commented to the FSS Specialist that it would be a day to "hunt and peck." He proceeded to file a flight plan, and indicated that he would either return to Fort Nelson or "stay at the one I can get to" if he encountered unfavourable weather.

1.8 Aids to Navigation

The Alaska Highway is, itself, a primary visual navigation aid for VFR pilots flying through northern British Columbia and the Yukon. The accident occurred approximately 6 nm north of the highway.

The crash site was adjacent to the centre line of the R5 low frequency airway which tracks between the Watson Lake and the Teslin non-directional beacons (NDB). The minimum obstruction clearance altitude (MOCA) for the airway is 8,800 feet asl. (See Figure 1.) Wreckage examination determined that the automatic direction finder (ADF) was tuned to the Watson Lake NDB frequency, 248 kilohertz (kHz). NDBs broadcast in the low to medium frequency radio bands, and do not require line-of-site positioning for reception.

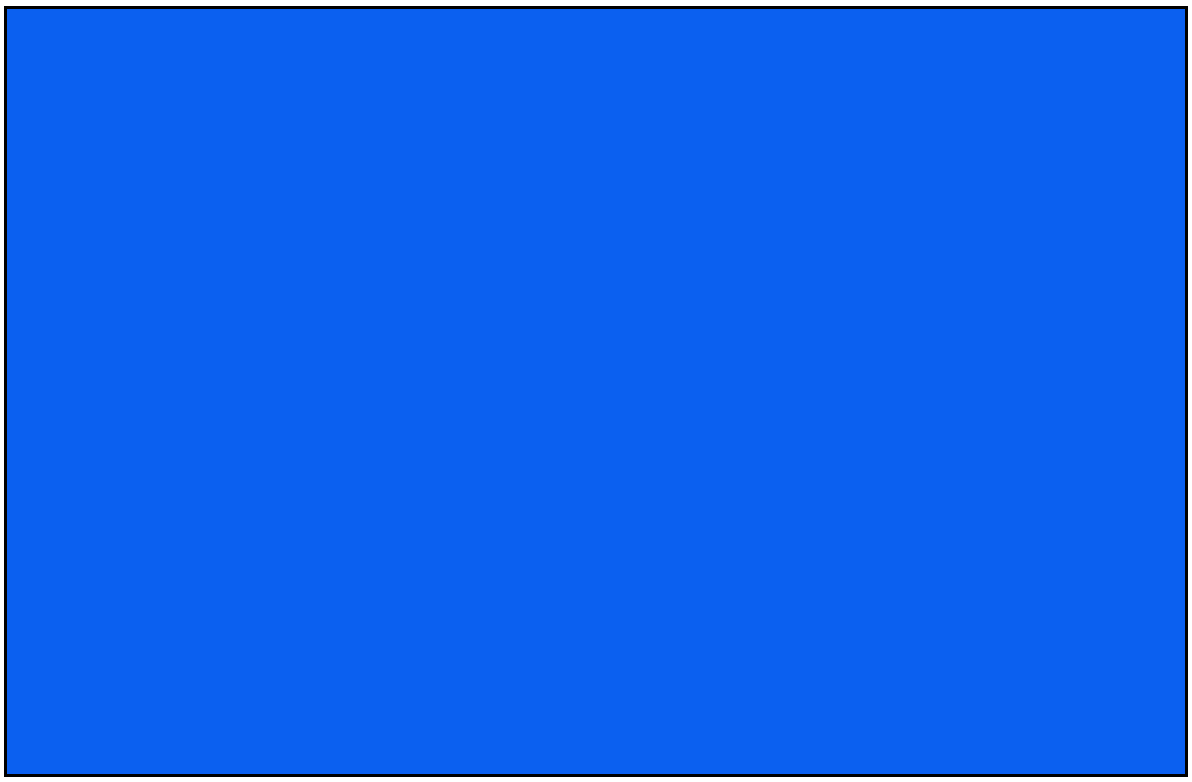

Figure 1 - Section of VFR Navigation Chart

A map folder containing an assortment of aeronautical charts and a torn Alaska Highway VFR navigation chart was found on the wreckage trail. The fragmented condition of the VFR navigation chart indicated that it was not in the map folder at impact. An aeronautical planning chart was also found. A yellow "hi-liter" pen had been used to delineate the Alaska Highway route from Fort Nelson, British Columbia, to Fairbanks, Alaska. The communities of Fort Nelson and Beaver Creek had been circled in pen.

The pilot was reportedly carrying a hand-held global positioning system (GPS), and remnants of a Trimble Flightmate Pro GPS were found on the wreckage trail.

1.9 Communications

The pilot reported 24 miles south of Watson Lake at 6,000 feet through a Whitehorse RCO at 1913Z (1213 PDT). He advised that he had been following the Alaska Highway all the way from Fort Nelson.

The pilot requested the current Teslin weather immediately following his position report. He was informed that the 1900Z (1200 PDT) Teslin weather was 1,800 feet thin scattered with an estimated ceiling of 4,500 feet broken and 5,500 feet overcast. The visibility was 15 miles in light rain. The temperature was nine degrees Celsius, the dew point was eight degrees Celsius, the wind was from 070 degrees at two knots, and the altimeter setting was 29.59. He was also advised that Whitehorse was reporting IFR ceilings, with a visibility of five miles in light rain and fog. The pilot was also cautioned that a light aircraft on the VFR flight plan from Fort Nelson to Whitehorse had landed in Watson Lake approximately one-half hour earlier, after encountering ceilings of 100 to 200 feet and low visibility about 14 miles southeast of Watson Lake.

There was no further communication with the aircraft, and no evidence of a distress call. Very high frequency (VHF) radio communication with area ground stations would have been difficult or impossible for an aircraft flying at 6,000 feet in the vicinity of the accident site because of the mountainous terrain.

1.10 Wreckage and Impact Information

The accident site was covered with a trace of snow when investigators arrived. Wreckage and site examination indicated that the aircraft had struck the slope in a near wings-level and nose-level attitude. The slope incline was 32 degrees. The airspeed indicator was captured at 140 knots indicated airspeed (KIAS). The location of fragments of the nose wheel pant and nose wheel, and a propeller blade tip indicated that the main impact had occurred approximately 200 feet below the top of the slope. The fuselage, engine, and partially attached left wing subsequently had rolled, and they came to rest, inverted, approximately 800 feet down the slope. All doors and flight control surfaces were accounted for. Cabin contents and pieces of wreckage were strewn along the entire wreckage trail from top to bottom. Propeller blade damage and twist was consistent with considerable power being produced at the time of the impact. An external visual and rotational examination of the engine revealed no evidence of a mechanical failure. There was no direct evidence of airframe ice on the wreckage.

Due to the almost complete destruction of the aircraft by the crash, it could not be determined whether any pre-impact failure or system malfunction contributed to this accident; however, none was identified.

1.11 Medical Information

There was no evidence that incapacitation or physiological factors affected the pilot's performance. Toxicological test results for the presence of carbon monoxide (CO) were negative.

The pilot had suffered from asthma for many years. The condition had been controlled with medication, and the medication was not known to induce observable fatigue or to have any debilitating effect on the pilot. A variety of prescription and non-prescription medications were found in the wreckage. Toxicology screens for acidic and basic drugs and opiates were negative for both occupants.

The pilot was required to possess corrective glasses for near vision. A pouch containing a pair of eye glasses was located at the accident site.

1.12 Fire

There was no evidence of an in-flight fire; however, a post-impact fire had occurred. The upholstery, seats, and harnesses adjacent to the left, lower side of the cabin and the left cabin door frame were scorched and burned. The left cabin door detached at impact and was found at the accident site, remote from the main wreckage. The interior of the cabin door displayed no evidence of fire damage, indicating that the fire had erupted at impact and self-extinguished. The right-wing fuel bay had also sustained post-crash fire damage.

1.13 Survival Aspects

The aircraft broke up at impact. The accident was considered to be non-survivable due to the magnitude of the deceleration forces and the collapse of the occupiable cabin survival space.

The aircraft was fitted with a Narco 10 emergency locator transmitter (ELT). The ELT detached from the mounting bracket and the co-axial antenna cable at impact. Fragments of the ELT case and several ELT batteries were located on the wreckage trail.

The search for the aircraft was impeded for several days by poor weather conditions and by the lack of an ELT signal.

The accident occurred within the region designated as "sparsely settled" in the Air Navigation Orders (ANO)[4]. A cursory examination of equipment and supplies, recovered from the accident site, indicated that the aircraft was carrying sufficient survival gear.

1.14 Additional Information

A hunter, located on a nearby mountain at an elevation of 4,200 feet asl and about six miles from the accident site, heard a light aircraft flying overhead about three or four times over an approximately one-hour period during the early afternoon of 12 September. He was not able to see the aircraft due to obscuring weather; however, he believed that it was the same aircraft passing from east to west each time. He estimated the ground visibility to be one mile in mixed light rain and snow. All of the mountain peaks and ridges were obscured by cloud above 6,000 feet asl, and much of the cloud base extended to below 5,300 feet asl. The hunter reported his observations to the Rescue Coordination Centre (RCC) on 14 September when he realized that a search was in progress. The information was used effectively to concentrate the search area.

The accident occurred in uncontrolled airspace. ANO Series V, No. 3, defines two minima for VFR flights elsewhere than in controlled airspace or aerodrome traffic zones. The ANO states that when an aircraft is flown at or above 700 feet vertically from ground or water, the flight visibility shall be not less than one mile, and the distance of an aircraft from cloud shall be not less than 500 feet vertically and 2,000 feet horizontally. The ANO also states that when an aircraft is flown at less than 700 feet vertically from ground or water, flight visibility shall be not less than one mile and the aircraft shall be flown clear of any cloud.[5] VFR flight "on top," above an overcast condition, is not permitted in Canada.

1.15 Flying the Alaska Highway

The Alaska Highway extends from Dawson Creek, British Columbia, to Fairbanks, Alaska. The highway passes through Fort Nelson, British Columbia, and the Yukon communities of Watson Lake, Teslin, Whitehorse, and Beaver Creek. Numerous light aircraft fly the VFR Alaska Highway route to Alaska each year, and many weather-related fatal accidents have occurred along the highway in the past. A guide published by Transport Canada (TC) for the tourist visiting Canada who intends to fly the Alaska Highway states, "The terrain is rugged and flying the area requires both good weather and your best abilities as a VFR pilot."[6] The publication also states, "The cardinal rule for flying the Highway is: DO NOT PUSH THE WEATHER."

4 *Order Respecting the Carriage of Emergency Equipment and Radio Communications Systems in Sparsely Settled Areas*, ANO Series V, No. 12.

5 *Order Respecting Weather Minima for VFR Flight*, ANO Series V, No. 3.

6 *Flying the Alaska Highway in Canada*, Transport Canada, TP 2168, p. 1.

2.0 Analysis

2.1 Introduction

Field examination of the wreckage indicated that the aircraft was serviceable at the time of the occurrence. The analysis will, therefore, focus on the weather conditions that existed along the planned route at the time of the occurrence, and on the pilot's experience and his decision to continue the flight into mountainous terrain in deteriorating weather.

2.2 Weather

The forecast and actual meteorological conditions on the planned route were unfavourable for VFR flight in the vicinity of Watson Lake and in the mountainous areas to the west of Watson Lake. Although VFR conditions existed near Teslin, the weather again deteriorated to IFR conditions further west in the vicinity of Whitehorse.

2.3 Pilot

The combination of unfavourable VFR weather conditions, mountainous terrain, and unfamiliarity with the route placed the pilot in a high-risk situation. When the pilot transmitted his last position report 24 miles south of Watson Lake, he advised that he had been following the Alaska Highway at 6,000 feet asl all the way from Fort Nelson. The reported position places the aircraft approximately 24 miles south of the Alaska Highway and suggests that he may have been deviating from the planned route due to poor weather at that time.

The aircraft was equipped and certified for IFR flight in non-icing conditions and the pilot was instrument rated; however, he had not recently exercised instrument flight privileges due to lack of currency. It could not be determined if the aircraft was below, in, or above cloud when it struck the mountain slope. However, the proximity of the accident site to the centre line of the R5 low frequency airway and the selected ADF frequency of 248 kHz suggests that he may have been tracking outbound from the Watson Lake NDB at 2,800 feet below the MOCA, rather than attempting to follow the highway, when the accident occurred.

It could not be determined why the pilot made the decision to depart Fort Nelson knowing that the en route weather conditions west of Watson Lake were marginal for VFR flight, or why he pressed on after encountering the unfavourable weather. There was no evidence that he was adhering to a precise schedule, or that he was under any external pressure to complete the leg from Fort Nelson to Beaver Creek on that particular day.

Several facts indicate that he had developed a mind-set to go. Witnesses observed that he was very excited about the flight to Alaska. He had not previously flown the Alaska Highway; however, he declined a route briefing by a Yukon pilot who was familiar with the terrain. Although the pre-departure FSS weather briefing indicated that the weather would be marginal for VFR flight in mountainous areas to the west of Watson Lake, the pilot proceeded to flight plan on Victor Airways all the way to Beaver Creek and departed with the notion that it would be a day "to hunt and peck." He carried on with the flight, in mountainous terrain, after encountering the forecast poor weather conditions and after being advised that another aircraft flying VFR to Whitehorse had landed in Watson Lake. He may have deliberately chosen not to attempt to land in Watson Lake because of the existing 200-foot ceiling, and to proceed to Teslin, where the conditions were reportedly better. The aircraft was carrying sufficient fuel to return to Fort Nelson, and the safer VFR procedure would have been to return in known VFR weather.

3.0 Conclusions

3.1 Findings

1. The meteorological conditions at Fort Nelson were favourable for VFR flight when the aircraft departed.

2. The meteorological conditions deteriorated along the planned route, as forecast, and were unfavourable for VFR flight near and to the west of Watson Lake.

3. The pilot held an instrument rating; however, he had not recently flown IFR due to lack of currency.

4. The ELT broke loose from the mounting bracket and fragmented at impact.

5. Search efforts were hampered by poor weather conditions and the lack of an ELT signal.

6. There was no evidence found of a pre-impact airframe or engine discrepancy.

7. The accident was not survivable due to the magnitude of the impact forces and the collapse of the cockpit survival space.

3.2 Causes

The pilot attempted to continue visual flight in adverse weather conditions.

4.0 Safety Action

The Board has no aviation safety recommendations to issue at this time.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson John W. Stants, and members Zita Brunet and Hugh MacNeil, authorized the release of this report on 19 May 1995.

Appendix A - Glossary

ADF	automatic direction finder
agl	above ground level
ANO	Air Navigation Order
asl	above sea level
AWOS	automated weather observation system
CO	carbon monoxide
CPL	Commercial Pilot Licence
ELT	emergency locator transmitter
FSS	Flight Service Station
GPS	global positioning system
hr	hour(s)
IFR	instrument flight rules
KIAS	knots indicated airspeed
kHz	kilohertz
lb	pound(s)
LL	low lead
MOCA	minimum obstruction clearance altitude
N	north
NDB	non-directional beacon
nm	nautical miles
NNW	north-northwest
PDT	Pacific daylight saving time
RCC	Rescue Coordination Centre
RCO	remote communications outlet
TC	Transport Canada
TSB	Transportation Safety Board of Canada
U.S.	United States
UTC	Coordinated Universal Time
V	Victor airway
VFR	visual flight rules
VHF	very high frequency
W	west
Z	Zulu time
'	minute(s)
°	degree(s)

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