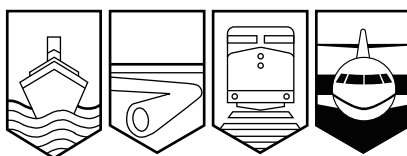


Transportation Safety Board  
of Canada



Bureau de la sécurité des transports  
du Canada

**AVIATION INVESTIGATION REPORT**  
**A99W0031**



**CONTROLLED FLIGHT INTO TERRAIN (LAKE)**

**SLAVE AIR (1998) LTD.**  
**BEECH KING AIR C90 C-GSAX**  
**SLAVE LAKE, ALBERTA 3 NM NW**  
**19 FEBRUARY 1999**

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

### Controlled Flight into Terrain (Lake)

Slave Air (1998) Ltd.  
Beech King Air C90 C-GSAX  
Slave Lake, Alberta 3 nm NW  
19 February 1999

Report Number A99W0031

### *Synopsis*

The Beech King Air C90 had flown from Slave Lake to Red Earth, Alberta, to pick up a patient. The air ambulance flight was being conducted at night and under visual flight rules. On the return flight to Slave Lake, six persons were on board: two pilots, a paramedic, an emergency medical technician, a four-year-old patient, and the patient's sister. The first officer was the pilot flying. During the first approach to runway 10 at Slave Lake, the aircraft was not aligned with the runway and an overshoot was initiated. The captain decided to fly the second approach and, shortly after the overshoot was commenced, the aircraft entered cloud and the pilots lost visual reference with the ground. The aircraft struck the surface of the frozen lake while in a left, descending turn. The emergency medical technician, who was attending to the patient and not strapped into his seat, was propelled forward onto the centre console between the pilots. The patient, who was lying in a fore-and-aft position on a stretcher, without the shoulder harnesses done up and secure, was ejected from the stretcher and ended up in the arms of the emergency medical technician. There were no serious injuries.

The Board determined that, during the overshoot, the aircraft entered cloud and the flight crew lost situational awareness, resulting in the pilot unintentionally flying the aircraft into the ice surface of the lake. Contributing to the loss of situational awareness were the lack of planning and briefing for the approach, the breakdown in crew coordination during the overshoot, and inadequate attention being paid to the flight instruments.

*Ce rapport est également disponible en français.*

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## 1.0 *Factual Information*

### 1.1 *History of the Flight*

At about 2345 mountain standard time (MST),<sup>1</sup> the captain received a call from the Slave Lake ambulance dispatcher tasking him for a flight to Red Earth, Alberta, to pick up one patient. The captain advised the first officer of the tasking, checked the weather with the Edmonton Flight Service Station (FSS),<sup>2</sup> and proceeded to the airport. The flight was to be conducted at night in visual meteorological conditions (VMC) and under visual flight rules (VFR). At the airport, the flight crew was joined by a paramedic and an emergency medical technician (EMT). The crew was self-dispatched and filed a VFR flight plan with the Edmonton FSS. The flight was planned and conducted on a Transport Canada (TC)-approved route in accordance with *Canadian Aviation Regulations* (CARs) Regulation 703.34 *Routes in Uncontrolled Airspace*. The flight plan was activated when the aircraft departed Slave Lake at 0034. The 20-minute flight to Red Earth was uneventful, and at Red Earth, a four-year old patient and the patient's sister boarded the flight.

On the return flight to Slave Lake, the crew obtained a weather update from the Edmonton FSS. The automated weather observation system (AWOS) at Slave Lake was reporting an overcast ceiling of 500 feet above ground level (agl) and a visibility of 2.5 miles. The first officer was the pilot flying and was seated in the right-hand seat. Approaching Slave Lake, the pilots could see the airport and town lights to their left. They entered a layer of haze and mist at about 2900 feet above sea level (asl) (1000 feet agl) and lost sight of the lights. The aircraft entered clear air again at an estimated 500 feet agl. The captain then provided verbal vectors to the first officer so that he could align the aircraft with runway 10. During the manoeuvring, the aircraft crossed the centre line of runway 10 and the first officer, assessing that he could not carry out a safe landing, passed control of the aircraft to the captain. The captain took control and commenced an overshoot. He turned the aircraft left toward the lake, and while in the climbing turn, entered the haze and mist over the lake and lost visual contact with the ground.

The flight crew had not briefed an overshoot procedure, and once the overshoot was initiated, neither pilot briefed or questioned the actions of the other, and neither provided verbal communications as to their functions or tasks. The first officer reported that, after re-entering the mist, he was trying to maintain visual reference with the ground lights and maintain a check of the cockpit instruments as a back-up for the captain. The first officer attempted to regain visual contact with the ground lights, but never did.

While the aircraft was in the left turn, the radio altimeter, set to 415 feet, activated. Both pilots heard the altitude alert and saw the altitude light activate; however, neither pilot reacted. The aircraft struck the snow-covered lake while in a descent. The EMT, who was attending to the patient and not strapped into his seat, was propelled forward onto the centre console between the pilots. The patient, who was laying in a fore-and-aft position on a stretcher without a shoulder harness, was ejected from the stretcher and ended up in the arms of the EMT. The

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<sup>1</sup> All times are MST (Coordinated Universal Time (UTC) minus seven hours) unless otherwise noted.

<sup>2</sup> See Glossary at Appendix A for all abbreviations and acronyms.

paramedic used the air ambulance radio to report the accident to their dispatcher at Slave Lake. The accident occurred at about 0135 during the hours of darkness at latitude 55°20' N, longitude 114°50' W at an elevation of 1900 feet asl.<sup>3</sup>

## 1.2 *Injuries to Persons*

	Crew	Passengers	Others	Total
Fatal	-	-	-	-
Serious	-	-	-	-
Minor/None	2	4	-	6
Total	2	4	-	6

## 1.3 *Damage to Aircraft*

The aircraft was substantially damaged during the impact with the snow and ice.

## 1.4 *Other Damage*

There was some minor environmental damage caused by spilt oil and hydraulic fluids.

## 1.5 *Personnel Information*

	Captain	First Officer
Age	36	30
Pilot Licence	Airline	Commercial
Total Flying Hours	4400	1550
Hours on Type	1100	31
Hours on Duty Prior to Occurrence	2	2
Hours Off Duty Prior to Work Period	30	30

### 1.5.1 *Captain*

The captain joined Slave Air (1988) Ltd. in November 1995 and had been assigned primarily to the King Air C90 and Navajo aircraft. He had a valid pilot proficiency check on the King Air C90 aircraft, and he held a current Group I instrument rating and a Class II airplane instructor's rating. He had completed his last ground training in May 1998 and his flight training in June 1998. He had attended a TC Pilot Decision Making (PDM) course in 1997.

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<sup>3</sup> Units are consistent with official manuals, documents, and instructions used by or issued to the crew.

The captain was well rested prior to the commencement of the flight. His schedule required him to work one week on air ambulance flights, four days on company charter flights, and three days off. While flying charter, he operated in a single-pilot cockpit environment. The majority of the captain's flight experience was in single-crew aircraft. The captain had received training specific to a two-pilot cockpit environment during his training sessions on the King Air C90.

In the seven days prior to the accident flight, the captain was off duty for three days and flew one flight two days before the accident flight. On the day prior to the accident flight, he was on call but did not fly. The day preceding the accident, he had gone to bed by 2200 and was up at 0800. On the day of the accident, he had a quiet, restful day with a 40-minute nap in the afternoon. He went to bed at 2300 and was reading when he received the call for the flight.

### *1.5.2 First Officer*

The first officer joined Slave Air (1988) Ltd. in April 1997 and was initially assigned to single engine aircraft operations. He completed his initial check on the King Air C90 in January 1999 and held a current Group I instrument rating. The King Air C90 was the first twin engine aircraft flown by the first officer since obtaining his multi-engine rating while attending Mount Royal College. He attended a crew resource management (CRM) course during his initial pilot training at college.

After the first officer's initial check on the King Air C90, he was paired with the occurrence captain and had not flown the King Air C90 operationally with any other pilot. The crew had last flown together on 17 February 1999. He worked the same schedule as the captain. The first officer was well rested prior to the commencement of the flight.

Before being assigned to the King Air C90 aircraft, the first officer had not been assigned to a two-pilot cockpit flight operation except during his training. Except for his initial 3.8 hours of flight training, he did not receive training in pilot/co-pilot responsibilities in a two-pilot cockpit environment when he was assigned to the King Air C90.

The co-pilot was on the same schedule as the captain and flew a total of 4.1 hours with the captain two days before the accident flight. On the evening of the call out he was in bed resting when the call for the medical evacuation (MEDEVAC) was received. Both pilots were aware of the problems of late night/early morning call outs. The company reasserted the need for relaxation between flights by not requiring their MEDEVAC pilots to report for duty except during actual call outs.

### *1.5.3 Medical Attendants*

The medical attendants are employees of the Keeweenaw Lakes Regional Health Authority. As required by Alberta Health, they receive training with the aircraft operator every six months. The purpose of the training is to ensure that all ambulance personnel are familiar with aircraft safety, procedures in communications, evacuation procedures, and basic patient loading and unloading techniques. Both medical attendants undertook the required training at Slave Air (1988) Ltd. on 21 December 1998.

The medical attendants are not crew members as per the interpretation provided in the CARs. However, because of their semi-annual training with the air operator and their specialty training in medical care, the flight crew deemed the medical attendants competent to provide the patient and any other passengers with onboard briefings on cabin safety. The medical attendants did not brief the patient's sister.

## 1.6 *Aircraft Information*

Manufacturer	Beech
Type and Model	King Air C90
Year of Manufacture	1976
Serial Number	LJ-697
Certificate of Airworthiness (Flight Permit)	Valid
Total Airframe Time	6419 hours
Engine Type (number of)	Pratt & Whitney PT6A- 36 (2)
Maximum Allowable Take-off Weight	4377 kg

The aircraft's maintenance records indicate that the aircraft was certified and maintained in accordance with existing regulations and approved procedures. The aircraft was equipped for flight in instrument meteorological conditions (IMC). The aircraft was equipped with a global positioning system (GPS), and it was turned on and programmed for the flight.

## 1.7 *Meteorological Information*

### 1.7.1 *General*

When he was just about to depart from Slave Lake, the captain called Edmonton FSS at 0015 to file a flight plan and check the weather forecast. The forecast for Slave Lake was as follows:

wind 100 degrees at 8 knots, visibility 1 statute mile (sm) in mist, ceiling 700 feet broken. Temporary conditions from 0700 UTC to 1300 UTC; visibility 3 sm in mist, ceiling 1000 feet broken.

In addition to the above was that Slave Lake was now reporting visibility 3.5 sm and a few clouds at 200 feet from the auto station.

The pilots reported that they could see the mist and stars clearly above the airport prior to their departure from Slave Lake.



At 0122, on the return flight to Slave Lake, the pilots received the following weather information from Edmonton FSS:

special for Slave Lake at 0814Z, automatic reporting, wind 110 degrees at 12 knots, visibility 2.5 miles, ceiling 500 feet overcast, temperature minus 9 degrees Celsius, dew point minus 11 degrees Celsius, altimeter 29.73 inches of mercury.

### *1.7.2 Automated Weather Observation System (AWOS)*

All AWOSs, which are designated and approved for aviation use, are operated and maintained by Environment Canada on behalf of and under contract to NAV CANADA. As part of the contract, Environment Canada is required to monitor and report performance on all operational AWOS. The AWOS Performance Ratings (PR) are a measure of system reliability: the percentage of time that reports are complete, properly formatted, and on time. The PR are not a measure of AWOS accuracy. During the 12 months preceding the accident, no complaints were made about the Slave Lake weather observations or the AWOS recorded by NAV CANADA, Environment Canada, Whitecourt FSS, or Edmonton FSS. The published AWOS PR for Slave Lake are:

Spring 1998	99.6%
Summer 1998	99.5%
Fall 98 (Aug.-Oct.)	99.6%

## *1.8 Aids to Navigation*

The Slave Lake airport is equipped with a non-directional beacon (NDB) located about one-half mile north of the runway and distance measuring equipment (DME) located about one quarter mile north of the runway. There is one published, non-precision, instrument approach for the airport, a NDB/DME approach aligned with runway 28. The minimum descent altitude (MDA) for that approach is 2480 feet asl (568 feet above the runway touchdown zone elevation).

## *1.9 Communications*

No communications problems were reported with respect to the Edmonton FSS frequency 122.1MHz and the aerodrome traffic frequency 123.2 MHz.

## *1.10 Aerodrome Information*

The Slave Lake airport is located adjacent to the east end of Lesser Slave Lake at an elevation of 1912 feet asl. The airport has one runway, runway 10/28. It is equipped with type K Aircraft Radio Control of Aerodrome Lighting (ARCAL) lighting system which requires that the pilot key the microphone three, five, or seven times on frequency 123.2 MHz to activate the lights. The captain activated the lights during the initial approach, and both pilots reported having observed the runway lights. The rescue team reported that the runway lights were on when they arrived at the airport. Runway 10/28 has a visual approach slope indicator system (VASIS)

installed. The pilots do not recall visually sighting the VASIS and no problems were reported with the system before or after the occurrence.

### *1.11 Flight Recorders*

The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), neither was required by regulation.

### *1.12 Wreckage and Impact Information*

The aircraft touched down on the ice of Lesser Slave Lake on a heading of about 156 degrees magnetic. The threshold of runway 10 was three miles from the aircraft on a bearing of about 145 degrees magnetic. Marks left in the snow indicate that, during the initial touchdown, the aircraft was in a slightly left-wing-low, nose-level attitude. Immediately after touchdown, the main and nose wheels sank into the snow, which was wind-packed and about 18 inches deep. As the aircraft settled, both propellers came in contact with the snow. After travelling for about 75 feet, the nose gear failed and the oleo and wheel separated from the aircraft. The aircraft came to rest about 640 feet after initial ground contact. Some buckling and twisting of the airframe occurred, both propellers and engines were damaged, and the radome was damaged due to snow contact.

### *1.13 Medical Information*

Nothing was found to indicate that incapacitation or physiological factors affected the performance of the pilots.

### *1.14 Fire*

There was no indication of fire either before or after the occurrence.

### *1.15 Survival Aspects*

After the aircraft came to a stop, the EMT and paramedic checked the passengers and crew for injuries. The captain exited the aircraft to check for fuel leaks and to assess the situation, then re-entered the aircraft. Next, the first officer and EMT exited the aircraft and opened the survival equipment in preparation for an indeterminate stay on the ice. The paramedic called the ambulance dispatcher at Slave Lake using the air ambulance radio and reported the accident, advising that there were no injuries. The dispatcher then called 911.

The Slave Lake Fire Department, Royal Canadian Mounted Police (RCMP), and the airport manager then assembled at the airport and were able to remain in touch with the survivors via the ambulance radio. Once assembled, the rescue team boarded three snowmobiles and proceeded to the threshold of runway 10. As they could not see the aircraft, the rescue team requested that the aircraft crew fire flares. As the snowmobiles moved onto the ice and toward the aircraft, three flares were fired at intervals and the rescue team located the aircraft. Once on site, the snowmobiles were used to transport the survivors to the airport where an awaiting

ambulance transported them to the hospital. The first trip was used to transfer the medical staff, the patient, and her sister. The flight crew was transported on a second trip. The rescue took about 45 minutes.

At the time of the accident, the air temperature was minus nine degrees Celsius, and the wind was about nine knots.

## *1.16 Tests and Research*

No tests or research were completed for this occurrence.

## *1.17 Organizational and Management Information*

The occurrence aircraft was the only King Air C90 operated by the company, and it was used exclusively in the air ambulance role. The flight crews were selected to crew the King Air C90 based on their performance on other company aircraft. Those flight crews qualified on the King Air were scheduled for one week standby for air ambulance flights, followed by one week standby for charter flights on other aircraft. They were given three days off every two weeks. The company attempted to have the same crew scheduled together when flying the King Air. Arrangements were made so that, should a crew reach its maximum hours of duty, another crew could be tasked to conduct air ambulance flights.

Company training is based on the principle of self-study, and it is a pilot's responsibility to prepare for annual check rides and written exams. The company does provide annual flight training prior to a check ride, and company staff will help individuals who require study assistance.

Flight training and check rides are conducted by the chief pilot acting as a flight crew member. Paired crews are not checked in flight; crew coordination is assessed based on the crews' interrelationship with the check pilot. Crew coordination and CRM are not the subjects of structured training, but they are discussed at the company in informal settings.

## *1.18 Additional Information*

### *1.18.1 Briefings*

Before departing Slave Lake and later Red Earth, the pilots did not conduct a safety briefing for the medical attendants or the passengers as required by the CARs. The flight crew and company officials considered the medical attendants to be crew members; therefore, a safety briefing would not be required. Alberta Health authorities did not deem the medical attendants to be crew members.

The Company Operations Manual contains detailed information on cockpit checks and briefings for instrument flight rules (IFR) flight, including approach and overshoot briefings. Challenge and response calls are to be used for certain altitudes during en route and approach operations. The sections of the manual addressing VFR operations did not contain information related to detailed in-flight briefings as is required by CAR 703 and *Commercial Air Service*

*Standards (CASS) 723.107.* It was the crew's belief that, during VFR operations, approach briefings were informal in nature and briefings for missed approaches were not needed. The Company Operations Manual has been changed to incorporate VFR briefing requirements. Before and during the flight, the flight crew discussed alternatives should a landing at Slave Lake not be possible due to weather. They were aware that a patient transfer was to be carried out early in the morning at Fort McMurray, Alberta, and decided that this would be their first choice of alternate airports; Edmonton City Centre Airport was the second choice. After receiving the weather information from the Edmonton FSS during the return flight, the reported low ceiling was assessed by both pilots as being due to faulty AWOS reports. Based on actual observations during flight, the flight crew had received what were deemed to be faulty reports on several occasions, including the AWOS report they had received from the Edmonton FSS prior to their departure from Slave Lake.

Once on the descent to Slave Lake, the pilots did not conduct a pre-approach briefing and did not brief or discuss what actions would be taken in the event of a missed approach. The first officer was flying the approach from the right seat and was being given vectors by the captain. The first officer had not flown a pilot-vector approach before.

During the flight, the fasten-seat-belt light in the cabin was illuminated. While on approach for landing, the flight crew did not check to ensure that the passengers were properly secured. The medical staff stated that this was not unusual on most flights they undertook. However, because of their frequent flights on the air ambulance aircraft, they were familiar with the aircraft profile and sounds and were aware that the aircraft was in the landing phase of flight.

### *1.18.2 Transport Canada*

In 1998, TC established a Canadian Aviation Regulation Advisory Council (CARAC) working group to study all aspects of air ambulance operations. The objective of this group is to determine the optimum way to regulate air ambulance operations conducted by commercial air operators and state operators, and to ensure that patients receive a level of safety equivalent to that which commercial air services provide to fare-paying passengers.

### *1.18.3 Patient Stretcher*

The stretcher system used was manufactured by LifePort Inc. The Federal Aviation Administration (FAA) issued supplemental type certificate (STC) SA00273WI for this system and the system in the occurrence aircraft met the STC requirements.

The stretcher was fitted at the mid-cabin area on the right side and was positioned so a patient lying down on the stretcher would have his or her head forward. The two shoulder straps provided connect to a belt that fits across the patient's torso. A second belt is located just below the mid-point of the stretcher for additional security. The top one-quarter of the back of the stretcher can be raised so a patient can be transported in a sitting position.

After the accident, LifePort Inc. placed a child of about the same stature as the occurrence patient in the stretcher and confirmed that all the straps, including the shoulder straps, could have been secured and in contact with the patient during the flight.

The medical team reported that they normally used the shoulder straps when transporting patients. On this flight, they believed that the patient was showing some signs of anxiety and that the patient would be more comfortable if the shoulder straps were not secured.

## 2.0 *Analysis*

### 2.1 *Introduction*

The flight crew was qualified for the flight, and the aircraft and on-board medical equipment met TC requirements. Both pilots were IFR rated. The analysis will consider the in-flight decision-making process and company flight crew training.

### 2.2 *Crew Resource Management*

Both pilots had received some CRM or PDM training; the captain attended a TC PDM training session about the time he started to fly the King Air C90, and the first officer received some CRM training at Mount Royal College while preparing for a professional career as a pilot. When not assigned to the King Air C90, both pilots spent time in single-pilot cockpits during the week of duty time which immediately follows their King Air C90 air ambulance duty schedule.

During the flight to and from Red Earth, the pilots discussed options for alternate airports should the weather at Slave Lake deteriorate prior to their return. On the return flight, the crew received a report from the Edmonton FSS based on the AWOS at Slave Lake. Although a low ceiling and low visibility were being reported, the crew did not alter their plans for a VFR approach. As well, they did not brief for the eventuality of a missed approach; they believed that the AWOS report was faulty because they could see the lights of Slave Lake through the undercast and they thought that missed approach briefings were required only for IFR flight. By not briefing for a missed approach, the crew did not have a plan should a missed approach be necessary.

When the aircraft entered the undercast mist and haze at about 1000 feet agl, the crew continued the descent even though they had lost sight of all outside visual references and were now operating in IMC, counter to regulatory requirements. During this time, the first officer was flying and attempting to gain visual contact by looking cross-cockpit, and the captain was attempting to provide verbal guidance for the approach. Once the first officer realized that a landing could not be made, the captain took control and turned left over the lake and away from the lights of the town. Thus, he placed himself into an area which would have few ground lights or references, even in clear air. Additionally, the captain initiated a climb back into IMC and would, therefore, be flying with reference only to instruments. By entering cloud and not changing to instrument flight, the crew lost situational awareness. This became evident again near the termination of the flight when both pilots heard the radio altimeter warning and neither reacted in an appropriate manner.

In the absence of a stated plan and intra-cockpit communications, flying the aircraft effectively became a one-pilot operation. This may be due, in part, to the mix of single- and two-crew cockpit operational environments that the pilots regularly work in, and their limited training in

crew coordination; i.e. the crews are placed into a two-crew cockpit without the benefit of training specific to their duties as captain or co-pilot (first officer). Without the benefit of such training, the crew is less apt to work effectively as a team.

## 2.3 *Training*

The pilots were not provided training specific to the duties of the pilot or co-pilot responsibilities in a two-crew environment by the company. Although the passive study training sessions were supplemented by occasional in-house discussions, these discussions were not reinforced with in-flight training or checks of the paired pilots operating as a crew. In the absence of flight simulator training, in-flight training or check rides would serve to reinforce previous CRM or PDM training and informal in-house discussions. Training and in-flight or route checks are essential elements in developing and monitoring flight crew skills. Although the ground and flight training met the intent of CAR 703, the training did not ensure that adequate defences were in place which would ensure that the flight crew worked as a team during flight operations.

## 3.0 *Conclusions*

### 3.1 *Findings*

1. The flight crew was certified and qualified in accordance with existing regulations.
2. The stretcher, as installed in the occurrence aircraft, met FAA STC requirements.
3. The air ambulance flight was flown under VFR; however, the Slave Lake AWOS reported the weather as below VFR limits.
4. The flight crew did not conduct a take-off or pre-landing safety briefing for the passengers and did not ensure that the passengers were secured prior to the approach to Slave Lake airport. One of the medical attendants was not seated and secured during the approach and subsequent collision with the lake.
5. The available stretcher shoulder straps were not used to secure the patient during the flight.
6. The flight crew did not conduct an approach briefing prior to the approach to the Slave Lake airport; they were unaware of a regulatory requirement for such a briefing.
7. The Company Operations Manual did not incorporate a VFR approach briefing as required by regulations.
8. During the approach to the Slave Lake airport, the first officer was unable to align the aircraft with the runway and passed control of the aircraft to the captain. The captain initiated an overshoot.
9. During the overshoot at Slave Lake airport, the crew did not communicate their intentions with each other, and the aircraft entered IMC.
10. The overshoot was conducted over the lake where there were no ground lights or other visual references.
11. While manoeuvring for another approach, the aircraft descended and the radio altimeter activated. Although aware of the altitude warning, the pilots did not take action to arrest the descent or communicate their observation with each other.
12. When the aircraft contacted the frozen surface of the lake, the patient was ejected from the stretcher and an unsecured passenger was thrown into the console as the aircraft decelerated.

### *3.2 Causes and Contributing Factors*

During the overshoot, the aircraft entered cloud and the flight crew lost situational awareness, resulting in the pilot unintentionally flying the aircraft into the ice surface of the lake. Contributing to the loss of situational awareness were the lack of planning and briefing for the approach, the breakdown in crew coordination during the overshoot, and inadequate attention paid to the flight instruments.

## *4.0 Safety Action*

### *4.1 Alberta Health*

On 26 February 1999, the Emergency Health Services Branch of Alberta Health issued a letter to all air ambulance medical crews with copies to all contracted air carriers in which the following was stated:

Medical crews are reminded that the LifePort AeroSled system must be correctly used when transporting a stretcher-bound patient by air ambulance. This device serves the vital function of securing the patient during the flight. In order to be effective, all straps, including the shoulder straps, must be fastened during transport.

and

Medical crews are also reminded to follow appropriate cabin safety procedures to ensure their own safety. Seat-belts must be buckled during take off and landing, and until such time that the pilot advises that it is safe to move around the cabin.

### *4.2 Slave Air (1988) Ltd.*

Slave Air (1988) Ltd. has replaced its King Air C90 with a King Air 100 aircraft. Conversion training was held at a west coast training facility. Within the company, emphasis is being placed on standard operating procedures (SOPs) for VFR and IFR operations with ad hoc in-flight checks by the chief pilot to provide a mechanism for the company to monitor the flight crew. The company has amended the SOPs, King Air 100, Normal Procedures, to include VFR Approach Briefing requirements. In addition, the company is instituting group ground recurrent training. Since the occurrence, one King Air crew has attended CRM training; others will be scheduled on future courses.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 20 April 2000.*



## *Appendix A - Glossary*

agl	above ground level
ARCAL	Aircraft Radio Control of Aerodrome Lighting
asl	above sea level
AWOS	automated weather observation system
CARAC	Canadian Aviation Regulation Advisory Council
CARs	<i>Canadian Aviation Regulations</i>
CASS	<i>Commercial Air Service Standards</i>
CRM	crew resource management
CVR	cockpit voice recorder
DME	distance measuring equipment
EMT	emergency medical technician
FAA	Federal Aviation Administration
FDR	flight data recorder
FSS	Flight Service Station
GPS	global positioning system
IFR	instrument flight rules
IMC	instrument meteorological conditions
MDA	minimum descent altitude
MEDEVAC	medical evacuation
MHz	megahertz
MST	mountain standard time
N	north
NDB	non-directional beacon
nm	nautical mile(s)
PDM	Pilot Decision Making
PR	Performance Ratings
RCMP	Royal Canadian Mounted Police
sm	statute mile(s)
SOPs	Standard Operating Procedures
STC	Supplemental Type Certificate
TC	Transport Canada
TSB	Transportation Safety Board of Canada
Type K	defines microphone keying sequence
UTC	Coordinated Universal Time
VASIS	visual approach slope indicator system
VFR	visual flight rules
VMC	visual meteorological conditions
W	west
Z	Zulu time
'	minute(s)
°	degree(s)