

## Findings and Recommendations of the Aviation Death Review Panel

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### Responses

1. Letter from John W. Crichton, President and Chief Executive Officer, NAV CANADA - RE: BC Coroners Service Aviation Death Review Panel Report – Recommendation Number 15 .....2
2. Letter from Roberta Ellis, Senior Vice President, Human Resources and Corporate Services, Work SafeBC – RE: RE: BC Coroners Service Aviation Death Review Panel Report and Recommendations .....4
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April 26, 2012

Ms. Lisa Lapointe  
Chief Coroner  
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Suite 800 - 720 Kingsway  
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**Subject: BC Coroners Service Aviation Death Review Panel Report - Recommendation Number 15**

Dear Ms. Lapointe:

I would like to thank you for the opportunity to comment on Recommendation 15 from the subject report.

*It is recommended that NAV CANADA engage in a consultation process with Environment Canada Meteorological Services Staff and British Columbia's float plane community, with the objective of improving the quality of weather camera imagery available through the Aviation Weather Web Site and increasing the number of web camera placements in critical coastal locations.*

In accordance with the Civil Air Navigation Services Commercialization Act, NAV CANADA is responsible for the specification of the location and frequency of weather observations and forecasts for aviation purposes in accordance with the Aeronautics Act and regulations made under the act, the procurement of those observations and forecasts (From Environment Canada) and the dissemination of weather information for aviation purposes including the dissemination of weather briefings. Requirements for aviation weather services are normally addressed through our Level of Service Policy and consultations with our customers and stakeholders.

Since the commercialization of the Air Navigation System in 1996, NAV CANADA has consulted regularly with customers and stakeholder organizations such as Environment Canada on all services including aviation weather. Consultations forums are conducted on a prescribed basis at both the national and regional levels. At these forums, customers and stakeholders have the opportunity to bring service issues to our attention for discussion and resolution. In addition, the NAV CANADA Advisory Committee (NCAC) has direct access to our Board of Directors on any issue and currently includes representation from the Float Plane Operator community.

Without question, the use of weather cameras in Canada has been a success story. Through the consultation process, NAV CANADA has already deployed weather cameras to over 130 locations in Canada, including 11 sites along the British Columbia coast, to improve aviation weather services to our customers. This was a major expansion from the original network of 22 sites that existed in 2008. In addition, we will soon be commencing a new project which involves the deployment of weather cameras at another 50 sites, 13 of which are along the BC Coast. These BC sites were recommended by the Floatplane Operators Association.

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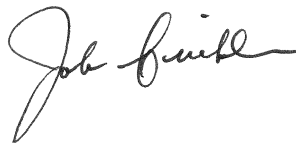
We have made other improvements to weather reporting on the west coast including the establishment of two additional weather observing sites, the provision of three local graphic forecasts that include marine weather information, and the inclusion of synoptic weather features on the Graphical Area Forecast. These initiatives also resulted from consultations with float plane operators.

The provision of aviation weather services is regulated by Transport Canada and must be consistent with International Aviation standards and recommended practices. As such the aviation weather equipment must meet these strict requirements to be used for aviation weather services. Weather Cameras are a cost effective means to provide Environment Canada with additional supplemental information that can be utilized by forecasters. It also provides customers with near accurate local conditions at the site (refreshed every 10 minutes), with access from the Aviation Weather Web Site; however, it must be noted that weather cameras do not constitute an official aviation weather source for weather reporting.

NAV CANADA has upgraded our equipment by replacing all analog cameras with new high resolution digital models. This upgrade improves both the on-site depiction of visible weather information and the quality of the imagery, as well as the reliability of service. Further upgrades are being assessed as part of our continuous improvement process and life-cycle management of the system.

In closing, NAV CANADA is very proud of the weather camera program and positive feedback we have received from the aviation community on the supplemental information it provides. We will continue to improve the system through technological upgrades and address customer requests for additional service in concert with our existing consultation and Level of Service processes. Thank you again for the opportunity to provide comments on this very important issue.

Sincerely,



John W. Crichton  
President and Chief Executive Officer  
NAV CANADA

JWC/rk

c.c.: Tom Pawlowski, Chair, Aviation Death Review Panel

**Roberta Ellis**  
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June 27, 2012

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MINISTRY OF SOLICITOR GENERAL  
OFFICE OF THE CHIEF CORONER

Dear Ms. Lapointe:

**Re: BC Coroners Service Aviation Death Review Panel Report and Recommendations**

Your letter of April 4, 2012 to David Anderson, together with the report and recommendations arising from the results of an Aviation Death Review Panel, have been referred to me for response.

The Panel recommended that WorkSafeBC introduce regulations or guidelines to encourage employers to address the safe transport of workers onboard aircraft. Specifically, the Panel suggested that employers employ the following measures:

- Provide underwater egress training for workers who routinely commute over water onboard aircraft,
- Provide personal flotation devices for workers to wear while flying over water, and train them on the deployment of such devices, and
- Select only air operators that demonstrate the highest standards and commitment to safety.

WorkSafeBC's authority to implement the panel's recommendations is limited due to issues of jurisdiction. While WorkSafeBC has occupational health and safety jurisdiction over provincially-regulated employers and workers, once the workers enter an aircraft Transport Canada's rules are paramount.

Employers have a responsibility under section 115(2)(e) of the *Workers Compensation Act* to provide their workers with the necessary instruction and training to ensure their health and safety in carrying out their work and to ensure the health and safety of other workers at the workplace. However, requiring an employer to provide specific underwater egress training could create a conflict with Transport Canada's regulations. Similarly, requiring an employer to provide

June 27, 2012

personal flotation devices for workers to wear onboard aircraft has the potential to generate a conflict with Transport Canada's regulations. For example, a situation might arise where a worker boards an airplane wearing a personal flotation device provided by the employer, but is asked by the aircraft staff to remove it. If WorkSafeBC were to require employers to provide training or equipment to workers travelling by air that conflicted with Transport Canada's regulations, this could create further safety risks for workers.

Regarding the Panel's recommendation to only select air operators with the highest safety standards, this would present implementation challenges as employers do not have the necessary knowledge or experience to assess an air operator's adherence to safety standards. WorkSafeBC would have to provide guidance on how to assess an air operator's level of safety, which could encroach on Transport Canada's jurisdiction and potentially create conflict with its regulations. All air operators are required to meet Transport Canada's regulations and standards for safety, and Transport Canada is responsible for ensuring that air operators certified to operate in Canada comply with these regulations and standards. If an operator does not demonstrate the highest standards and commitment to safety, it is expected that corrective action will be taken by Transport Canada.

WorkSafeBC recognizes that air travel to remote worksites presents a significant risk to workers and is committed to taking steps to reduce this risk and prevent any further injuries or fatalities. In order to enhance the safety of workers required to travel by air, WorkSafeBC's Industry and Labour Services staff will be liaising with the BC Forest Safety Council to discuss enhanced employer awareness regarding the safe transport of workers on aircrafts over BC waters.

I want to assure you that the recommendations directed to WorkSafeBC have been carefully considered. Please do not hesitate to contact me if you wish any further information or clarification regarding this matter.

Sincerely,



Roberta Ellis  
Senior Vice President  
Human Resources and Corporate Services

cc:

Dave Anderson, President & CEO, WorkSafeBC  
Betty Pirs, Vice President, Prevention Services, WorkSafeBC  
Donna Wilson, Vice President, Industry Services and Sustainability, WorkSafeBC  
Anne Burch, Director, OHS Regulation & Policy, Policy and Regulation Division, WorkSafeBC



Transport  
Canada

Transports  
Canada

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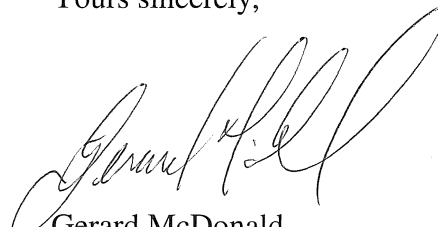
Dear Mrs. Lapointe:

**SUBJECT: British Columbia Coroners Service Aviation Death Review Panel  
Report and Recommendations.**

This is in response to your letter to Minister Lebel of April 4, 2012, and the enclosed Coroner's Investigation Report from the examination of the facts and circumstances surrounding twenty three deaths resulting from four aviation incidents involving small commercial aircraft on British Columbia's coast.

The appropriate Transport Canada officials have reviewed the report. The attached comments are provided in response to your recommendations addressed to Transport Canada.

Yours sincerely,



Gerard McDonald

Attachment

Canada

[www.tc.gc.ca](http://www.tc.gc.ca)

03-0068 (0308-01)

## **Transport Canada's Representations to the British Columbia Coroners Service Regarding the Aviation Death Review Panel Report and Recommendations.**

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### **Recommendation #1**

It is recommended that Transport Canada create a regulatory requirement that all new and existing commercial seaplanes be equipped with emergency exits that would allow rapid egress following a collision with water.

### **Transport Canada's Response**

TC has initiated an extensive review of past Transportation Safety Board reports of water-related seaplane accidents over the past several years, as well as other information and studies on the subject, to ascertain/assess the factors affecting underwater evacuation and to identify if there are viable design options to improve underwater egress performance. It is anticipated that the results of this work will indicate the regulatory approach to best address this issue.

### **Recommendation #2**

It is recommended that Transport Canada create a regulatory requirement that all passengers and crew of commercial seaplanes wear personal floatation devices (PFDs) during all stages of flight.

### **Transport Canada's Response**

The process has been initiated for the creation of a new regulation with regards to mandating that all passengers, except for infants and small children, wear PFDs during all stages of flight. Legal drafting of the proposed amendment is anticipated to begin by the end of 2012.

### **Recommendation #3**

It is recommended that Transport Canada create a regulatory requirement that illumination strips identifying emergency exits be installed onboard all commercial seaplanes.

### **Transport Canada's Response**

A review of seaplane accident reports that have occurred over past years across Canada has not identified that difficulty by occupants in locating exits is a significant factor in survivability in seaplane accidents.

The accident reports reviewed by Transport Canada suggest that a thorough pre-flight briefing, including the location and operation of emergency exits and the use of seatbelts and shoulder harnesses are among the greatest factors influencing successful egress from a survivable seaplane accident.

The accident reports reviewed do not support the proposal that enhancing exit identification is likely to significantly improve the chances of a successful egress in the same way that exits that promote rapid egress would, and thus, Transport Canada will

continue to focus on the issue of doors, ‘pop-out’ windows and single action door release.

#### **Recommendation #4**

It is recommended that Transport Canada introduce a requirement that all certified aircraft be equipped with a battery-disconnect “gravity switch” or a similar system that severs connections with electrical power sources in a collision, thus removing a potential source of post-impact fires.

#### **Transport Canada’s Response**

The comments by the Chair of the Death Review Panel refer to the 2006 Safety Issues Investigation Report (SIIA0501). In TC’s review of that report, it was noted that throughout the report, numerous instances are identified where there was a lack of data with respect to the role that post-impact fire (PIF) played in an occurrence involving a fatality or serious injury and the report itself called for caution in interpretation. The report also focussed on amateur-built and ultralight aircraft, not just type certificated aircraft, so the overall contribution of PIF to the fatality rate in type certificated aircraft was not concluded.

Where the SII report did make a number of recommendations, including a number of comments regarding possible design improvements to ‘isolate’ ignition sources from combustible materials, or to distance combustible materials, particularly fuel, from occupants, the report did not specifically identify how and to what extent and on which types of aircraft, and with what cost/benefit ratio, pertinent changes would improve survivability.

In addition to not providing analysis of the actual benefits likely to accrue from implementation on different types/categories of aircraft, the report fails to address the potential drawbacks of increased electrical system complexity, which would result from such implementation. Indeed, implementation of some changes could, in certain scenarios, result in a deterioration of safety – for instance, installing a battery electrical automatic disconnect could fail under normal operating conditions, resulting in a loss of DC electrical power in flight.

Where each improvement in general aviation safety comes at a cost, the benefit of the improvement must justify the expense. In many areas, the design standards for general aviation airplanes have significantly improved over many decades. However, as a consequence, new aircraft are commensurately more expensive to design and purchase, which has resulted in an observed 93% of the general aviation fleet being made up of airplanes designed in the 1950s-1970s. Indeed, each of the aircraft involved in the occurrences discussed in this B.C. Coroner’s Service report are of that era. All of the advances in design standards over the past 40 years are reflected in less than 7% of general aviation fleet.

Along with the FAA and other world aviation authorities, Transport Canada is studying this economic reality in an FAA Aviation Rulemaking Committee (ARC) looking at the



next generation of general aviation, the need to continue to improve safety in combination with the need to reduce the costs of new aircraft certification and production.

#### **Recommendation #5**

It is recommended that Transport Canada undertake a formal review of the efficacy of available stall warning systems, including angle of attack indicators, for applications in all certified aircraft, with the objective of identifying systems that would enhance pilot's awareness of the angle of attack and allow for early recognition of situations that may result in an aerodynamic stall if uncorrected.

#### **Transport Canada's Response**

Along with the FAA and other world aviation authorities as part of an FAA Aviation Rulemaking Committee (ARC), Transport Canada is studying whether a revision to Federal Aviation Regulation (FAR) part 23 / Airworthiness Manual (AWM) 523 / CS-23 to provide performance-based, less prescriptive safety requirements will foster innovation that will ultimately improve safety. The more widespread installation and use of angle of attack indicators is being viewed as potentially beneficial to general aviation airplanes. However, how specific safety targets will be met may be left to the individual aircraft designer, where they may choose from a variety of different equipment options to achieve the same level of safety. Each technology has its own benefits and drawbacks (failure modes), so mandating one technology over another may not result in the optimum safety scenario.

The goal of the ARC is to identify how to continue to improve safety in combination with reducing the costs of new aircraft certification and production. It is believed that facilitating the introduction of lifesaving technologies into a revitalized general aviation fleet will significantly reduce the overall fatality rate. The focus is on preventing fatalities due to:

- loss of control;
- controlled flight into terrain; and
- engine failures/mismanagement by pilot.

Collectively, these accident causes represent about 50% of fatalities. Addressing these issues is seen as the biggest safety return for investment that the industry and authorities can make.

#### **Recommendation #6**

It is recommended that Transport Canada create a regulatory requirement that all new and existing commercial aircraft be equipped with real-time satellite tracking systems.

#### **Transport Canada's Response**

*Canadian Aviation Regulations* (CARs) 605.38 requires the carriage of emergency locator transmitters (ELTs) by Canadian aircraft. These devices track aircraft locations via dedicated satellite constellations (SARSAT and GLONASS). There is an exemption

available to that rule for large commercial air carrier aircraft being operated with full time dispatch (Class A) monitoring, but the CAR requirements for ELTs are in place, and include most commercial and general aviation aircraft. The Emergency Locator Transmitter Working Group, several years ago, made recommendations to allow operators a choice of aircraft tracking and locating device alternatives, such as real time satellite tracking systems. Transport Canada plans to review its policy with respect to Alternate Means of Compliance.

#### **Recommendation #7**

It is recommended that Transport Canada initiate research into technologies that would allow seaplanes to stay afloat, or significantly delay the rate of sinking following collisions with water.

#### **Transport Canada's Response**

In September of 2012, Transport Canada was invited to participate in a joint helicopter study with the Newfoundland and Labrador Offshore Petroleum Board involving additional flotation devices affixed to the upper aircraft structure(s). These devices would prevent aircraft from rolling inverted and sinking following ditching procedures. The technology may be applicable to small airplanes as well as helicopters and will be evaluated with that mutual goal in mind. This study represents a first step in the development of improving flotation technology for overwater flight.

#### **Recommendation #8**

It is recommended that the configuration of the pilot seat and restraint system as observed in the Beaver aircraft involved in the Saturna Island accident and currently in use on some other Beaver aircraft be examined to determine whether it meets its intended purpose of providing efficacious restraint of the occupant in a survivable collision.

#### **Transport Canada's Response**

The basis of certification of the DHC-2 Mk.1 Beaver includes the British Civil Airworthiness Requirements (BCAR), as amended to June 1, 1947 and Normal Category and Information Circular T/4/48, dated March 3, 1948. The safety standards of this aircraft are commensurate with the era in which it was originally designed. That an aircraft design can continue to operate without modification for the duration of its service life, in compliance with its original basis of certification, is a fundamental principle of international civil aviation, as provided for by the International Civil Aviation Organization (ICAO). Only in the case where an unsafe condition develops in the fleet are changes required pursuant to Airworthiness Directives. At this time, no unsafe condition has been identified with respect to the DHC-3 Beaver occupant restraint systems, and in consideration of the vintage of this aircraft design.

The final report (A09P0397), regarding the accident of a DHC-2 MKI at Lyall Harbour on Saturna Island B.C., was reviewed for content. The only relevant information from the Transportation Safety Board accident investigation report regarding the pilot seat restraint system was found in the section titled "Wreckage Examination". Page 6 states

in part, “The pilot’s seat frame remained attached to the floor, but the seat-back portion, including the lap belt attachments, had broken away”. This section also states in part, “Damage was consistent with high energy impact at a flat attitude and high engine power”.

Transport Canada has no data on pilot seat restraint systems, or the seat-back failures, to indicate a safety concern. Consequently, the configuration of the pilot seat restraint system, as certified during type certification for the DHC-2 MKI, is considered to meet the Certification Basis as specified within the Type Certificate Data Sheet (TCDS) A-22.

Transport Canada has been in contact with Viking Air Limited, the Type Certificate Holder for the DHC-2 aircraft. Viking Air has indicated that they will be examining the facts surrounding the seat and restraint systems as identified within the Transportation Safety Board investigation report A09P0397. Transport Canada will work closely with Viking Air to address any findings and determinations made as a result of this examination.

#### **Recommendation #9**

It is recommended that Transport Canada develop a process for issuing Operational Directives, similar to the existing Airworthiness Directives processes, to enable speedy and efficient dissemination of safety related information and directives addressing operational safety issues.

#### **Transport Canada’s Response**

Transport Canada has recently developed an instrument for the purpose of distributing critical operational information, called the Civil Aviation Safety Alert. It is intended as a rapid response to any perceived safety issue, and will be distributed to both industry and Transport Canada Regional Personnel.

#### **Recommendation #10**

It is recommended that Transport Canada eliminate the granting of Operations Specifications that allow commercial Visual Flight Rules (VFR) fixed-wing operations in reduced visibility conditions.

#### **Transport Canada’s Response**

As a result of a number of fixed-wing accidents that occurred in the 1990’s, the Transportation Safety Board recommended that fixed-wing VFR operations in uncontrolled airspace incorporate a higher visibility criterion: specifically – that the CARs requirements be raised from one statute mile to two statute miles. This change was incorporated into CARs 602.115(c) (i) Minimum Visual Meteorological Conditions for VFR Flight in Uncontrolled Airspace.

There are numerous requirements listed in the Commercial Air Service Standards (CASS) to qualify for the operations specification permitting a reduction of this requirement from two miles to one mile visibility, including additional equipment and pilot training. To date, these mitigations have been deemed effective and adequate.

The training for the operations specification includes a requirement to be able to make timely decisions to avoid being trapped inadvertently.

It is important that the pilot decision-making process be emphasized. To this end, Transport Canada is embarking on expanded Crew Resource Management (CRM) regulatory requirement for commercial operators in Air Taxi, Commuter and Airlines. The new regulation will include requirements for threat and error management and pilot decision-making; both primary considerations for these types of flights.

#### **Recommendation #11**

It is recommended that Transport Canada require commercial VFR operators to provide their pilots with annual decision-making training specific to the scope of operations; and further, that Transport Canada require commercial VFR operators to provide annual decision-making training to all critical personnel that provide support to the pilot, including flight followers and company management.

#### **Transport Canada's Response**

Transport Canada will be developing new CRM regulations and standards that will include recurrent training, for commercial operations that will include decision making theory and application as well as decision making challenges.

#### **Recommendation #12**

It is recommended that Transport Canada develop standardized curriculum for underwater egress training and make underwater egress training mandatory for flight crews involved in commercial seaplane operations; and further, that enhanced safety briefings outlining underwater egress procedures be mandatory on all commercial seaplane flights.

#### **Transport Canada's Response**

Transport Canada will be making underwater egress training mandatory for flight crew involved in commercial seaplane operations.

Transport Canada has produced TP 12365 Seaplanes/Floatplanes - A Passenger's Guide that includes information on underwater egress for Floatplanes and seaplanes. The brochure has been very successful and is made available to passengers by the operators.

#### **Recommendation #13**

It is recommended that Transport Canada create a requirement that all commercial seaplane pilots undergo training that includes a component on avoidance of and recovery from sudden encounters with hazards such as conditions that are below Visual Meteorological Conditions (VMC) minima, low level flight over glassy water and in poor visibility and other typical hazards frequently encountered by seaplane pilots.

#### **Transport Canada's Response**

Current regulatory training requirements in the CARs and CASS address various emergencies encountered in the aircraft operations. Float operators are required to

develop procedures that reflect their operating environment, as well as procedures for VFR operations in uncontrolled airspace. Again, the Standard for low visibility operations requires pilot training and company procedures involving route/terrain knowledge and/ or restrictions including availability of forced landing areas, potential for white-out (loss of visibility) and so on. VFR pilots are taught to turn around when faced with a loss of visibility scenario. The equipment requirements for VFR aircraft do not include basic instruments necessary for inadvertent Instrument Flight Rules (IFR), so training for inadvertent penetration of these is restricted to avoidance techniques only. The curriculum for a float rating addresses glassy water awareness and operations.

Accordingly, we believe that appropriate CRM training, including threat and error management and pilot decision making, to be the proper mitigations necessary to reduce float operation accidents. As mentioned previously, Transport Canada will be developing new CRM regulations and standards for commercial operations.

#### **Recommendation #14**

It is recommended that Transport Canada develop standardized curriculum for Mountain Flying Training and develop criteria for measuring students' proficiency in reaching the acceptable standard.

#### **Transport Canada's Response**

Under the current personnel licensing system, Transport Canada will only develop a standardized training curriculum where a rating or similar licensing action will result. As there is no mountain flying rating in Canada, no Transport Canada approved curriculum exists or is contemplated for this activity.

Various training organizations in Canada offer mountain flying courses for pilots, both for aeroplanes and helicopters, in accordance with best industry practice. Commercial operators are also required under the (Part VII) CARs to train and test their pilots to a level of competence for the flying environment in which they are expected to operate.



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**FEB 01 2013**

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*Your file    Votre référence*

*Our file    Notre référence*  
AARQ 5002-A09P0397  
RDIMS 8142591

Dear Mrs. Lapointe:

**SUBJECT: Update to British Columbia Coroners Service Aviation Death Review Panel Report and Recommendations.**

This is an update to Transport Canada's response sent to the BC Coroners Service Aviation Death Review Panel Report on November 16, 2012.

The attached comments are provided as an update to Recommendation #8 of the report.

Should TSB officials have any questions concerning this response, please contact Steve Dudka of Aviation Safety Analysis at 613-949-3825.

Yours sincerely,

Martin J. Eley  
Director General, Civil Aviation

## **Transport Canada's update to British Columbia Coroners Service Aviation Death Review Panel Report Recommendation #8.**

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Transport Canada (TC) responded to Recommendation #8 on November 16, 2012 stating, "Transport Canada would work closely with Viking Air to address any findings and determinations made as a result of this examination."

Viking Air Limited, the Type Certificate Holder (TCH) for the DHC-2 aircraft responded to TC's request to review the facts surrounding the pilot's seat and restraint systems as identified within the Canadian Transportation Safety Board (CTSB) investigation report A09P0397. Viking has completed their review and has communicated their findings and determinations to TC.

The accident aircraft, identified within the TSB report A09P0397, had a pilot's seat configuration/assembly that was equipped with a military pilot seat pedestal, which is approved in the civilian DHC-2 aircraft, and a military cabin seat pan with tilting seat back, which is also approved. The cabin seat pan with tilting seat back is specifically designed for the mid-cabin location. The tilting seat back provides egress for the rear seating passengers. Although these two units are approved separately, the combining of these two units, or configuration, is not Original Equipment Manufacturer (OEM) approved. Viking has stated that they are not aware of any document, domestic or foreign, that has approved the installation of this configuration/assembly as installed in the accident aircraft identified within the CTSB report A09P0397.

TC has reviewed the documentation and determination presented by Viking Air. An approved configuration/assembly as identified within the TSB report A09P0397 could not be found. Consequently, TC concurs with the review completed by Viking Air Limited.

Although the TCH issued Service Bulletin 2/39 in August 1984 stating that seat/restraint systems must be approved, TC is considering the issuance of a Canadian Aviation Safety Alert (CASA). The purpose of the CASA would be to advise owners who purchase these older aircraft to be attentive when reviewing the technical records. There is a possibility of unapproved configurations/assemblies in older aircraft that have an extensive history of modifications and maintenance.