COMMISSION OF INQUIRY INTO THE AIR ONTARIO CRASH AT DRYDEN, ONTARIO

Final Report

Volume II

The Honourable Virgil P. Moshansky
Commissioner

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This Final Report consists of three volumes: I (Parts One–Four), II (Part Five), and III (Parts Six–Nine and the General Appendices). The table of contents in each volume is complete for that volume and abbreviated for the other two volumes. Seven specialist studies prepared for this Commission have been published separately in a volume entitled Technical Appendices; the contents of the Technical Appendices are given at the end of this volume.

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This volume has been translated by the translation services of the Secretary of State, Canada, and is available in French.

The aerial photograph reproduced in the endpapers was taken by CASB investigators on March 11, 1989, the day following the crash of Air Ontario flight 1363. It depicts the area of the Dryden Municipal Airport (upper right), surrounding road system, and crash site. McArthur Road runs vertically up the middle of the photograph, curving to the right at about the centre of the book on the right-hand page. (The cleared straight line is a hydro right of way.) Middle Marker Road angles to the left off McArthur in the lower left-hand section. The path of Air Ontario flight 1363 through the trees begins not far from the end of runway 29, and the crash site can be seen just above Middle Marker Road. Many survivors walked out to Middle Marker Road immediately after the crash.

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PART FIVE

THE AIR CARRIER – AIR ONTARIO INC.

13 CORPORATE HISTORY

Air Ontario Inc. is Canada's third largest regional air carrier in terms of revenue. With a fleet of fifteen Dash-8 series 100 and four Dash-8 series 300 turboprop aircraft, and approximately 670 employees, Air Ontario provides scheduled and charter service to 15 destinations throughout central Canada and the northern United States. Its most travelled scheduled routes were, as of May 1991, Toronto (Pearson) to Sudbury, Toronto (Pearson) to Windsor, and Toronto (Island) to Ottawa.

Air Ontario Inc. is the product of a functional merger between Austin Airways Limited and Air Ontario Limited. The origins of Air Ontario Inc. are described in the following section and in figure 13-1.

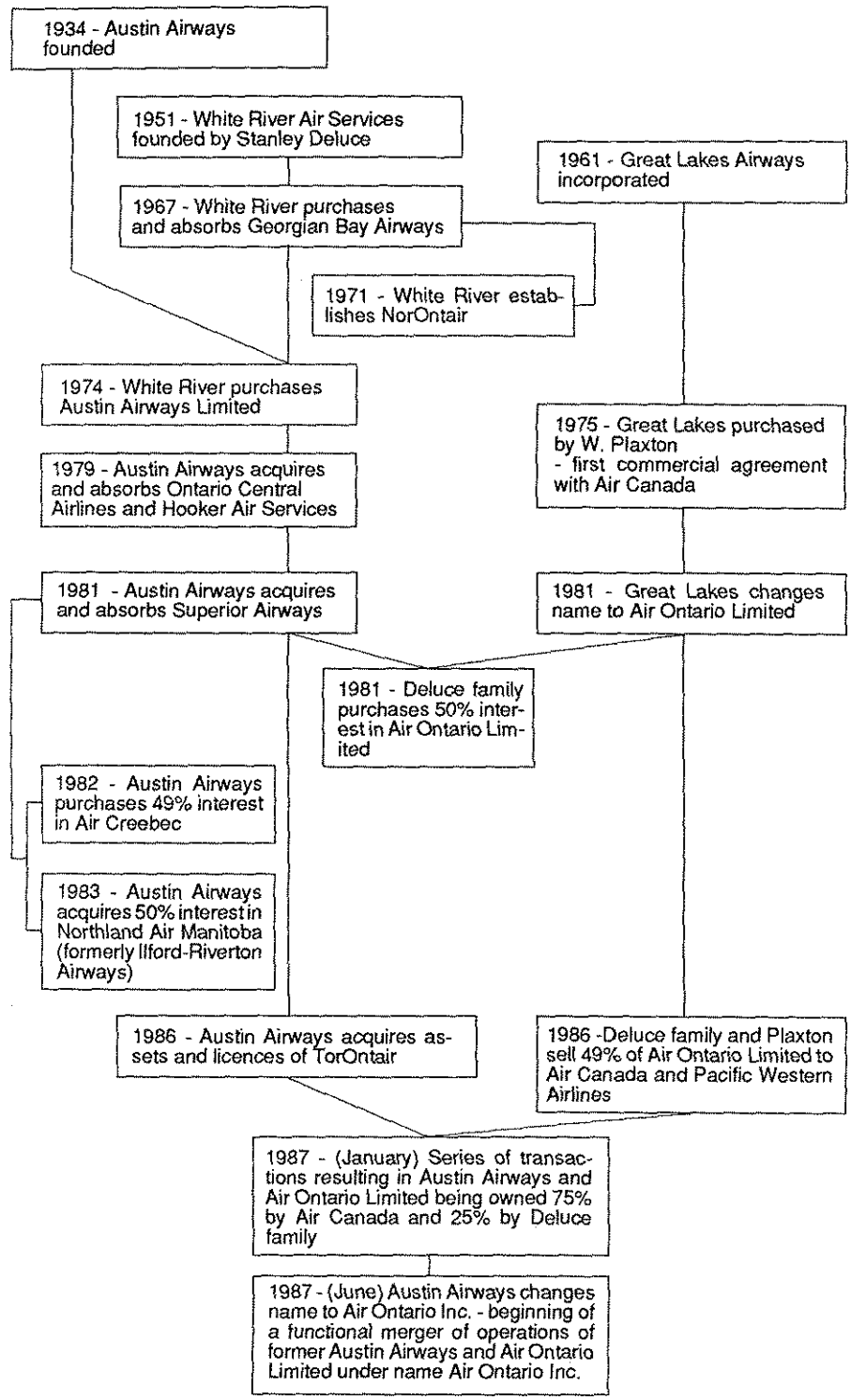
Austin Airways Limited

Austin Airways Limited, a largely northern operation, was founded in 1934 by Jack and Charles Austin. In 1974, all of the shares of Austin Airways were purchased by White River Air Services, which had been founded by Stanley M. Deluce in 1951. From its earliest days of operation, White River was run as a family business, with Stanley Deluce employing his seven sons in various capacities.[1] In the early days, White River was an exclusively visual flight rules (VFR) charter operation flying single-engine Cessna, Beaver, and Otter float-equipped aircraft in the summer months in Northern Ontario.

In 1967 White River purchased Georgian Bay Airways, then operating a scheduled service between Timmins and Kapuskasing, using twin-engine aircraft and with the capability of conducting flights in accordance with instrument flight rules (IFR). Thus White River acquired its first licence to operate a scheduled service. Approximately 95 per cent of the White River traffic between Timmins and Kapuskasing connected with Air Canada flights at Timmins. Although on a small and informal scale, this was the first feed service that White River provided to Air Canada routes.

[1] Stanley and Angela Deluce have seven sons, William, Robert, Joseph, James, Bruce, Gerald, and Terrance, each of whom has been employed at various times in various capacities in the aviation business.

Figure 13-1 Air Ontario Inc. Corporate History



In 1971, White River won a competition for a Government of Ontario contract to establish and operate NorOntair airlines. NorOntair, under the direction of Mr William Deluce, provided scheduled service in Northern Ontario using Twin Otter aircraft. Eventually, NorOntair would operate four to five Twin Otters employing between 20 and 25 pilots and 10 aircraft maintenance engineers (AMEs). It provided scheduled service to northern communities including Chapleau, North Bay, Sudbury, and Sault Ste Marie, with its main base of operation being Sudbury and later Timmins.

Mr William Deluce described how, as the vice-president and general manager of NorOntair, he oversaw the development of this new airline:

> A. ... NorOntair was a new ... service. It was the provision of scheduled service ... utilizing Twin Otter, new Twin Otter, aircraft that had been ordered and purchased from de Havilland by the Ontario government and leased to us for a dollar.
>
> It was our obligation and responsibility to hire people, to set up the systems and to manage the operation and in so doing, provide a highly reliable service to the people of northern Ontario. And at that time as well, we integrated the scheduled service very closely with that of Air Canada. We tied in with Air Canada. They were basically our handling agent at any point that we had dual operations.
>
> (Transcript, vol. 151, pp. 23–24)

Mr Deluce described his reporting relationship:

> A. I had two reporting streams at that point. I reported again back to Stan Deluce and aside from that, I also reported to the Ontario government from a fiscal point of view. It was a subsidized operation in the early days and the fiscal responsibility basically was one that the Ontario government was very much interested in and involved in.
>
> (Transcript, vol. 151, p. 26)

In all, Mr William Deluce and White River operated NorOntair for approximately three-and-one-half years.

In October 1974, after approximately one-and-one-half years of negotiations, White River acquired all the shares of Austin Airways. Mr William Deluce described how his family acquired existing airlines and their licences as a method of expanding its operation in a tightly regulated airline industry:

> A. It was the fact that in order to expand back in those days in a highly regulated environment which the transportation – air transportation business was, you had to either expand through

> the licensed application route which was a very time consuming, tedious and usually not very successful route.
>
> The easier way or the way that we certainly had expanded in the '70s was to acquire other companies that already had licences and all of this came together ... after working quite vigorously with Mr Austin in about a year and a half – in about a year and a half's time of negotiation with Mr Austin for the purchase of Austin Airways in October of 1974.
>
> (Transcript, vol. 151, p. 35)

In Austin Airways, the Deluce family acquired an airline operation that was four to six times larger than White River. Austin Airways flew DC-3 and Canso aircraft on predominately IFR, scheduled service. These aircraft were larger than anything flown by White River at that time and brought the Deluce family within the regulatory regime of Air Navigation Order (ANO) Series VII, No. 2, which governed air carriers operating aircraft heavier than 12,500 pounds.

Approximately 80 per cent of Austin Airways' business was scheduled service while 20 per cent was charter work. Austin serviced communities on both sides of Hudson Bay as far north as Cape Dorset and Baffin Island. Austin had no significant presence in southern Ontario at that time.

One of the first priorities for the new ownership of Austin Airways was to modernize its equipment. Mr William Deluce testified that they sought to replace the Austin DC-3 and Canso aircraft with turbine aircraft, which were able to operate more effectively in the harsh northern environment. Hawker Siddeley HS-748 aircraft were eventually acquired to fulfil this role.

Austin Airways and White River were initially operated as separate entities; eventually, however, the two operations were integrated under the name of Austin Airways. It was the objective of Austin management to phase out the single-engine VFR operation and move exclusively to a multi-engine IFR operation.

In 1979, Austin Airways, under the ownership and management of the Deluce family, continued its expansion of operations by acquiring the assets and licences of Ontario Central Airlines and Hooker Air Services Limited. These airlines' extensive scheduled licences for northwestern Ontario and Manitoba complemented the existing Austin service in northeastern Ontario and Quebec. With these acquisitions, Austin Airways added some 25 additional scheduled points, 75 to 80 employees, and 20 to 30 single-engine, light twin-engine, and DC-3 aircraft. The Ontario Central and Hooker Air operations were immediately integrated into the operations of Austin Airways.

In 1981 Austin Airways acquired Superior Airways Limited, which was based in Thunder Bay, Ontario. In so doing, Austin Airways

acquired an established operation in Thunder Bay (the largest city in northwestern Ontario), six or seven aircraft of varying types, and a number of licences including one linking Thunder Bay and Minneapolis, Minnesota. For Austin Airways, the Minneapolis licence represented its first scheduled service to the United States.

In 1981 the Deluce family made an additional acquisition of significance – namely a 50 per cent ownership interest in Air Ontario Limited, the dominant regional carrier in southern Ontario. Mr William Deluce testified that it had been his family's intention to purchase 100 per cent of Air Ontario Limited, but its owner, Mr James Plaxton, would surrender only one-half of his company. In Air Ontario Limited, the Deluces saw an opportunity to expand their operation further into southern Ontario. At this stage, there was no attempt to integrate the operations of the two companies since the Deluces were not involved in the day-to-day management of Air Ontario Limited.[2]

In 1982 the Deluce family became involved in establishing and managing Air Creebec, a scheduled service to settlements on the lower eastern shore of James Bay. The Deluce family maintained a 49 per cent equity interest in the airline with the Cree community owning a 51 per cent interest. While Air Creebec was an independent entity, Austin Airways did provide some management and maintenance services to it on a contract basis.[3]

In 1983 Austin Airways acquired a 50 per cent interest in Ilford-Riverton Airways Limited, which later became Northland Air Manitoba. This acquisition coincided with an Austin Airways sale of some of its northern Quebec assets to Air Inuit. Because of the sale to Air Inuit, Austin Airways had surplus personnel and equipment which were deployed in Northland Air Manitoba. Although it was an independent airline, Northland Air Manitoba, like Air Creebec, was operated by imported Austin management.[4]

In 1986 Austin Airways acquired the assets and licences of TorOntair, which enabled it to provide service out of Toronto to Trenton, Kingston, and Elliot Lake. These routes were served by Hawker Siddeley HS-748 and Beech 99 aircraft. With this additional service, Austin Airways'

---

[2] Though Mr William Deluce was the vice-president of Air Ontario Limited and a member of its board of directors, he and his family were not involved in the day-to-day management of the company. Mr James Plaxton, as president and CEO of Air Ontario Limited, maintained managerial control over his company until he sold off all of his interest in 1987.

[3] The Deluce family divested itself of its interests in Air Creebec in 1988.

[4] Mr James Morrison was brought into Air Creebec as the general manager. Mr Morrison would later become the vice-president of flight operations of Air Ontario Inc. Captain Robert Nyman was brought into Northland Air Manitoba as the director of flight operations, a position he would later assume at Air Ontario Inc.

already comprehensive northern operation was linked to Canada's busiest airport, Pearson International.

Air Ontario Limited

Air Ontario Limited was originally incorporated in 1961 as Great Lakes Airlines. Based in Sarnia, Ontario, Great Lakes operated Convair 440 aircraft in southern Ontario. A partnership, including Mr James Plaxton, purchased the company out of receivership in 1975, and shortly thereafter Mr Plaxton became the 100 per cent owner of Great Lakes. At approximately the same time, Great Lakes entered a commercial agreement with Air Canada whereby Great Lakes took over Air Canada's money-losing Toronto-to-London, Ontario, route, servicing it with four newly acquired 55-passenger Convair 580 turboprop aircraft.

Mr Thomas Syme, formerly the Air Ontario group vice-president of operations and marketing, described this early commercial arrangement that existed between Great Lakes and Air Canada as the first "feeder-trunk" relationship involving Air Ontario and Air Canada.[5] In addition to Great Lakes taking over Air Canada service between London and Toronto, the two carriers' schedules were arranged so that passengers flying from London to destinations beyond Toronto could make a coordinated connection onto Air Canada at the international airport in Toronto.

During the late 1970s, Great Lakes provided scheduled service between Sarnia, London, Toronto, Peterborough, and Ottawa, Ontario. Mr Syme explained that the regulatory environment in Canada inhibited the expansion of Great Lakes during these years:

> A. At that time, any new routes had to be approved in terms of the licensing to operate into those routes, and licensing was – was often very difficult to get, and on a number of occasions, Air Ontario had applied for ... various licences, which would have allowed them to operate into new areas and had been declined.
>
> (Transcript, vol. 97, pp. 14–15)

[5] "Feeder-trunk" or "trunk-feed" refers to the relationship between a national/international carrier and its regional affiliate. In a deregulated environment, where an air carrier has greater flexibility in adding and abandoning routes, a trend developed in the United States in the 1970s whereby large national and international carriers would purchase equity interests in established regional carriers. The parent, or "trunk" carrier, would typically abandon its short-haul regional routes, which were picked up by the established regional affiliate, operating on a more cost-effective basis. It would "feed" the national carrier at significant "hub" airports. Following the deregulation of the Canadian airline industry in the mid 1980s, similar trunk-feed arrangements were developed.

In the spring of 1981, Great Lakes changed its name to Air Ontario Limited. At this time Mr Plaxton sold a 50 per cent interest in the company to the Deluce family of Timmins, Ontario, the owners of Austin Airways Limited, then the largest airline serving Northern Ontario.

From 1982 to 1986, in spite of the difficulties with regulation described by Mr Syme, Air Ontario Limited expanded its routes to include service to Winnipeg, Thunder Bay, Sault Ste Marie, Windsor, North Bay, Montreal, Cleveland, Ohio, and Hartford, Connecticut. To service these expanded routes, Air Ontario added more Convair 580 aircraft to its fleet.

In 1986 Air Canada and Pacific Western Airlines Corporation each acquired 24.5 per cent of the shares of Air Ontario Limited. The Deluce family and Mr Plaxton held the outstanding 51 per cent through a holding company called Delplax Holdings Limited. This was the first time that Air Canada held an equity position in Air Ontario Limited.

The commercial arrangement with Great Lakes and later Air Ontario Limited was regarded by Air Canada as successful, and an ownership interest in the feeder airline was one way to ensure that the relationship remained intact. Mr William Rowe, formerly the Air Canada senior vice-president of associated airlines and Air Canada shareholders' representative on the board of directors of Air Ontario Inc., explained in testimony that, in the United States, some feed carriers had changed allegiances, causing disruption for the "trunk" carrier. By purchasing an equity interest, rather than simply relying on a contractual arrangement, Air Canada was able to exert some control over the feeder.

Austin Airways and Air Ontario Limited: Pre-Merger

At the time of their merger, Air Ontario Limited and Austin Airways had annual sales of approximately $35 million each. The two companies were, however, different in almost every other respect. Their fleets, operating environments, employee groups, and management styles are contrasted in the following section.

Austin Airways had approximately 30 aircraft of seven different types. Many of these aircraft were acquired through the different airline acquisitions previously described. Its fleet included the Cessna 402, a light twin-engine aircraft seating seven passengers; the Beech King Air 200, a light twin-engine aircraft seating approximately nine passengers; the Beech 99, a light twin-engine aircraft seating 14 passengers; the de Havilland Twin Otter, a twin-engine aircraft seating 19 passengers; the Douglas DC-3, a larger twin-engine piston aircraft used primarily for

flying cargo in the north; the Cessna Citation, a small straight-wing jet aircraft used for air ambulance services; and the Hawker Siddeley HS-748, a turboprop aircraft seating from 40 to 43 passengers.

Air Ontario Limited operated a fleet of 11 Convair 580 aircraft, a turboprop aircraft with a passenger capacity of 55. It had operated Convair 580 aircraft exclusively since the upgrade of its fleet from Convair 440 aircraft following its first commercial agreement with Air Canada in 1975.

Austin Airways provided a diverse range of commercial airline activities. It had a scheduled passenger service, complemented by a charter passenger and cargo service. In addition, it operated an air ambulance service with the Cessna Citation jet aircraft. Although Austin did operate some scheduled service out of Toronto, it primarily served northeastern and northwestern Ontario.

Air Ontario Limited provided, almost exclusively, scheduled passenger service in southern Ontario. With its Convair 580 aircraft, it serviced communities like Sarnia, Windsor, London, Ottawa, Montreal, and Cleveland.

The demands placed on pilots and crews flying in the Canadian North were and are qualitatively different from those encountered by pilots flying in the southern, and for the most part controlled, airspace. These differences were reflected in the experiences of pilots flying for Austin Airways and Air Ontario Limited.

The Austin Airways operating environment was generally harsher than that of Air Ontario Limited. Many of the communities served by Austin had airport facilities that would be described as marginal by southern standards. Gravel airstrips in the summer and fall could be covered with mud in the spring and snow in the winter. Navigation aids and weather reporting are, by and large, less reliable in the north than they are in the south. Austin Airways, in many respects, was still a "bush"-type operation as it entered its merger with Air Ontario Limited. Air Ontario Limited, conversely, served the busier southern centres and had the benefit of long, paved runways, controlled airspace, and superior navigation aids.

Mr Martin Brayman, a retired Transport Canada regional superintendent of large air carrier inspectors for Ontario Region, was shown the accident statistics for a number of carriers, including Austin Airways, operating in northern and remote regions. In discussing the accident rates of these carriers, he stated that there is "a direct relationship between the number of accidents or incidents that a carrier has and the condition under which the carrier operates" (Transcript, vol. 131, p. 63). He pointed out that in northern Canada, in mountainous areas like British Columbia, in northern Quebec, and in the Arctic, there are a

number of factors that have to be taken into account with respect to operations.

Mr Brayman expressed his opinion with respect to the element of risk involved in the hostile environment of northern operations:

> A. ... there is no question that in remote areas where the population demands a reasonably high level of air service, and in Canada, our native peoples surely do that, the carriers are hard-pressed often to meet those demands.
>
> You are working in areas of bad weather, poor runways, little in the way of runway markings or approach aids, weak beacons often covered with ice. So it's a – it is a hostile environment.
>
> And if you take it even further to operations that extend out onto the sea ice, for instance, a lot of the northern operators land and take off from frozen lakes, from frozen sea ice, they touch down on frozen cracks in the sea ice. There is no question there's an element of risk.
>
> (Transcript, vol. 131, pp. 63–64)

He elaborated upon the difficult conditions habitually faced by pilots in northern operations:

> A. You are getting in an area that has a paucity of aids to the pilot. You are dealing with basic single runway strips. You are dealing with heavy snowfalls, high snowbanks, drifting snow, white-outs.
>
> It's a very difficult area to fly in successfully. Extremely cold temperatures, heavy icing during transitional periods, spring and fall. Yes, it's a very, very difficult area to fly in.
>
> (Transcript, vol. 131, p. 65)

Aside from this difficult flying environment, northern operators are also typically faced with personnel problems that Mr Brayman, a person from that environment, outlined succinctly:

> A. The basic structure of Austin's, Bradley's, any company in the north, is fairly constant. They have a hard-core group of people who stay with the company for a long period, and these people are very well qualified, especially in the management ranks.
>
> There is always a high turnover of junior people in companies. In the pilot world, the normal progression is upward. And we don't have a system similar to the National Hockey League where they remunerate minor leagues when they take players.
>
> In the aviation world, it's very common to see a complete migration from the very bottom up to the very top carriers in a

> very short period. Pilots are jumping ship and going to bigger and better equipment.
>
> So carriers in the north do have trouble holding onto their flight crews.
>
> (Transcript, vol. 131, p. 66)

Austin Airways had approximately 600 employees and, at the time of the merger, no active unions. In the Austin Airways non-unionized, northern environment, employee responsibilities were relatively unstructured. If support facilities were not available at a station stop, flight crews would do whatever was required to complete the mission at hand. For example, it was not unusual for pilots at northern outlying bases to assist in loading or fuelling aircraft. This was the nature of bush flying, and it is not uncommon in the Canadian North today.

Air Ontario Limited, in contrast, had approximately 250 employees who were largely unionized. The pilots of Air Ontario Limited were represented by the Canadian Air Line Pilots Association (CALPA); the flight attendants were represented by the Canadian Air Line Flight Attendants Association (CALFAA) and later the Canadian Union of Public Employees (CUPE); and the station agents, ground handlers, and mechanics were represented by the Canadian Auto Workers (CAW). In this unionized environment, employee tasks were clearly delineated. Pilots flew the aircraft, ground handlers loaded and serviced the aircraft, and AMEs were responsible for the repair and maintenance of the aircraft.

Mr Syme described the management of the two companies as reflecting their different operating environments. He described the non-unionized Austin Airways environment as less structured than that of Air Ontario Limited. He noted that the Austin management was more interactive with its employee group than was the Air Ontario Limited management. In the unionized Air Ontario Limited, collective agreements with the employee groups defined the structure of labour-management relations.

The Merger into Air Ontario Inc.

Change in Ownership: January 1987

As at January 1987, prior to the increased ownership by Air Canada, Austin Airways was wholly owned by the Deluce family while Air Ontario Limited was 51 per cent owned by the Deluce-Plaxton holding company (Delplax Holdings), 24.5 per cent owned by Air Canada, and 24.5 per cent owned by Pacific Western Airlines. Through a series of transactions in late 1986 and early 1987, the shares of Austin Airways

and Air Ontario Limited were purchased by numbered company 152160 Canada Inc., which was owned by Air Canada (75 per cent) and the Deluce family (25 per cent). With these transactions Mr James Plaxton and Pacific Western Airlines divested themselves of all interest in Air Ontario Limited. After the transactions, via the numbered company 152160 Canada Inc., the Deluce family owned 25 per cent of each of Austin and Air Ontario Limited.

Mr William Deluce, in explaining the rationale for the sale of part of the family's holdings to Air Canada, pointed to trends in the United States regarding the so-called "trunk-feed" relationship. Mr Deluce noted that the American experience indicated that the trunk-feed phenomenon would become increasingly important in Canada as deregulation took hold. He recognized that his family was the dominant force in Ontario regional air carriage. However, to take full advantage of their positions, Austin and Air Ontario Limited needed a significant amount of capital investment to expand and upgrade their operations. For these reasons, Mr Deluce explained, his family was willing to relinquish a degree of ownership in its businesses in exchange for the needed investment.

From the perspective of Canada's two national airlines the Deluce assets were extremely attractive. The Deluce dominance of Ontario regional air carriage would necessarily feed either of the two major airlines. An added attraction was the Deluce purchase of 50 de Havilland Dash-8 aircraft and spare parts on very favourable terms.

In late 1986, the Deluce family entertained offers from both Air Canada and Canadian Pacific Airlines, ultimately entering into an agreement with Air Canada. Following the change in ownership of Austin and Air Ontario Limited, Mr William Deluce was retained by Air Canada to act as the president and chief executive officer (CEO) of its newly acquired regional carrier. The boards of directors of each company consisted of nominees of the two owners, Air Canada and the Deluce family, reflecting their proportionate ownership interests. Apart from a common board of directors and CEO, Austin and Air Ontario Limited continued to operate as separate entities in the early months of 1987. Austin Airways provided passenger feed to Air Canada pursuant to the terms of a commercial agreement dated January 7, 1987. Air Ontario Limited continued to feed Air Canada, as it had since the 1977 Great Lakes agreement.

Merging Austin Airways and Air Ontario Limited

Although it was initially the intention of the Austin/Air Ontario Limited ownership to maintain the two companies as distinct entities, discussions were held regarding the future of both throughout early 1987. Economic

and labour concerns were identified as the principal factors that motivated their merger. On the economic side, Mr Syme described the "synergies" that could be taken advantage of by joining the two companies and rationalizing less productive departments (Transcript, vol. 97, pp. 47–48).

Addressing labour concerns, Austin/Air Ontario Limited senior management believed that the separate operation of the two companies under common ownership might not be economically or operationally viable. Following the change of ownership, CALPA filed an application for certification before the Canada Labour Relations Board to become the bargaining agent for the Austin Airways pilot group. Mr Syme testified that there was a possibility of the Canada Labour Relations Board imposing Air Ontario Limited working conditions on the less structured and non-unionized Austin Airways employee group. This lack of structure was viewed as necessary for Austin's northern bush flying. The imposition of Air Ontario Limited collective agreements on the Austin group – which was a real possibility according to Mr Syme – would threaten the economic viability of the outlying Austin routes. Rather than wait for the imposition of such conditions upon Austin, it was the decision of the combined Austin/Air Ontario Limited board of directors to join the two companies with one integrated employee group, and proceed with their business planning accordingly.

At the meeting of the joint Austin/Air Ontario Limited board of directors held on April 29, 1987, the merger of the two companies was addressed. The following minutes of that meeting provide an insight into the discussions at this level:

> Mr. Deluce pointed out that while initially it had been the intention to maintain the separate operations of the companies until all labour relations issues had been resolved, it had now become apparent that there were in fact certain advantages to merging the two companies from a labour relations point of view. In addition thereto, there were numerous employee relations, operational and financial advantages in merging the two companies immediately.
>
> ...
>
> William S. Deluce elaborated upon the current status of labour relations matters at both companies. In particular, Mr Deluce advised the meeting that as of March 11, 1987 CALPA had the right to strike Air Ontario Limited however there were no indications at the present time that a strike would, in fact, take place. The Air Ontario CUPE Agreement expires in September of 1987 and the Air Ontario CAW Agreement expires in September of 1988. Mr Deluce also advised the meeting that certification proceedings were continuing before the Canada Labour Relations Board with respect to the Austin Airways Limited pilots.
>
> (Exhibit 934, tab 1, pp. 2–3)

The merger of the two companies was approved in principle at this meeting of the combined board. The merger was effected as of June 19, 1987, and Air Ontario Inc. commenced business as of that date.

Mr Brayman, who occupied the position of regional superintendent, large air carriers, at Transport Canada during the period of the merger between Austin Airways and Air Ontario Limited, commented upon the reaction of the regulator to the merger and the steps taken to ensure that the new operation met with the regulator's approval. He indicated that the areas of concern included "the smooth transition brought about by hostilities associated with seniority lists, displacement of personnel" and "the integration of the training programs, to make sure that where cross-training is required, it follows a legitimate normal process, and that the files are kept up to date" (Transcript, vol. 131, p. 67).

Mr Brayman testified that "there was no doubt that the Austin group of supervisors displaced the Air Ontario [Limited] group of supervisors" (p. 68). He stated that Air Ontario Limited was basically a commuter operation which for a number of years operated at major airports on hard-surface runways with one type of airplane, the Convair 580. He described Air Ontario Limited as "a nice, neat, tidy operation" while describing Austin Airways as "a sprawling organization which flew in quite a few spectrums," including charter type, non-scheduled operations (p. 68).

Mr Brayman stated that there was concern at Transport Canada about how the two management groups would meld, and that "it was an awkward period" with the old staff from Air Ontario Limited being displaced and new people from Austin Airways taking over. Although he described the merger outcome as being "not as drastic as we thought it might be," he stated that Transport Canada had concerns regarding a smooth transition of operational control from one group to another:

> A. In fact, from management down, the Austin's group, the principals of the White River group, which were the Deluces, they came in in senior management positions and they brought with them the operational people and the airworthiness people from the Austin group to take over.
>
> (Transcript, vol. 131, p. 69)

Mr Brayman expressed the concerns of Transport Canada about a carrier that operated in a very broad area of Northern Ontario, spread out over large distances with a large number of aircraft, coming down to southern Ontario and "operating in a nice, tight little commuter environment":

A. Yes, we had some concern. Austin's had been operating 748s on scheduled routes, so we knew they had the infrastructure to take over. But there was other factors.

For instance, at the same time the Dash 8 was being introduced into service, the Convair 580 was – which had been the backbone of the Air Ontario fleet was going out.

Yes, we would have to say that there were some concerns.

Q. And what were those concerns?

A. We were concerned about the smooth transition of operational control from one group to the other.

(Transcript, vol. 131, p. 70)

Mr Brayman spoke of flight following as being one of the focal points of Transport Canada's concern about the operational control within the newly merged company. As the events have borne out, the Air Ontario flight dispatch and flight-following system proved to be a valid concern indeed. This subject is discussed further in chapter 23 of this Report, Operational Control.

Air Ontario Inc.

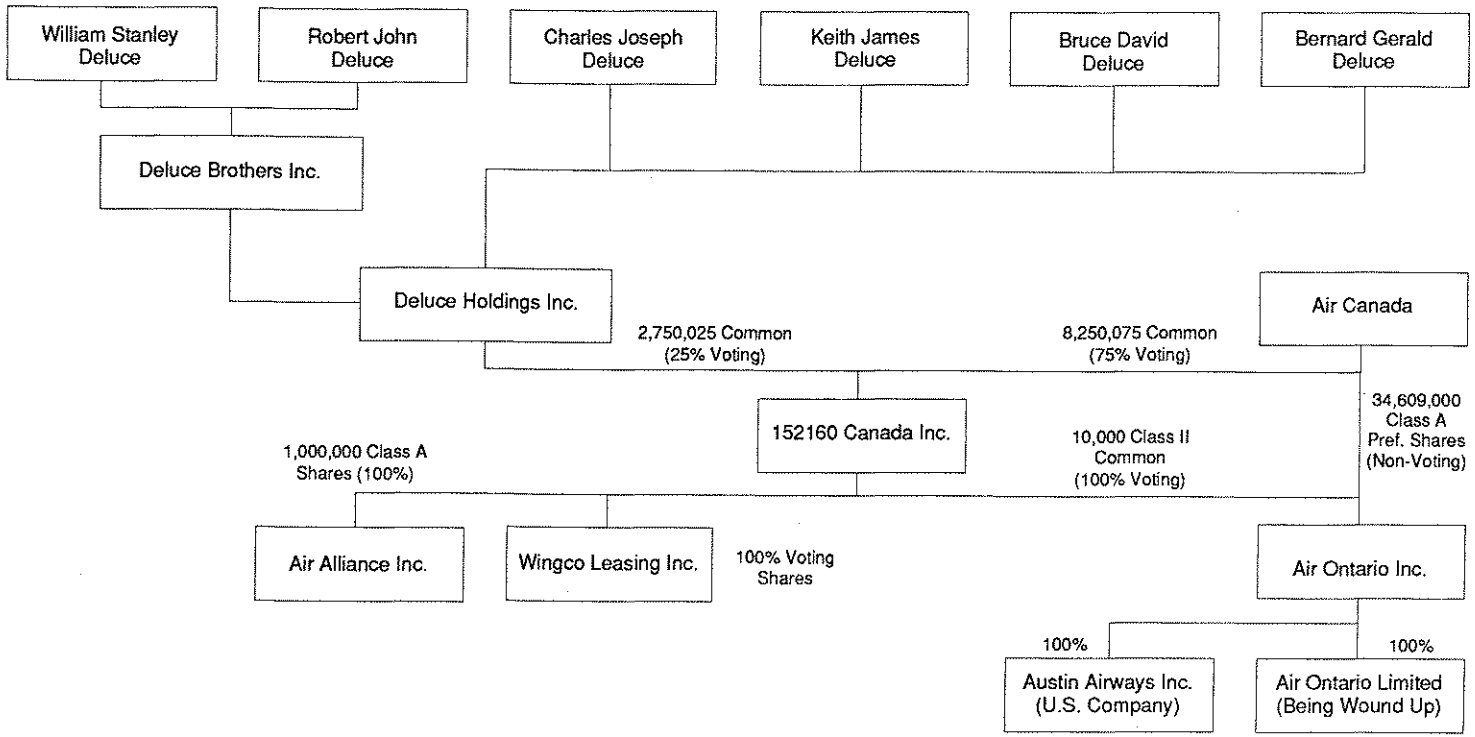
Air Ontario Inc. (Air Ontario) was wholly owned by a numbered company 152160 Canada Inc. which, in turn, was owned by the Deluce family and Air Canada (see figure 13-2).[6]

Immediately following the merger, Air Ontario Inc. operated the combined Austin/Air Ontario Limited routes, which went north to Fort Severn and Great Whale on Hudson Bay, west to Winnipeg, east to Montreal, into large southern Ontario cities like London and Toronto, and into three American centres, Minneapolis, Cleveland, and Hartford (see figure 13-3). In the period after the merger, Air Ontario Inc. had approximately 800 employees – the former Austin employees who were not yet unionized and the former Air Ontario Limited employees who were largely unionized. The new company operated a combined fleet of approximately 40 aircraft of eight different aircraft types.

Following the merger the entire combined operation of the two companies continued for some months. Air Ontario's head office and main base of southern operations was in London. The northern

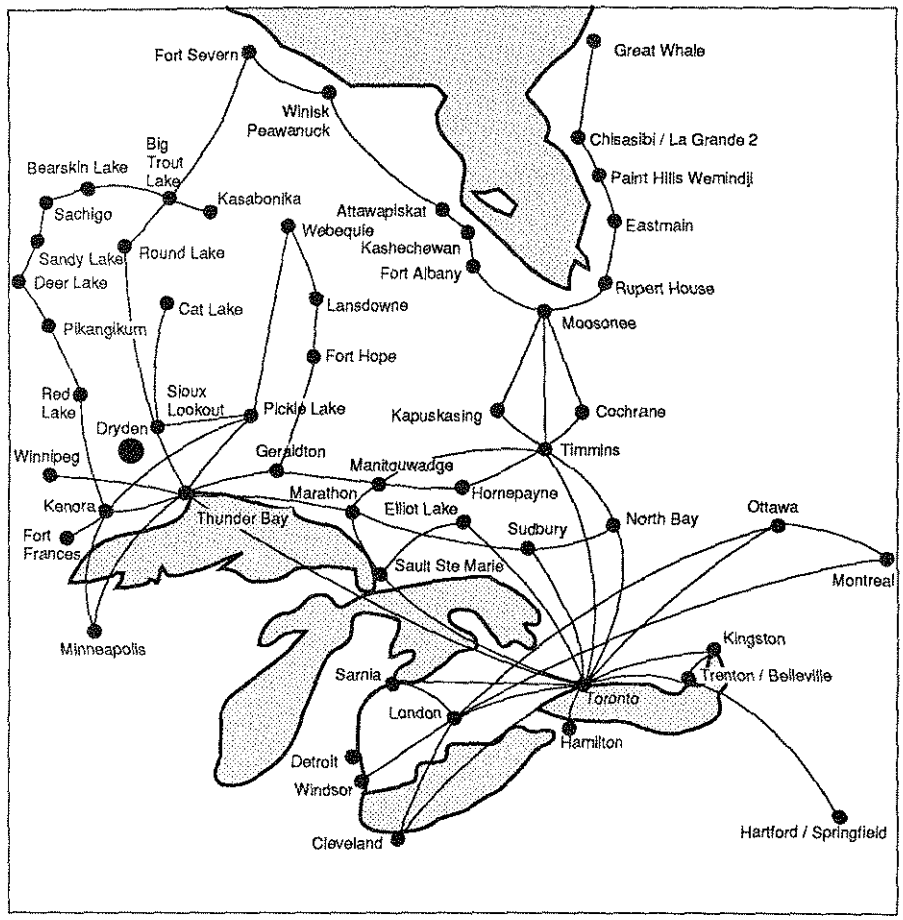
[6] In addition to its 75 per cent interest in the voting common shares, Air Canada purchased a substantial number of non-voting preference shares. Though they represented a substantial equity interest, the preference shares were "debt-like" in that they were to be redeemed by Air Ontario according to a set schedule. Therefore Air Canada, with its combined common and preference shares, had at any given time following the merger an equity position in Air Ontario of more than 90 per cent.

Figure 13-2 Air Ontario Inc., Ownership Structure, March 10, 1989



Source: Based on Exhibit 782

Figure 13-3 Air Ontario Inc., Route Map, June 1987



Source: From Exhibit 778

operation was managed in Timmins by Mr Bruce Deluce, the company's vice-president of charter sales and northern operations. As the administrative departments of the new company were consolidated in London, there was a contemplated immediate loss of 25 to 30 jobs from the Austin employee group.

With the functional merger of the two companies, the combined Air Ontario Limited/Austin employee groups took various steps to establish common collective representation by the various unions. The two pilot groups were merged under the representation of CALPA with a common seniority list. Upon completion of the merger of the pilot lists, CALPA began negotiating the first collective labour agreement for the combined pilot group. The negotiations, which commenced in the fall of 1987, broke down in the spring of 1988, resulting in a pilot strike from March until May 1988. The ultimate settlement of the labour-management dispute was a collective labour agreement which applied common work rules to all Air Ontario pilots.

As a consequence of the changes in working conditions, the continued viability of northern routes became questionable. Mr William Rowe, Air Canada representative on the Air Ontario board, explained the effects of the unionization of the northern pilots and the application of southern working conditions on the entire operation:

> A. The two entities were not compatible ... as separate entities under one management structure. It was obvious they had to be merged. They were.
>
> At the time of the merging, the unions of Air Ontario petitioned, and in particular, CALPA, the pilots' association, was successful in receiving authority to organize the Austin pilots.
>
> The work rules for Austin at the time of the merger were that essentially of a charter and bush operator, where there were – a multiplicity of duties were performed by various individuals, including the flight crew, who would frequently and as part of their normal duties be called upon to load the aircraft, et cetera, perform multiple duties other than just flying.
>
> At the time of the organizing, a delineation of duties took place, and the multiple duties that the pilots once had were not carried forward any further. They had refused to continue in that line.
>
> Also at the time, there was an increase in competitive flying by other non-union operators, and very much smaller operators than Austin, on several of their routes, and it became apparent that the smaller operators were going to erode the economic position that Austin once enjoyed in the area where indeed, in many cases, they had a monopoly service and were able to provide this service at very good rates, but still at reasonable cost, but that whole cost structure was now going to be eroded

> by virtue of the union contract and the merger contract – or merging, results of the merger, and be attacked from a competitive position of much less expensive operators and smaller entities.
>
> We then decided that it would be best to divest ourselves of the routes of Austin as much as possible, while they ... still had value, and while there was a buyer available for them.
>
> There was a buyer available, and negotiations took place, and subsequently, we agreed to transfer those operations to the new owner, new owners.
>
> (Transcript, vol. 121, pp. 148–49)

The decision to divest Air Ontario of its northern assets was first conceived in June 1988 with a divestment plan being formulated in July and August. The sales of the northern assets were completed in the last quarter of 1988 and the beginning of 1989.

Air Ontario Inc. maintained scheduled service to Winnipeg, Dryden, Kenora, Fort Frances, Thunder Bay, Sault Ste Marie, Elliot Lake, Sudbury, Kapuskasing, Timmins, North Bay, Ottawa, Montreal, and points south. All Air Ontario routes north of the named locations were discontinued.

The principal purchasers of the northern hard assets and routes of the former Austin Airways were Air Creebec and Bearskin Airlines. Although the Deluce family and Air Ontario did not maintain an equity interest in these airlines, they maintained commercial relationships with them. The northern service remained integrated in the Air Ontario system via commercial agreements with these carriers. Northern passengers were fed into the Air Ontario system by Bearskin and Air Creebec. Air Ontario then fed these passengers into Air Canada's national and international transportation network.

By late 1988, Air Ontario had approximately 550 to 600 employees, a decrease of approximately 200 to 250 employees (or 25 to 30 per cent) from the period immediately following the merger. Some of the displaced Austin personnel were able to find employment with the newly expanded Air Creebec and Bearskin Airlines.

As would be the case with any major corporate rationalization, there were anxieties among the employee group regarding their future with Air Ontario. At least one manager associated low employee morale with poor job performance, which potentially compromised flight safety. Certainly, in any time of great change and dislocation within a company, it is the task of management to remain focused on operational imperatives; in the case of an airline, the operational imperative is flight safety.

Without a doubt, Air Ontario's managerial resources were greatly taxed during the functional merger of the two regional carriers. The divestment of northern operations, the reduction of employees by almost

one-third, the consolidation of its operation in London, Ontario, the merger of two disparate pilot and flight attendant groups, a lengthy pilot strike, the cultivation of a relationship with the new controlling shareholder, Air Canada, the rationalization of its aircraft fleet, and the introduction of a new aircraft type all represented significant challenges to Air Ontario management in the 18 months following the merger. The issue to be examined is whether Air Ontario management was able to support the flight safety imperative during this period of distraction.

14 MANAGEMENT ORGANIZATION

Following the merger of Air Ontario Limited and Austin Airways, the management of Air Ontario Inc. was faced with the challenge of integrating the two somewhat disparate companies. Quite understandably, there were many management changes at Air Ontario as this integration proceeded. Adding to the demands on management was a pilot strike from March 11 until May 1, 1988. It was within this environment of significant management change, company integration and rationalization, and management preoccupation with labour relations that Air Ontario undertook its first jet transport operation.

In the review of the F-28 program that follows it is apparent that operational deficiencies which were linked to the crash of flight 1363 were attributable, at least in part, to inattentive management. To understand fully the circumstances that led to this accident, it is necessary to consider the operational deficiencies of the air carrier management component of the air transportation system.

This section describes the operational management of Air Ontario during the material period from June 1987 until January 1990.[1] There is a discussion of significant changes in operational management and the events that were occupying the attention of management during this period (see figure 14-1).

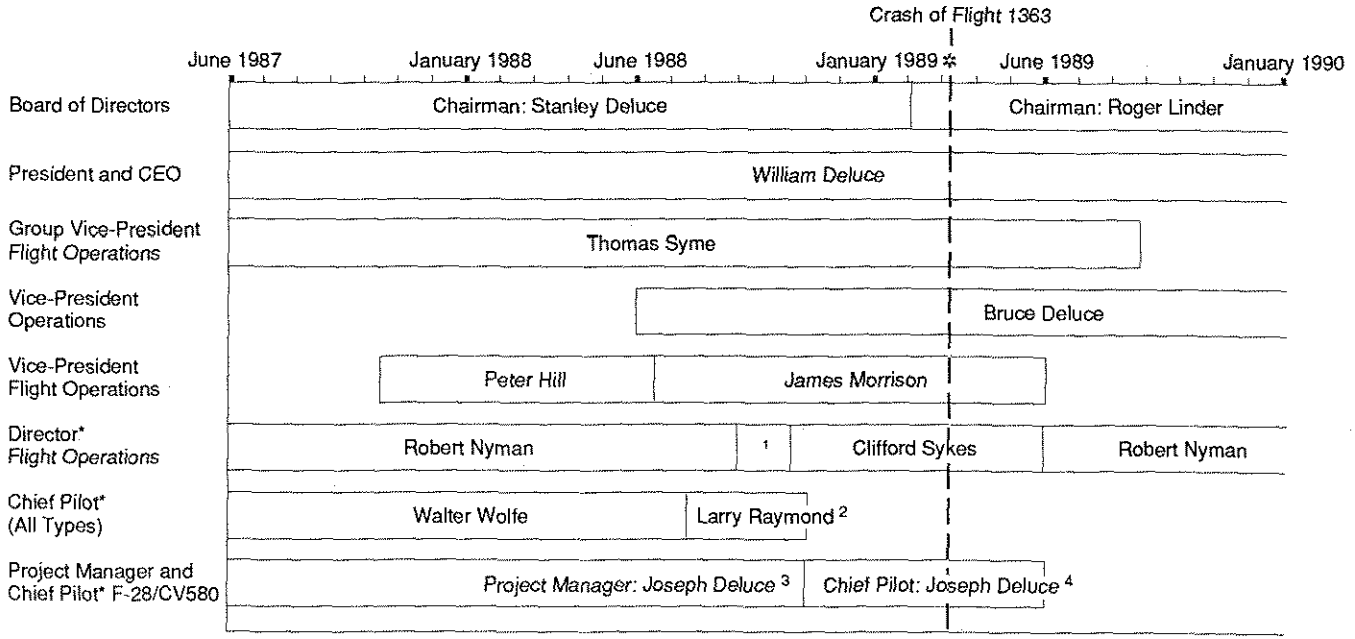
Management Structure

The management structure of Air Ontario is not unusual. Its corporate hierarchy consisted of lower level supervisors and managers reporting to middle management directors, who in turn reported through one or two levels of vice-presidents to the president and chief executive officer (CEO). The president and CEO reported to the board of directors.

The board of directors met at least four times per year and was ultimately responsible for the overall direction and management of the company. Decisions affecting the company fundamentally, such as the selection of Air Ontario officers at the vice-president or president level or the acquisition of new aircraft, required approval of the board of

[1] Operational management includes flight operations and maintenance management.

Figure 14-1 Air Ontario Inc., Senior Operational Management, June 1987–January 1990



* Appointments of director of flight operations and chief pilot require the approval of Transport Canada.

1 James Morrison, acting director of flight operations.
2 Acting chief pilot.
3 The duties and responsibilities of the project manager were not formally defined. Because there were items that were not complete from the F-28 Project Plan when Captain Deluce was formally appointed F-28/CV580 chief pilot, the duties of the project manager are said to overlap with those of the F-28 chief pilot.
4 Although the evidence suggests that Captain Deluce was fulfilling the role of F-28 chief pilot as early as June 1988, he was not formally appointed to the position until November 1988.

directors. Air Ontario's 12 board members were nominated by the company's two shareholders, 9 by Air Canada and 3 by the Deluce family, reflecting their respective ownership interests. Mr Stanley Deluce was chairman of the board from June 1987 until February 1989, when he was succeeded by an Air Canada nominee, Mr Roger Linder.

There were several committees of the board of directors; of particular significance was the executive committee, which met on a monthly basis and included as members Mr Stanley Deluce, Mr William Deluce, and Air Canada nominees William Rowe, John McMurtry, and later Roger Linder. Because it met frequently, the executive committee was able to review proposals and decisions of more immediate significance to the day-to-day management of the company. The Air Ontario F-28 project was one proposal that was discussed at length at the executive committee and at the board of directors.

Mr William Rowe served as Air Canada's "shareholder's representative" on the Air Ontario board and executive committee. Mr Rowe, who was also Air Canada senior vice-president, associated airlines, reported directly to Air Canada's president and chief executive officer regarding Air Ontario. Although in testimony Mr Rowe described his role as primarily one of protecting Air Canada's financial interest in Air Ontario, he stated that he also served as a liaison between Air Canada and Air Ontario management and, to the extent that Air Canada wanted to influence Air Ontario, he would introduce matters of interest to Air Canada at the Air Ontario board meetings.

Air Canada, as the majority shareholder of Air Ontario, had effective control of the board. Thus, Air Canada's interests were, or ought to have been, reflected in every decision of the board of directors of Air Ontario.

Reporting to the board of directors, and directly responsible for the day-to-day management of the company, was the president and CEO, Mr William Deluce. Mr Deluce was 38 years of age when he became president of Air Ontario Inc. in June 1987. He has a degree in chemical engineering from the University of Toronto and is a licensed pilot. As is evident from the description of the history of the company, Mr William Deluce has performed many roles in his family's businesses. He handled baggage and fuelled aircraft as a boy, at the age of 19 he managed a northern base, as a young man he built NorOntair "from scratch," and finally, at a still relatively young age, he became the chief executive officer of Canada's third largest regional airline. In addition to being a member of the Air Ontario board and executive committee, Mr William Deluce has been a member of the boards of directors of a number of other companies including Canada 3000 Airlines and the Canadian Tire Corporation. He was also a director of the Air Transport Association of Canada (ATAC) from 1985 to 1988 and its chairman for 1987–88.

Mr William Deluce, as CEO, was directly involved in the selection and approval of managers at the level of vice-president and director. In some instances he would make management choices himself; on other occasions management changes would be presented to him for consideration by his group vice-president, Mr Thomas Syme.

Throughout the material period, Mr William Deluce only attended at Air Ontario's head office at London, Ontario, approximately two to three days per week; however, he was in daily telephone contact with Mr Syme there. When he was not directly involved in the management of Air Ontario, Mr Deluce attended to his other business interests. He relied upon Mr Syme as the senior officer responsible for the day-to-day management of Air Ontario Inc. Both Mr Syme and Mr Deluce equated the role of Mr Syme to that of a "chief operating officer," although he was not formally given that title until a recent reorganization in 1991. Mr Deluce elaborated on his working relationship with his group vice-president:

> Q. Were you relying very heavily on him in day-to-day matters of running the corporation, sir?
> A. I was relying upon Tom [Syme] and Tom had assembled under his wing other suitable support staff.
> Q. To what extent, would you say, had you delegated your duties and responsibilities to Tom Syme?
> A. Well, when it came to day-to-day operational types of things, Tom was responsible for it. If it was a strategic matter, those would be areas that I would be involved, very much involved in. If it was a policy matter, Tom would ... normally bring it to me and we would sort it out either between Tom and I or with our senior vice-president group.
>
> (Transcript, vol. 151, p. 128)

Mr Syme's experience was primarily in the fields of finance and accounting. He graduated from the University of Western Ontario Business School with an honours business administration degree in 1976 and he is a certified general accountant (CGA). Following graduation, he worked in the insurance and accounting business until 1981, when he joined Great Lakes Airlines as its chief accountant. In 1983 he was appointed corporate comptroller of the company (by then Air Ontario Limited) and was responsible for finance and accounting functions, information systems, personnel, and payroll. In late 1985 Mr Syme was appointed assistant to the president, Mr James Plaxton, taking on the additional responsibility of strategic planning. This involved operational, commercial, and fleet planning, including the acquisition and disposition of aircraft.

After less than one year Mr Syme was appointed director of operations for Air Ontario Limited. With this new position – his first in airline operations – Mr Syme was directly responsible for the flight operations and maintenance functions of Air Ontario Limited; in addition, he carried on as director of strategic planning and coordinator of the corporate business plan. In early 1987 Mr Syme became the vice-president of operations for Air Ontario Limited and, in June 1987, he was appointed the group vice-president operations of the newly merged company, Air Ontario Inc.

For the material period, from June 1987 until March 10, 1989, Mr Syme had reporting to him the vice-president of operations, the vice-president of maintenance and engineering, the vice-president of flight operations, and the vice-president of marketing. Mr Syme was involved in all managerial appointments within the flight operations and maintenance departments.

Mr Syme is neither a licensed pilot nor a licensed aircraft maintenance engineer. He testified that, because he had no technical background, he relied upon the advice of his senior technical people on operational matters.[2]

In June 1988 Mr Bruce Deluce was appointed vice-president of operations reporting to Mr Syme. With this organizational change, Mr Syme was, for the first time, one step removed from direct line authority over the flight operations department. Six months later, in December 1988, Mr Syme's line authority over the maintenance department was interrupted by an expansion of Bruce Deluce's role. The senior management organization at Air Ontario on March 10, 1989, is portrayed in figure 14-2.

Mr Syme continued as chief operating officer until mid-1989, when Mr Bruce Deluce as vice-president of operations was given a direct reporting relationship to his brother, William Deluce. Mr Syme's responsibilities were then limited to commercial services. With this change, Mr Bruce Deluce became responsible for the entire operational side of Air Ontario and Mr Syme concentrated strictly on commercial matters.

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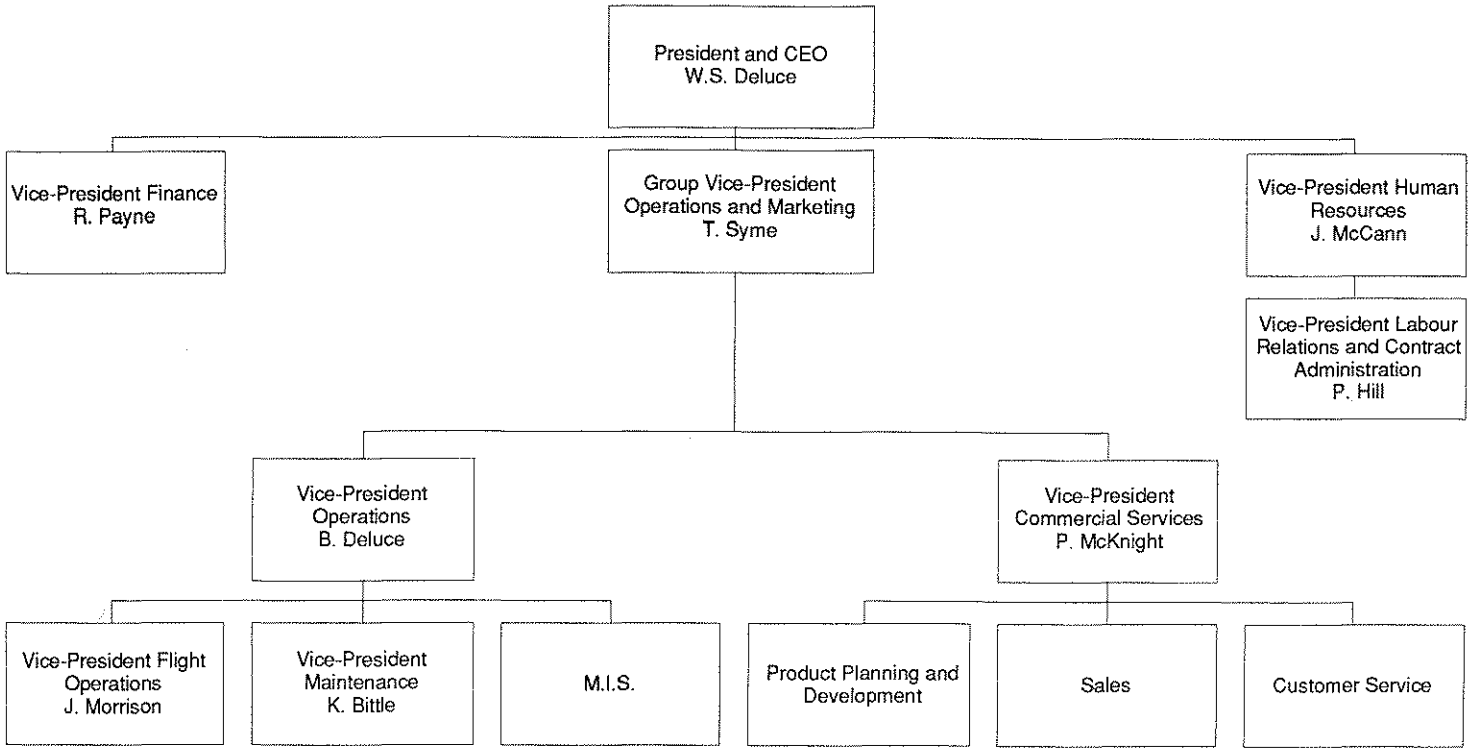
[2] The issue of technical and operational proficiency of senior airline managers is discussed in chapter 25, Management Performance.

Figure 14-2 Air Ontario Inc., Senior Management Organization, March 10, 1989



Source: From Exhibit 793

Operational Management: Flight Operations and Maintenance

Regulatory Requirements

To obtain an operating certificate, an air carrier operating large aircraft must have a flight operations and maintenance organization that meets the requirements of Air Navigation Order (ANO) Series VII, No. 2, which states:

> 5.(1) An applicant for an operating certificate shall show that he has the qualified managerial personnel necessary to operate the proposed commercial air service and that such personnel are employed on a full time basis in the following or equivalent positions:
> (a) Managing Director;
> (b) Director of Flight Operations (or Operations Manager);
> (c) Director of Maintenance and Engineering (or Maintenance Manager);
> (d) Chief Pilot; and
> (e) Chief Inspector.
>
> (2) Where because of the nature of a commercial air service, positions other than those specified in subsection (1) would, in the opinion of the Director, be more appropriate, the Director may
>
> (a) approve different positions or a different number of positions; and
> (b) authorize the allocation of more than one position to one person.
>
> 6.(1) No person shall serve as a Director of Flight Operations (or Operations Manager) or as a Director of Maintenance and Engineering (or Maintenance Manager), unless his qualifications, background and experience are satisfactory to the Director.
>
> (2) No person shall serve as a Chief Pilot or Chief Inspector unless he meets the requirements set forth in Schedule A.

Candidates for the chief pilot and chief inspector positions must fulfil the following qualifying criteria in Schedule A to ANO Series VII, No. 2:

1. Every Chief Pilot shall
   (a) hold a valid airline transport pilot licence or a senior commercial pilot licence with a Class I instrument rating with full privileges;
   (b) have at least three years experience as a pilot-in-command of a large aeroplane with an air carrier;
   (c) know the contents of the air carrier's Operating Certificate, Operations Specifications and Operations Manual; and
   (d) know the provisions of the *Air Regulations* necessary for the proper performance of his duties.

2. Every Chief Inspector shall
   (a) hold a valid aircraft maintenance engineer licence Category "A" and shall have held such licence for at least three years;
   (b) have at least three years experience on large aeroplanes with an air carrier or an approved maintenance organization, one year of which was as a maintenance inspector;
   (c) know the appropriate parts of the air carrier's Operating Certificate, Operations Specifications, and Maintenance Manual necessary for the proper performance of his duties; and
   (d) know the provisions of the *Air Regulations* necessary for the proper performance of his duties.

The ANO contemplates separate maintenance and flight operations organizations. The director of flight operations and the chief pilot are the two flight operations management positions required by the ANO, and the director of maintenance and the chief inspector are the two required maintenance management positions.

The air carrier's flight operations organization and practices are described in its operations manual while its maintenance organization and practices are described in its maintenance manual. An air carrier is required to produce both manuals for Transport Canada's approval as a condition of operation. Both manuals must describe the duties, responsibilities, and reporting relationships within the flight operations and maintenance organizations. (The approval of manuals is discussed in chapter 19, F-28 Program: Flight Operations Manuals.)

Although Transport Canada is to review and approve the contents of the carrier's operations manual and maintenance manual, there are no clear regulatory descriptions of the duties, responsibilities, or qualifications of the required management personnel.

Air Ontario Flight Operations Management

A flight operations organization, in the simplest terms, is responsible for the planning and execution of aircraft movements. This responsibility encompasses operational control and flight following; operational standards and practices; initial and recurrent training of pilots; and, in the case of Air Ontario, the initial and recurrent training of flight attendants. The Air Ontario flight operations organization and practices were described in the Air Ontario Flight Operations Manual (issue date September 15, 1987). As at March 10, 1989, three amendments to the manual, dated December 23, 1987, April 13, 1988, and May 1, 1988, had been approved and incorporated. This manual was submitted to Transport Canada in fulfilment of the requirements of ANO Series VII, No. 2.

The Air Ontario flight operations management experienced considerable change in organization and personnel during the period June 1987 to September 1989. For the most part, this organizational change was not reflected in any amendments to the Flight Operations Manual.

Flight Operations: Summary of Structural Changes[3]

In June 1987 the director of flight operations, Captain Robert Nyman, was reporting directly to the group vice-president of operations, Mr Thomas Syme, who reported to the president. In late 1987 the position of vice-president of flight operations was created, a position initially occupied by Mr Peter Hill.[4] The director of flight operations reported to the vice-president of flight operations, who reported to the group vice-president.

In June 1988 the position of vice-president of operations was created. This position was occupied by Mr Bruce Deluce. The vice-president of flight operations reported to the vice-president of operations, who reported to the group vice-president. This is the organizational structure that was in place on March 10, 1989, and is reflected in figure 14-3.

Eventually, in September 1989, the positions of vice-president of flight operations and group vice-president would be eliminated so that the director of flight operations reported directly to the vice-president of

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[3] Please refer to figure 14-1.

[4] Amendment #1 to the Air Ontario Flight Operations Manual, dated December 23, 1987, describes Mr Hill as the vice-president of operations. This seems to be the only reference to Mr Hill having had that title. The position filled by Mr Hill at that time (and later by Mr James Morrison) was known internally at Air Ontario as the vice-president of flight operations. The position of vice-president operations, later occupied by Mr Bruce Deluce, was considerably different from Mr Hill's position as referenced in the Flight Operations Manual (Exhibit 146).

operations, who reported directly to the president. Thus, in the 27 months from June 1987 until September 1989 Air Ontario either added or subtracted layers of operational management on three occasions. In addition to these structural changes, there were changes in the senior management personnel of the Air Ontario flight operations department.

Personnel Changes

Director of Flight Operations Captain Robert Nyman In June 1987, following the merger of Austin and Air Ontario Limited, Captain Robert Nyman became the director of flight operations for Air Ontario Inc. He had held this position at Air Ontario Limited for two months prior to the merger.

Since obtaining his commercial licence in 1958, Captain Nyman has accumulated in excess of 20,000 hours of flying and has been employed for most of his career by companies owned in whole or in part by the Deluce family. Captain Nyman worked in various capacities for Austin Airways including pilot, check pilot, chief pilot, and director of flight operations. From 1984 until April 1987 he was employed by Northland Air Manitoba as director of flight operations.

In early 1987 Captain Nyman indicated to Mr William Deluce that he would like to move back to Ontario. Mr Deluce advised him of the possibility of replacing Captain Robert Murray, who was the head of the flight operations department at Air Ontario Limited. On Mr Deluce's suggestion, Captain Nyman met with Captain Murray to discuss the position that Captain Murray was voluntarily leaving. Shortly thereafter, on April 1, 1987, Captain Nyman began in his position as the director of flight operations.

Captain Nyman acknowledged that his duties and responsibilities were those set out in section 3.2 of the Air Ontario Flight Operations Manual. These are as follows:

> 3.2 DIRECTOR OF FLIGHT OPERATIONS – DUTIES, RESPONSIBILITIES AND AUTHORITY
>
> 1. The Director of Flight Operations is responsible to management for overall direction and supervision of Company Flight Operations and the development of policy governing these functions, and shall ensure that all such operations, under all Licenses and Certificates held by the Company will be conducted in accordance with the general and specific policies and instructions contained in this Manual, as approved by the Department of Transport.
> 2. He will develop and apply new flight operations policy and procedures in keeping with changing conditions, equipment, experience and competency of personnel.

3. He will have available for immediate communication to rescue co-ordination centres, lists containing information on the emergency and survival equipment carried on board any Company aircraft.
4. He will ensure that all flight crew are familiar with the regulations and procedures pertinent to the performance of their duties prescribed for the areas to be traversed, the airports to be used and the air navigation facilities relating thereto. He shall ensure that other members of the flight crew are familiar with each of these regulations and procedures as are pertinent to the performance of their respective duties in the operation of the aircraft.
5. He will also be responsible for the preparation of amendments to this Manual and for the briefing of all Operational Personnel regarding the reasons for, and effects of all amendments and shall keep a permanent register of acknowledgements by Operational Personnel ensuring they are fully and currently informed.
6. Although some of the above duties may be delegated to other supervisory personnel, i.e., Assistant Director of Flight Operations, Chief Pilot the responsibility for the safe and efficient operation of all Company flight operations remain with the Director of Flight Operations.
7. He will report directly to the Vice-President of Operations.

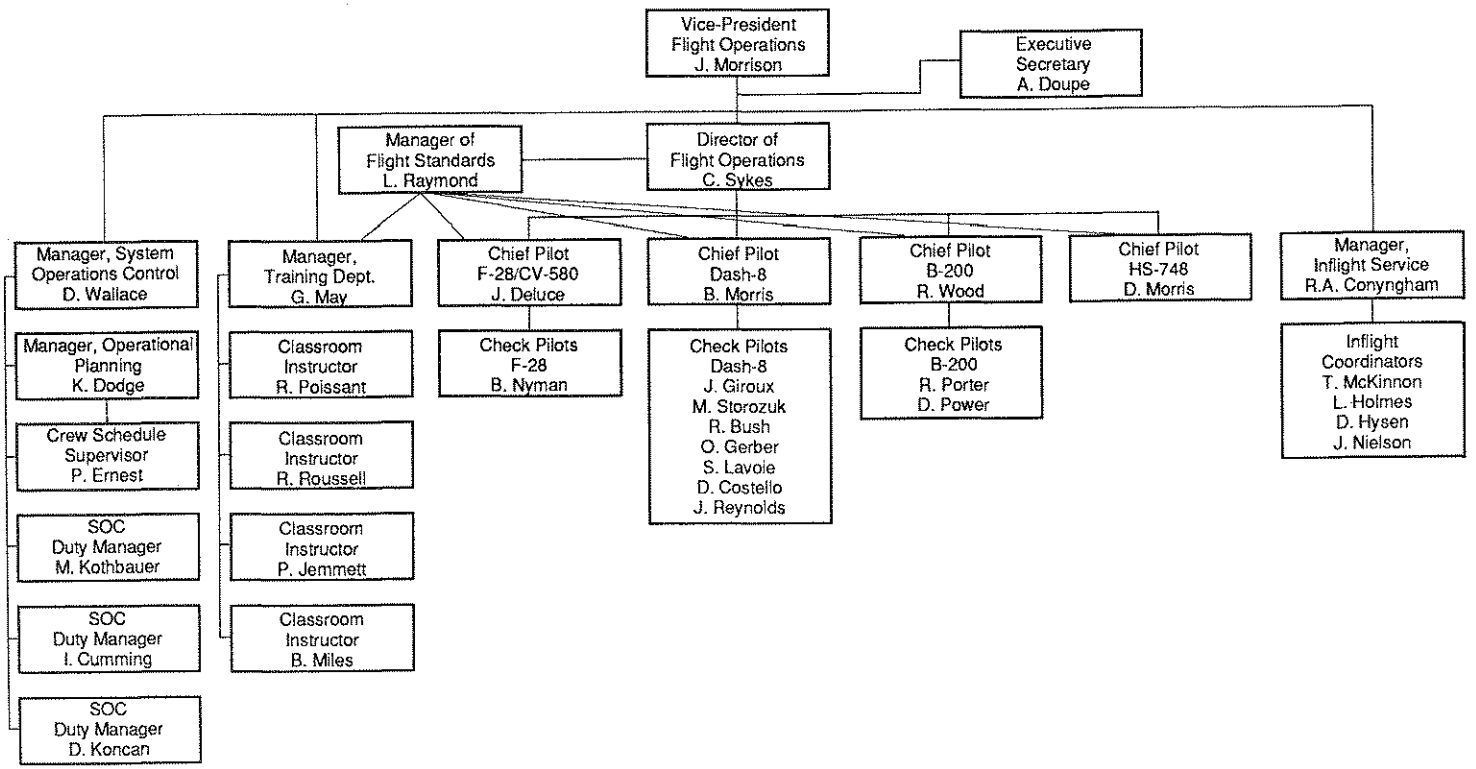
(Exhibit 146, p. 3-6)

Initially, Captain Nyman reported to the group vice-president of operations, Mr Thomas Syme. From November 1987 until June 1988, Captain Nyman reported to the vice-president of flight operations, Mr Peter Hill. Contrary to the description in the Air Ontario manual, there was no individual with the title of vice-president of operations until Bruce Deluce took on the position in June 1988.

Air Ontario's pilots went on strike in March 1988. Captain Nyman testified that from the fall of 1987 until the strike began, he assisted Mr Hill in negotiations with the pilot group. Captain Nyman described the labour negotiations and background research as occupying approximately 50 per cent of his time during this period. His involvement with negotiations ceased at the commencement of the strike, as he and other management pilots were then engaged in line flying responsibilities.

After the strike Captain Nyman carried on as the director of flight operations for several months. He testified that he preferred to return to line flying, and on August 24, 1988, Air Ontario announced that Captain Nyman would be stepping down and Mr James Morrison would become, after a transitional period, acting director of flight operations. By the end of September 1988 Captain Nyman was out of the director of flight operations position completely, and flying as a line pilot.

Figure 14-3 Air Ontario Inc., Flight Operations Organization, March 10, 1989



Source: From Exhibit 793

In July 1989 Mr Bruce Deluce informed Captain Nyman that Mr Morrison had accepted a position with Air Creebec and asked that Captain Nyman take over from Mr Morrison, vice-president of flight operations, as an interim director of flight operations. Captain Nyman agreed on condition that the appointment would be for no longer than six months to one year, at which time he would return to line flying. Captain Nyman continued in the position of director of flight operations, reporting to Mr Bruce Deluce, vice-president of operations, until July 1990.

Vice-President of Flight Operations Peter Hill The creation of the position of vice-president of flight operations and the appointment of Mr Peter Hill to it was initiated in late 1987 by the group vice-president, Mr Syme. Mr Syme explained that he wanted to consolidate some of the operations functions which were previously reporting directly to him. Mr Hill was selected for the position because of his previous experience with system operations control (SOC) and airport services. As the vice-president of flight operations, Mr Hill oversaw both the flight operations department and SOC.

Mr Hill's qualifications were described in the "Air Ontario Inc. Corporate Overview and Historical Financial Statements Fleet Plan":

> Following the Aviation and Flight Technology course at Seneca College, where he obtained a commercial pilots licence, Mr Hill spent three years with Toronto Airways and Air Canada before joining Air Ontario in 1974 as a dispatcher.
>
> Mr Hill has been involved in all labour negotiations and developed the present dispatch system, as he worked up through Chief Dispatcher and Assistant Director of Operations. When Mr Hill was appointed Director of Stations and Contracts in 1984, he took responsibility for all airports, handling agreements, facilities and petroleum purchasing.
>
> (Exhibit 778, p. 12)

It should be noted that Mr Hill's role as the vice-president of operations is referred to on at least three occasions in the Transport Canada–approved Flight Operations Manual. There are no defined duties and responsibilities for the vice-president of operations position, although it appears at the top of the approved flight operations organization chart at page 3-3 of the manual. At page 3-4 Mr Hill is listed as the vice-president of operations, and, at page 3-6, the director of flight operations is said to report directly to the vice-president of operations. On each of these pages was the Transport Canada seal of approval.

Although Mr Syme testified that "Mr Hill was not holding an approved flight operations position from the perspective of Transport," it appears to me from the evidence that Mr Hill in fact had a very definite senior supervisory role in Air Ontario's flight operations department (Transcript, vol. 97, p. 159). From October 1987 until the commencement of commercial service of the F-28 in June 1988, the jet program fell within Mr Hill's realm of responsibility. In June 1988 Mr Hill was named the vice-president of employee relations and contract administration. At that time Mr James Morrison was appointed vice-president of flight operations and Mr Bruce Deluce was appointed to the newly created position of vice-president of operations.

Vice-President of Flight Operations James Morrison In early June 1988 Mr William Deluce announced the replacement of Mr Hill by Mr James Morrison as the vice-president of flight operations. In a memorandum to Air Ontario employees, Mr William Deluce described Mr Morrison's new role with the company:

> Jim's responsibilities will encompass all flight operations activities including administration of SOC, Technical Training and the pilot group. Jim brings a wealth of previous aviation experience to Air Ontario and most recently was employed as General Manager of a Quebec based regional carrier. Jim will report to the Vice President, Operations, Bruce Deluce.
>
> (Exhibit 791)

The Quebec-based regional carrier referred to was Air Creebec, a company 49 per cent owned by the Deluce family.[5] Mr Morrison had had an involvement with the Deluce family since 1981. After flying light aircraft for several years throughout northern Canada, Mr Morrison began flying with Austin, first as a contract Twin Otter captain, then as an HS-748 first officer. In 1982 he was appointed general manager and operations manager of Air Creebec. As such he was responsible for establishing a management structure for the new airline. In 1987 he was appointed vice-president and general manager of Air Creebec. During the startup phase at Air Creebec, Mr Morrison reported to Mr William Deluce; later, he reported to Mr Billy Diamond, president and CEO of Air Creebec.

Later in 1987 Mr Morrison advised Mr William Deluce and Mr Diamond of his intention to leave Air Creebec and his interest in joining Air Ontario. Towards the end of the Air Ontario pilot strike (March–May 1988) Mr Morrison flew as a management pilot for Air Ontario. At the

[5] The Deluce family divested itself of its interest in Air Creebec in 1988.

same time, with the approval of Mr William Deluce and Mr Diamond, he wound up his responsibilities with Air Creebec.

During this period Mr Bruce Deluce advised Mr Morrison of the possibility of his becoming the Air Ontario vice-president of charter sales and airport services.[6] Later, Mr Bruce Deluce advised him that, owing to a restructuring at Air Ontario, this position was no longer available but the position of vice-president of flight operations was. Mr Morrison took the position and formally left Air Creebec to join Air Ontario on July 1, 1988.

Reporting to Mr Morrison in his new position was Captain Nyman as director of flight operations. Mr Morrison in turn reported to Mr Bruce Deluce, who was appointed vice-president of operations in June 1988. On August 24, 1988, Air Ontario announced that Mr Morrison would assume the additional responsibilities of "acting director of flight operations." Mr Morrison was vice-president of flight operations at Air Ontario for approximately one year, during which time he effected a complete reorganization of the flight operations department. In July 1989 he left Air Ontario and returned to Air Creebec as executive vice-president and chief operating officer.

Director of Flight Operations Clifford Sykes After interviewing a number of in-house candidates, Mr Morrison appointed Captain Clifford Sykes to succeed Captain Nyman as director of flight operations in mid-October 1988. Captain Sykes had worked for Air Ontario Limited and Great Lakes Airlines since 1973. He flew the Convair 440 and later the Convair 580 aircraft. At various times, he had been the chairman of the master executive committee for CALPA and the chief pilot for Air Ontario Limited. Prior to being appointed director of flight operations, Captain Sykes was a line captain on the F-28 aircraft.

As director of flight operations, Captain Sykes was responsible only for the pilot group. The manager of system operations control, the manager of training, and the manager of in-flight service all reported directly to the vice-president of flight operations, Mr Morrison.

A large part of Captain Sykes's tenure as director of flight operations was devoted to administering the new CALPA contract and assisting in the integration of the two pilot groups – those formerly employed by Austin Airways and by Air Ontario Limited. In addition, Air Ontario was divesting itself of many of its northern assets during this period and

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[6] The proposed organization of Air Ontario that included Mr Morrison as the vice-president of airport services and charter sales was presented to the Air Ontario executive committee on May 6, 1988, and was rejected by the Air Canada representative, Mr Rowe.

Captain Sykes helped to facilitate the transition of many of the pilots who were displaced from the north.

Captain Sykes left his position as director of flight operations in May 1989, when he joined another airline.

Vice-President of Operations Bruce Deluce In June 1988 the position of vice-president of operations was created and Mr Bruce Deluce was appointed to it. Like his brother William Deluce, Mr Bruce Deluce had been involved with his family business since he was a boy. Starting as a high school student in 1975, he worked for White River Air Services performing various tasks including those of a station agent, refueller, radio operator, and flight attendant. He worked as a load master in cargo operations and as an apprentice maintenance engineer in the maintenance department.

In the fall of 1979 Mr Bruce Deluce began to fly commercially with Austin Airways. During this period he was endorsed to fly the Twin Otter, the Cessna 402, the HS-748, and the Cessna Citation. Much of his early flying was as a first officer, but he did fly the Cessna 402 as a captain. Throughout this period he also worked on special business projects for his brothers William and Robert Deluce.

From 1981 to 1983 Mr Bruce Deluce studied electrical engineering at Lakehead University in Thunder Bay, Ontario. While attending university, he continued to fly the HS-748 out of the company's Thunder Bay base. In the summer of 1982 he was temporarily assigned to be the Thunder Bay base manager. He was also endorsed as a captain of Twin Otter aircraft.

In the spring of 1983 Mr Bruce Deluce continued to work in various capacities for the family business. From August until December 1983, he worked in Thompson, Manitoba, where he acted as Austin's regional manager for northern Manitoba. From December 1983 until August 1985, he worked as the computer services manager for Austin at Timmins, Ontario. From the autumn of 1985 until February 1987 he worked as the director of finance and administration for Austin, reporting to his brother Robert who was vice-president and general manager. From February until June 1987, Mr Bruce Deluce was the vice-president of operations for Austin.

Following the merger in June 1987, when he was 28 years old, Mr Bruce Deluce was the vice-president of charter sales and northern operations for Air Ontario Inc. In June 1988 he was appointed vice-president of operations reporting to the group vice-president, Mr Thomas Syme. This reporting relationship continued until September 1989, when Mr Bruce Deluce began reporting directly to the president, Mr William Deluce.

Changes in the Flight Operations Department

In the two years from June 1987 until July 1989, there were significant changes in the management of the Air Ontario flight operations department. These changes coincided with Air Ontario's divestment of northern assets and the resultant dislocation of northern personnel. Air Ontario's employee group, based on the testimony of Mr Thomas Syme, decreased by "almost one-third" during this period (Transcript, vol. 97, p. 195). Also, at this time, labour relations in the company strained to the point that an eight-week pilot strike occurred from March 11 until May 1, 1988.

Of the senior flight operations managers, Captain Nyman held his position for the longest period of time. He was initially the director of flight operations from June 1987 until September 1988 and then on an interim basis from August 1989 until July 1990. During his initial appointment as director of flight operations, Captain Nyman was ultimately responsible for all flight operations aspects of the F-28 implementation plan, indeed all aspects of flight operations at Air Ontario.

In a 1988 year-end memorandum to his employees, Mr William Deluce addressed the changes that his company was experiencing:

> As we approach the end of 1988, I think that all employees will look back at the past year as having been a time of continued change within Air Ontario Inc.
>
> The implementation of change is a difficult undertaking for any company. It creates instability for the corporation, and in particular, for the employee group. The management of change is a complex process which requires a well coordinated effort by all departments within the corporation. The necessity for fairness and equitability in the administration of the employee group is matched by commercial realities and economic efficiencies which must be addressed to preserve the viability of the company as a whole.
>
> Air Ontario Inc. is a company which, although rich in the traditions of its predecessor companies, is itself less than two years old. The approximate eighteen months since the formation of Air Ontario Inc. has seen a level of evolution within the industry as a whole, from a commercial, regulatory and technological perspective that is unparalleled in the history of Canadian aviation. Against this background the primary focus of Air Ontario has remained unchanged, that being the providing of high quality scheduled passenger services on a regional basis in central Canada and the northeast U.S.
>
> Since the formation of Air Ontario Inc., management has been committed to a resource rationalization programme which culminated in the recent sale to Air Creebec of most of the company's non-scheduled service assets. Air Ontario Inc. is now much less

> complicated and better focused company than it was eighteen months ago. It is management's strong belief that this positions the company very favourably going into 1989 from a commercial, operational and competitive perspective.
>
> ...
>
> We can look back to 1988 as a year of necessary change, however, management is committed to realizing 1989 as a year of stabilization.
>
> (Exhibit 793)

Reading this document and hearing the evidence of its authors, Mr William Deluce and Mr Thomas Syme, I was struck by the clarity with which the difficulties encountered by the company were articulated. Four points from this memorandum are worth emphasizing for the purposes of my study of the F-28 program:

- The implementation of change ... creates instability for the corporation.

There was great instability within the flight operations department at Air Ontario. I have already described the ongoing internal changes at Air Ontario, particularly at the level of vice-president of flight operations and director of flight operations. Also significant were the number of key operational individuals who left Air Ontario to pursue opportunities elsewhere. Captain Robert Murray was supposed to play a major role in the F-28 program; yet, within weeks of the commencement of F-28 service, he left the company. At approximately the same time, the company's chief pilot, Mr Walter Wolfe, also left to go to another airline. Captain Larry Raymond replaced Captain Wolfe as acting chief pilot until the flight operations restructuring was completed and new chief pilots were appointed some five months later.

- The management of change is a complex process which requires a well coordinated effort by all departments within the corporation.

A well-coordinated effort was indeed required by all departments. It is revealed, however, that the implementation of the F-28 program was characterized by a troubling lack of coordination and effective management. Deficiencies in project coordination were significant to the crash of flight 1363.

- The approximate eighteen months since the formation of Air Ontario Inc. has seen a level of evolution within the industry as a whole, from a commercial, regulatory and technological perspective that is unparalleled in the history of Canadian aviation.

Mr Deluce's allusion to deregulation and the commercial imperatives it brought about is significant to the company's drive to provide its first transport jet service.

- [M]anagement is committed to realizing 1989 as a year of stabilization.

At approximately the same time as this memorandum was written, Air Ontario lost access to the F-28 simulators it was using at Piedmont Airlines. In chapter 20, F-28 Program: Flight Operations Training, I explain how this event was destabilizing and how it contributed to a further unravelling of the F-28 program.

Within one year of joining Air Ontario, and following the CEO's commitment to "1989 as a year of stabilization," Mr Morrison – the architect of a complete restructuring of the flight operations department – left Air Ontario to pursue an opportunity at another airline.

In my view, it is significant that the senior managers at Air Ontario understood that the forces of change were creating dislocation within their company and that they would have to redouble their management efforts for the company to operate effectively. In later sections, I examine how the F-28 program was allowed to deteriorate seriously in the absence of meaningful operational management.

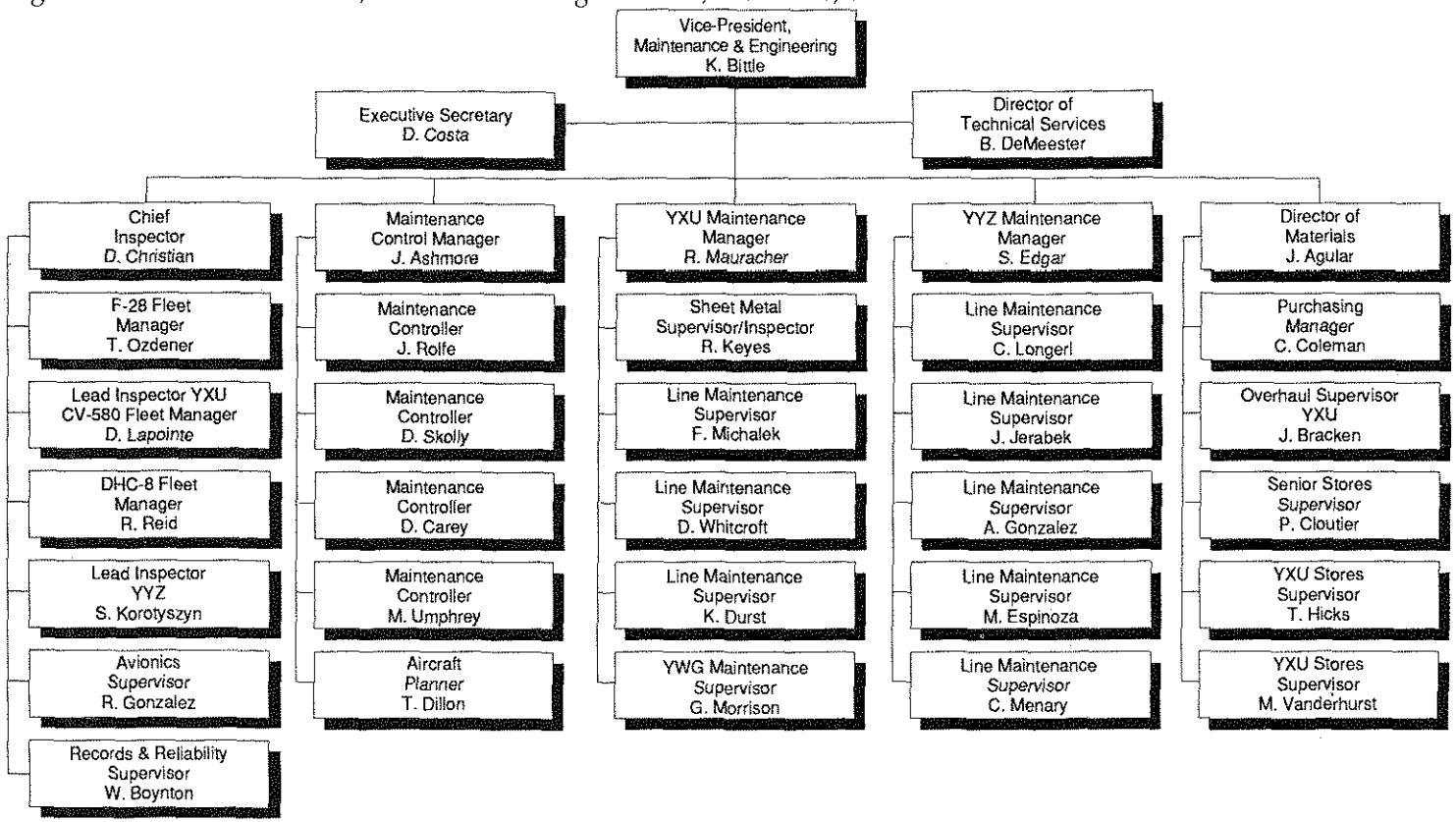
Maintenance and Engineering Management

The Air Ontario maintenance organization and practices were described in its Maintenance Control Manual (Exhibit 319). Unlike the flight operations management, the senior management of maintenance was relatively stable during the period June 1987 to July 1989. Mr Kenneth Bittle was vice-president of maintenance and engineering at Air Ontario during that material time.

Mr Bittle began his aviation career in 1975 as an apprentice mechanic with Patricia Air Transport (Pat Air) of Sioux Lookout, Ontario, a small northern airline flying primarily float aircraft. In 1978 Pat Air went into bankruptcy and Mr Bittle moved to Hooker Air Services as an AME. When the Deluce family acquired the assets and licences of Hooker Air Services in 1979, Mr Bittle joined Austin Airways as a base engineer in Sioux Lookout.

Mr Bittle worked in many operational capacities at Austin Airways. At various times he held the positions of base manager, chief parts storeman, materials manager, director of support services, operations manager for northeastern Ontario, and, finally, director of maintenance and engineering. In the last position he reported to Mr Robert Deluce, who was then vice-president and general manager. Mr Bittle had held

Figure 14-4 Air Ontario Inc., Maintenance Organization, March 10, 1989



Source: From Exhibit 793

this position for two years when Austin and Air Ontario Limited merged.

Mr Bittle then was selected to be vice-president of maintenance and engineering of Air Ontario Inc. in preference to Mr Peter DaCosta, former head of maintenance at Air Ontario Limited. Mr Bittle held this position until August 1990, when he became president and chief executive officer of Northland Air Manitoba.[7]

The Air Ontario maintenance organization in place on March 10, 1989, is depicted in figure 14-4.

The two principal operational departments at Air Ontario Inc. – flight operations and maintenance – were dominated by former Austin Airways management personnel during the material period: Captain Robert Nyman, the director of flight operations, Mr James Morrison, the vice-president of flight operations, and Mr Kenneth Bittle, the vice-president of maintenance and engineering. That former Austin Airways personnel came to dominate the operations of Air Ontario Inc. is, in my view, significant and is discussed later in the Report.

Management Selection

The Selection Process

The appointment of any officer of the company, including the CEO, required approval by the board of directors of Air Ontario.

Mr William Deluce was president and CEO of Air Ontario Inc. pursuant to his earlier employment agreement with Austin Airways Limited and Air Ontario Limited. He discussed his role as CEO with Mr Leo Desrochers and Mr Ray Lindsay of Air Canada during the negotiations for Air Canada's purchase of 75 per cent of Air Ontario Limited and Austin Airways. Mr William Deluce testified that, although his being the president of Air Ontario was not a condition of the sale to Air Canada of a majority interest in his company, his acceptance of the position of CEO was predicated upon very definite conditions:

> A. ... part of the prerequisite on ... my part that I set out with Air Canada was that I was prepared to take on the job on the basis that I had a normal board reporting responsibility. I was not interested in running a division of Air Canada. I was interested

[7] Northland Air Manitoba is a regional airline that is owned 50 per cent by the Deluce family and 50 per cent by Ilford-Riverton Holdings Incorporated.

> in running a company or a couple of companies but on a very independent basis. Independent to the ... extent that I would have ... to report as a normal C.E.O. would do to a board.
>
> (Transcript, vol. 151, pp. 111–12)

Mr William Deluce testified that he would normally select all senior management personnel and he was occasionally involved in the placement of managers at a lower level. The selection of managers at Air Ontario typically involved his consulting with Mr Syme and the human resources department. All changes in management structure discussed above would have required at least the approval of Mr William Deluce and, in some cases, would have been an initiative of Mr Deluce.

Mr William Deluce brought with him the entrepreneurial management style of a man who had built his company up from a small family business. While his style of management changed somewhat as his company grew, differences in his corporate culture and that of the majority shareholder resulted in some disagreement at the board level. Mr Rowe, an Air Canada representative on the Air Ontario board, provided insightful evidence on the clashing of Air Canada and Air Ontario corporate cultures:

> A. ... This was my first encounter with a small entrepreneurial style of operation, and, as a consequence, I had some personal adjustments and difficulties in that adjustment in ... getting used to the style of a smaller management group and, in particular, the entrepreneurial style of a chief executive officer.
>
> Q. Now, an entrepreneurial style, could you just either explain that term generally or explain how that differs from the management that you were used to.
>
> A. Well, I think, in that context, Counsel, I would define it basically as being able to make a lot of decisions often by one's self very quickly as opposed to, in our corporation, where most decisions were run through various committees with a lot of studies to back them up and that type of thing, often a gut-feel-type decision-making as opposed to one backed up by extensive study and – and vetting of – at various levels by various experts, because there simply weren't the experts around and the experts weren't needed in that environment. It was a much smaller, closer-in environment where the experience of the individuals could be brought to bear and the right decisions generally made very quickly.
>
> I, on the other hand, came from an organization where consensus, extensive study, various levels of approval, checks and balances existed, and that was simply not ... necessarily the style in an entrepreneurial environment, which, incidentally, we

felt, Your Honour, we wished to foster because it was one of the things we had purchased that we couldn't supply ourselves in relation, Counsel, to a previous question of yours, is why didn't we build our own house ... that we felt that we could purchase this particular style of operation, which would be germane to the size of community and the routes being served and would allow a much better style of operation than we ourselves could provide.

So I went through a lot of personal adjustment in that regard, and that's no secret, that, as a board member and executive committee member, I frequently had disputes with management on how they arrived at decisions and how they sometimes carried them out, and I was generally somewhat a thorn in management's side as I grappled with understanding how they operated and how that translated into my environment, and also the expectation of my superiors in the role I played on behalf of our corporation and how they would interpret the actions.

So, Counsel, I spent some considerable time within our corporation counselling our senior management members on why decisions were taken and what was behind them. Similarly, I would spend some considerable time with Bill Deluce, in particular, but other members as well on their style and testing as to why things were done.

So I was generally in the position more frequently of ... probing – not being antagonistic, I hope, but I suppose so on several occasions, because we had some fairly hot sessions, of really probing the thing, because it was a different environment to me ... things were done very much faster, usually – often without consultation that I thought might have taken place or should have – in my world, would have taken place.

Q. Consultation with whom, sir? ...

A. Oh, with the board, with other members. I had to understand how a board operated at that particular level.

Our own board of directors had a particular consultative style and management, their executive management relationships, and I was – initially, at any rate, I was very concerned that the boards of these smaller companies behave in a similar fashion, and that the chief executive officer behave as ... responsibly as our chief executive officer behaved to his board.

I guess the difficulty arose in the style. Chief executive, Bill Deluce, was an entrepreneur, family-style operation which I knew nothing about, never encountered before. And he ... had been projected into an environment that he wasn't used to either, and from an entirely different background, what we had expected of him, and I had come from a background that was different than what he was experiencing as well, so the two of us had to dance around and get used firstly to each other, our expectations, and the environment that was growing up at the

> time. And incidentally, these ... companies were generally our first real encounter with small companies that we had not created in our own image and managed with our own personnel.
>
> Heretofore, many of the companies that we had created ... had Air Canada management seconded to them. So the corporate culture was quite complete all the way through, whereas in the case of these smaller companies, it was anything but the same.
>
> And so we both had to get used to each other's demands, and that was part of my role, to bring the smaller company up to some of the standards of reporting and expectations and behaviour from an executive point of view that we expected.
>
> I had to translate back to our corporation the need for the freedom to act and the entrepreneurial flair that was required to keep the companies viable in the atmosphere in which they existed.
>
> So there was a dichotomy back and forth, and that took place over a period of several years.
>
> (Transcript, vol. 121, pp. 81–85)

An example of disagreement between Mr William Deluce and Mr Rowe is seen in discussions surrounding Mr Deluce's selection of his brother Bruce Deluce as vice-president of operations for Air Ontario.

The Appointment of Bruce Deluce as Vice-President of Operations

The proposed appointment by Mr William Deluce of his brother Mr Bruce Deluce as the vice-president of operations was the subject of considerable discussion at the Air Ontario executive committee meeting of May 6, 1988. This is reflected in the following minute from that meeting:

> Material was distributed to the members of the Executive Committee at the meeting with respect to the proposed change in the management structure of the Company.
>
> William Deluce spoke to this issue. Considerable discussion took place with respect to the appointment of Bruce Deluce as Vice President, Operations.
>
> It was agreed that the appointment of Bruce Deluce as Vice President, Operations would be deferred until the next meeting of the Executive Committee.
>
> (Exhibit 934)

The new position of vice-president of operations had authority over the vice-president of airport services and charter sales, the vice-president

of flight operations, and the vice-president of maintenance. Under this proposal, Mr Bruce Deluce, who was 29 years old at the time, would have had direct responsibility for three of the largest departments in the company.

Mr Rowe explained his concern with the possibility of nepotism and his objection to the proposed management change:

> A. Well, Your Honour, I was concerned about the degree of experience that the individual had, and I ... wished to be satisfied – because I did not know too much about ... the individual at the time, I wanted a further explanation as to his capabilities.
>
> I also was somewhat perturbed that the appointment had been put forward without consultation with the executive committee prior to it appearing almost a fait accompli, and I was trying to make the point that that sort of procedure was not acceptable and it was not compatible with the way we did things in Air Canada, somewhat tying in, Counsel, to my remarks earlier about the differences in the two organizations.
>
> Secondly ... I was concerned about the possibility of nepotism within the organization, not that it was bad or wrong necessarily but that I did not want it to appear that Air Canada would condone any structure of that nature in ... this company.
>
> I was quite sensitive to the fact that the family had owned and operated Austin Airways in their own manner and as a family, and I was particularly concerned, as were several others in our company, that it not appear as if, quotes, "the family," end of quotes, were running Air Ontario, that promotions should be on merit.
>
> And, again, because of my background and experience in management, I was concerned about the development of a successor to the president, not that he was leaving or anything like that, but that ... there be a clear – fairly clear line of development for all people within Air Ontario and that career possibilities be protected and excellence of management be encouraged and rewarded on its own merit.
>
> (Transcript, vol. 121, pp. 135–36)

After some discussion over a number of weeks, a less ambitious appointment for Mr Bruce Deluce was implemented. The initial proposal of May 1988 would have made Mr Bruce Deluce responsible for flight operations, maintenance, charter sales, and airport services. The organization implemented in June 1988 made Mr Bruce Deluce responsible for flight operations, airport services, and charter sales. The vice-president of maintenance remained in a direct reporting relationship with the group vice-president, Mr Syme. Further, Mr Morrison was named vice-president of flight operations instead of Mr Hill. Mr Morrison had more experience in flight operations than Mr Hill, and this

change was seen as assisting Mr Bruce Deluce in his transition to the new position. In addition, Mr Bruce Deluce maintained a reporting relationship with Mr Syme.

During the weeks between the initial proposal and the ultimate appointment of Mr Bruce Deluce, Mr Rowe made several inquiries about his experience and competence. In particular, Mr Rowe spoke with Mr John McMurtry, another Air Canada nominee on the Air Ontario board, who was apparently more familiar with the Deluce family than was Mr Rowe. Mr Syme testified that Mr McMurtry had expressed his opinion that the appointment of Mr Bruce Deluce, as originally contemplated, represented too much of a change at that time. Further, Mr Syme testified that the executive committee thought a staged transitioning of Mr Bruce Deluce into the senior operating position within the company would be desirable.

Mr Rowe testified further that, on the advice of the Air Canada personnel department, he considered requiring Mr Bruce Deluce to undergo independent "executive testing" prior to approving his appointment as vice-president of operations. However, after at least two discussions with Mr William Deluce, Mr Rowe "came to believe that the candidate was satisfactory ... [and that] there were enough safeguards given to proceed" (Transcript, vol. 121, p. 141). Mr Rowe testified that he expressed concern at the board level that executive talent was scarce within Air Ontario, with the exception of the Deluce family, and, in the future, they should look outside the company for appointments at a senior executive level. His inquiries, combined with the proposal to bring Mr Bruce Deluce into the senior operational position in the company by stages, satisfied Mr Rowe that the appointment of Mr Bruce Deluce was acceptable.

Following his June 1988 appointment, Mr Bruce Deluce was given increasing responsibility. In December 1988 the maintenance department was brought within his area of responsibility, as was management information systems. In July 1989 system operations control and in-flight service began reporting directly to Mr Bruce Deluce.[8] Finally, in September 1989, Mr Thomas Syme was appointed executive vice-president commercial services and Mr Bruce Deluce, as vice-president operations, reported directly to Mr William Deluce, the president and CEO. With this final change, Mr Bruce Deluce became the senior executive manager responsible for the entire operational side of Air

[8] Previously, system operations control and in-flight service reported to the vice-president of flight operations. In July 1988, with the departure of Mr James Morrison, Mr Bruce Deluce took on direct responsibility for the flight operations department, in addition to his responsibility over maintenance.

Ontario. Mr Syme's area of responsibility was restricted to commercial matters.

In summarizing this description of the air carrier, the following points should be emphasized:

- The operational management of Air Ontario Inc. was dominated by individuals who received their aviation experience in the northern environment of Austin Airways.

- Air Ontario Inc., as a scheduled passenger carrier providing a regional feed to Air Canada in a deregulated environment, was a very different operation from that of Austin Airways. Air Ontario management was confronted by demands that were materially different from anything they had previously encountered.

- Significant demands were placed on Air Ontario management by:

  - the merger of the two employee groups – the non-unionized Austin Airways with the unionized Air Ontario Limited – including the merger of the pilot seniority lists;
  - the negotiation of the first collective agreement of the newly merged pilot group;
  - the continuation of commercial service on a limited basis, by management pilots, during an eight-week pilot strike;
  - the management of the orderly commencement of services after the strike;
  - the administration of collective labour agreements that delineated employee working conditions and the relationship between management and labour;
  - the rationalization of operations which involved an abandonment of northern routes, a sale of northern assets, and a reduction in size of the company's workforce by one third; and
  - the cultivation of a new trunk-feed relationship with the parent company, Air Canada, which involved among other things the operational demands of providing a reliable coordinated connecting service with the national carrier at its Toronto and Winnipeg hubs.

- Frequent changes to the operational management at Air Ontario, in addition to a high turnover of key management personnel, characterized the company during the period from June 1987 until March 10, 1989.

It was in this environment of high stress on a frequently changing operational management group that Air Ontario commenced its first transport jet operations.

Chapters 15–22 of this Report provide a detailed analysis of the F-28 program. It will be shown that operational deficiencies which were significant to the crash of flight 1363 were attributable, at least in part, to deficient and inattentive management.

15 THE F-28 PROGRAM: PLANNING

Introduction

As stated in the opening pages of the Report, the ultimate goal of this Inquiry is the prevention of future aviation accidents. From the outset I have accepted the premise that accident prevention is best served through a properly functioning commercial aviation system. Generally, when accidents do occur, it is because the aviation system has broken down; accordingly it is the purpose of accident investigation to identify the causes of the system malfunction so that appropriate corrective action can be taken.

In this system analysis I must describe the immediate operational environment in which the crew of flight 1363 operated. That operational environment included the following factors:

- the improper deferral of the maintenance of the aircraft auxiliary power unit;
- the dispatch of the aircraft with an unserviceable APU out of a maintenance base;
- the dispatch of the same aircraft into Dryden, where there were no ground-start facilities for the F-28;
- general serviceability problems with the aircraft;
- the limited F-28 training of ground-handling staff at Dryden; and
- the erroneous flight release for flight 1363.

These and other factors are indicative of systemic problems with the Air Ontario F-28 program. In this section there is an examination of that program.

In October and November 1987, after a period of assessment and planning commencing in approximately June 1987, Air Ontario entered negotiations to lease two F-28 aircraft from the French air carrier, Transport Aérien Transrégional (TAT). Air Ontario was to receive these two aircraft in the spring of 1988, but a number of events intervened to result in its taking delivery of the first F-28 aircraft, C-FONF, in late May 1988 and the second, C-FONG, in November 1988. It was the intention of Air Ontario management to build its F-28 fleet eventually to as many as eight aircraft.

When Air Ontario embarked on its F-28 program, it was the first time that its management had operated a transport category jet aircraft in commercial scheduled service. As the F-28 aircraft was new to its personnel, Air Ontario management, with the express approval of parent company Air Canada, sought to access the expertise of individuals and organizations having experience with the aircraft. In this regard it contracted for ground school and flight simulator training for its pilots with Piedmont Airlines of Winston-Salem, North Carolina, which had one of the world's largest fleets of F-28 aircraft in commercial service. Air Ontario pilots were given their ground school training by Piedmont in Winston-Salem, and their simulator training in Tampa, Florida. In December 1988, because of the Piedmont takeover by USAir of Arlington, Virginia, and the increased training demands experienced within those two merging airline operations, Air Ontario lost access to the F-28 simulator in Tampa. Accordingly, Air Ontario flight operations management implemented alternative arrangements for training its F-28 pilots. Apart from its involvement with Piedmont/USAir, Air Ontario did little to employ any individuals with either F-28 experience or transport category jet experience in its new F-28 operation.

Air Ontario introduced its commercial F-28 aircraft service in June 1988.

The analysis that follows begins with a description of the business rationale behind Air Ontario's first foray into scheduled jet transport operations. I describe the marketing imperatives that apparently motivated the acquisition of the F-28s, the early operational planning, and, ultimately, the implementation of the program. The information contained in this initial description is gleaned largely from the testimony of Air Ontario and Air Canada executives who were involved in the decision making, as well as relevant Air Ontario corporate minutes and planning documents that were tendered into evidence.

I then contrast Air Ontario's plan to introduce the F-28 aircraft with what actually occurred during the implementation of F-28 service. What emerged from the evidence was that a reasonably sound plan went awry in its implementation. The derailing of the plan occurred under the management of an overburdened individual who had no experience in the certification and introduction of a scheduled jet transport operation. The difficulties encountered by the F-28 project manager were exacerbated by the fact that his immediate operational supervisors were occupied by labour relations matters and other concerns related to the integration and rationalization of a newly merged company. These management problems manifested themselves in undesirable operational practices within the F-28 operation and in specific flight safety shortcomings, each of which is considered below.

Air Ontario, as a commercial air carrier, was not operating in a vacuum. Transport Canada, as the regulator, had a duty to prevent the serious operational deficiencies in the F-28 program. Before commencing its jet service, Air Ontario had to obtain the approval of Transport Canada in the form of an amendment to Air Ontario's operating certificate to include the F-28. The evidence convinced me that the granting of the amendment to the operating certificate in June 1988 was the pivotal point in the commercial air transportation system relative to this accident. This regulatory requirement represented the best opportunity, in my view, for Transport Canada to impose its regulatory will upon Air Ontario's proposed introduction of the new aircraft type. It was at this point that Transport Canada should have satisfied itself that Air Ontario was fit to offer jet service, with the requisite degree of safety, to the travelling public. Had the regulator been more diligent in scrutinizing the proposed F-28 implementation at Air Ontario, many of the operational deficiencies that had a bearing on the crash of flight 1363 could have been avoided. The Air Ontario operating certificate amendment to include the F-28 is, accordingly, a focal point for much of the analysis of the F-28 program.

Apart from the scrutiny that should precede an amendment of an operating certificate, the ongoing monitoring role of Transport Canada should also be emphasized. After a proposed operation has been approved, Transport Canada is responsible for ensuring that what was represented in the air carrier application for amendment is in fact implemented and that any startup problems are dealt with promptly and professionally.

As Air Ontario endeavoured to make the F-28 program operational, Air Canada (Air Ontario's majority owner) remained largely uninvolved. Air Canada's role was kept to a minimum for reasons discussed in chapter 26, Role of Air Canada. What little operational consultation there was amounted to a cursory look at the F-28 Project Plan by Air Canada's senior technical personnel. There was neither a monitoring of the progress of the Air Ontario F-28 program nor a review of the support structure for that operation by Air Canada.

It is in the context of this air carrier and regulatory activity that the operational deficiencies are analysed. Although for the purposes of analysis I have structured the story of the F-28 program in light of the defined roles within the operational and regulatory environments, I must stress that safety awareness should not be so limited. The evidence convinced me that concern about safety must transcend that which is defined as a minimum "legal requirement."

Planning the F-28 Program

Fleet Rationalization

In the period following the merger, Air Ontario management undertook an immediate assessment of its fleet composition. At the time of the merger, Air Ontario had 51 aircraft of nine different types, representing the combined Austin–Air Ontario Limited fleet. Air Ontario Limited had flown one type, the Convair 580. Austin Airways operated a fleet of different aircraft types.[1]

It was acknowledged by Air Ontario and Air Canada witnesses that Air Ontario had to reduce the number of aircraft types in its fleet. Mr Syme described how a multi-type fleet is operationally more expensive and complicated for an air carrier because each type requires specific training for pilots and maintenance personnel. Each type also requires its own equipment and spares inventory and, although some common equipment might be used, differentiated equipment is also necessary. He explained that "a larger management and administrative support base" is required. He went on to elaborate:

> A. ... in general, in a multi-type fleet environment ... the tendency would be for the company to be less flexible. Change is more difficult to implement because of the training requirements, and in a unionized environment, when there's a structured process of flowing pilots, for instance, from aircraft type to aircraft type. If you upgrade one captain on the senior piece of equipment, there's a waterfall effect, that you are upgrading all – in order of seniority, you are upgrading – you could be upgrading eight captains through eight different types. And enhanced product quality, again, is focusing on the increased flexibility that we contemplated achieving through the rationalization of the fleet.
>
> Q. So from an operational point of view, then, is it fair to say that the more types you have, the more burdensome it is for the flight operations organization?
>
> A. I think that's a fair statement.
>
> (Transcript, vol. 98, pp. 22–23)

[1] The nine aircraft types in the Air Ontario fleet were: Dash-8 series 100, Convair 580, HS-748, DC-3, DHC-6 (Twin Otter), Beech 200, Beech 99, Cessna Citation, and Cessna 402. It should be noted that the Dash-8 series 100 was introduced to the combined Austin-Air Ontario Limited fleet following the change in ownership of the two companies in January 1987.

Selecting the F-28

The first documentary reference to the F-28 aircraft at Air Ontario is found in the June 1987 Air Ontario Inc. business plan, where it was stated:

> Air Ontario faces no less competition in the charter sector of its operations, both from aggressive, low-cost carriers in Northern Ontario, and from other regional airlines who traditionally operated with turboprop equipment but are now introducing jet aircraft. Air Ontario will not only need to introduce a cost-efficient small aircraft but will also need to consider larger aircraft in order to be competitive. The answer in the latter case may be the 56-seat Dash 8 series 300, or it may lie in acquiring a small (60–70 seats) jet aircraft of the F-28 variety.
>
> (Exhibit 938, p. 2)

The rationalization of the Air Ontario fleet and the possible acquisition of the F-28 were again discussed in the context of the Air Ontario five-year business plan at the board of directors' meeting of August 12, 1987.

In a document entitled "Fleet Rationalization Discussion Paper," written in July–August 1987, the importance of reducing the number of aircraft types was discussed:

> The existing aircraft fleet at Air Ontario comprises eight[2] different aircraft types. A recent survey of the top fifty regional carriers in the United States indicates no carriers with more than 5 aircraft types and the vast majority with less. The diversity of revenue services which Air Ontario enjoys is a factor in the fleet mix; however, the optimization of the service/resource mix is undoubtedly the most significant opportunity for enhancement of Air Ontario's long term profitability.
>
> (Exhibit 796, p. 1)

In this fleet rationalization discussion paper, there was a preference expressed to reduce the fleet to four aircraft types: a 7- to 19-passenger aircraft, a 27- to 44-passenger aircraft, a 55+ seat aircraft, and a cargo aircraft capable of carrying 6000 to 12,000 pounds.

In the 55+ seat category, management's intention was to replace the ageing Convair 580 aircraft, whose residual resale values were deteriorating. Included among aircraft types considered in the replacement program were the de Havilland Dash-8 series 300, the Aerospatiale

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[2] There is a discrepancy between the number of aircraft types cited in Exhibit 938 and Exhibit 796: the former listing nine and the latter eight.

ATR72, the British Aerospace ATP and BAe 146, and the Fokker F-28 Mk1000. Of these aircraft the Dash-8 series 300, the ATR72, and the ATP were turboprop aircraft; the BAe 146 and the F-28 were jet aircraft.

Air Ontario was already committed to the delivery of new Dash-8 series 300 aircraft; however, because of delivery delays and a reassessment of manufacturer promises with regard to aircraft capacity, Air Ontario was looking for faster and larger aircraft.

Partially because the ATR72 and the British Aerospace ATP were not readily available, either of the two jet aircraft – the BAe 146 or the F-28 – was favoured. In reviewing the document entitled "F-28 Acquisition Proposal," which was presented to the Air Ontario board of directors for consideration, I note that particular emphasis was directed to the competitive attractiveness of a jet aircraft:

> Air Ontario has begun operation on a number of routes (namely Toronto–Sault Ste Marie, Thunder Bay–Winnipeg, Toronto–Cleveland, London–Ottawa) where competitors are offering larger, faster jet equipment in the 100–200 seat range. Thus far, Air Ontario has managed to capture a modest share of the market through scheduling and using the "AC" flight designator to its best advantage. The time has arrived for introduction of a larger, faster aircraft into the fleet.
>
> (Exhibit 800, p. 4)

It is interesting that these Air Ontario internal documents, intended for the board of directors, underlined the words "*larger*" and "*faster*" for emphasis. Without a doubt there was a great deal of enthusiasm as Air Ontario embarked upon its first transport category scheduled jet airline service.

Along with the practical size and speed advantages of jet aircraft was a certain prestige. Mr Rowe, the Air Canada representative on the Air Ontario board of directors, testified that many communities exerted political pressure on the airlines to provide jet service. On the subject of "jetitis," as it was sometimes described, Mr Rowe gave the following evidence:

> A. [C]ommunities were vying for economic development, and airline service was deemed to be a prime ingredient for economic development. Furthermore, with the advent of the ... jet aircraft, that was deemed to be ... one of the prime elements of economic development for any city. So various cities and towns would exert considerable pressure to find carriers available for providing jet service for economic development, and, hence, there was quite an intensive interplay between a city, the province, and the federal government on a member-of-parliament level and the regulatory body on the federal side itself.

> There was considerable influence as to finding carriers and getting them to serve the area itself.[3]
>
> (Transcript, vol. 121, p. 16)

The prestige of jet service described by Mr Rowe was borne out by comments of the chief administrative officer of the Town of Dryden, Mr John Callan:

> A. When Air Ontario announced that they were looking at reinstating jet service to the Dryden Airport, that really thrilled us to no end, because it was seen as a feather in our hat to have jet service ...
>
> (Transcript, vol. 4, p. 69)

Given delivery problems with the Dash-8 series 300 and the desire to sell off their ageing Convair 580 aircraft, there appears to have been a sense of urgency in getting the jet acquisition program under way.

With regard to the delay in Dash-8 300 delivery and a concern regarding Dash-8 300 passenger capacity, the following comments in the F-28 Fleet Acquisition Proposal (November 1987) are significant:

> A response from Air Ontario in light of the above two events has yet to be formulated. But what has emerged is *a pressing need* for a faster, larger-capacity aircraft in the Air Ontario system in advance of the spring of 1989.
>
> (Exhibit 800, p. 9, emphasis added)

Further evidence of Air Ontario's pressing need to commence the jet acquisition is seen in the following passage from the F-28 acquisition proposal:

> Air Ontario must examine larger aircraft in the 50+ seat range and select one for use in its system in the *earliest possible timeframe*. Unfortunately, other than the ATR-72 and the British Aerospace ATP, there are no larger turboprop aircraft which will meet the mission requirement. Both of these aircraft are rejected at this point, largely on the basis of acquisition time. The only other practical alternative lies with smaller, used jet aircraft in the 65–90 seat range, namely the F-28 and the BAe 146.
>
> (Exhibit 800, p. 10, emphasis added)

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[3] Mr Rowe went on to explain that in recent years the preoccupation with jet service has waned. This has resulted from the advent of a reasonable alternative in modern, large, pressurized turboprop aircraft.

Having narrowed the list of possible replacements for the Convair 580 to two aircraft types, a comprehensive comparative aircraft evaluation was performed. On an economic basis, the F-28 was judged to be a more viable aircraft for Air Ontario than the BAe 146.[4]

Marketing Considerations

After the economic rationale for choosing the F-28 was established, a marketing study was performed to determine how best to utilize the F-28 within the Air Ontario route structure. Again the competitive attractiveness of a jet aircraft was emphasized from the marketing perspective. Noted among the advantages to deploying the F-28 on the Winnipeg–Thunder Bay–Sault Ste Marie–Toronto route was the following:

> Maximum competitive impact vs. Canadian Airlines, with respect to CP overlap with Air Ontario routes, and through direct jet-to-jet competition.
>
> (Exhibit 800, p. 40)

Mr Syme testified regarding the meaning of this particular passage:

> A. In the markets that were mentioned, we were competing, in the Canadian market-place, with Canadian, who were operating 737s on those markets, and with USAir who was operating – the Cleveland route that he referred to, USAir operates DC-9s on the market. And as we expanded into these types of markets, it was the first time that we had really competed head to head with jet operators, and ... this section was put together by our vice-president of marketing and ... that was a major concern, from a competitive factor, to him.
>
> (Transcript, vol. 98, p. 135)

The marketing implications of having Air Ontario take over some routes previously serviced by Air Canada DC-9 aircraft were also considered:

> In addition, acquisition of F-28 aircraft by Air Ontario presents certain longer-term benefits to Air Canada in its route rationalization efforts. Air Canada's reduction in frequency or even eventual withdrawal from certain markets in Ontario would be far more

[4] Exhibit 800, Air Ontario Inc. Acquisition Proposal (November 1987), states: "The comparative aircraft evaluation clearly indicates a substantial profit/cash flow benefit for the F28-1000 alternative, relative to the BAe 146 and the Dash 8-300."

> palatable in both a commercial and political sense if Air Ontario could offer a mixed jet/turboprop replacement service.
>
> (Exhibit 800)

Again, Mr Syme elaborated upon the effect of local politics on the proposal:

> A. I guess the underlying issue there is that at that time, there existed a very – a fairly strong bias in the market-place for jet equipment over turbo prop equipment. And ... the statement just reflects that.
> Q. In particular, what is meant by "political sense"? What are the political considerations?
> A. The airline industry seems to be one that attracts a lot of political attention. And as Air Canada pulled out of markets in northern Ontario, that was of great interest to the local politicians. And one of the issues that they raised was the loss of jet service, and what is being suggested here, that if we are able to offer alternate jet service, that that will thereby reduce the political sensitivity.
>
> (Transcript, vol. 98, p. 136)

Air Ontario's attention to the marketability of a jet service to replace the former Air Canada DC-9 service is consistent with the marketing emphasis in the Air Ontario–Air Canada commercial agreement.[5] While the agreement is discussed in chapter 26, Role of Air Canada, for present purposes I note that one of the stated objectives of the agreement is to deliver a "homogeneous product" to Air Ontario and Air Canada passengers (Exhibit 783). The agreement establishes Air Canada–Air Ontario commonality in many of the marketing aspects of air carriage. This indicates to me that both companies understood a consumer preference for an "Air Canada-like" service. The cited evidence of Mr Syme regarding the marketability of jet service can be viewed as another example of delivering a product that looked like an Air Canada product. Notwithstanding, it was the evidence of Mr William Deluce that the F-28 program was "entirely an Air Ontario initiative ... conceived and orchestrated by Air Ontario" that he took to the Air Ontario Board for approval (Transcript, vol. 152, p. 129).

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[5] Mr Syme testified that this commercial agreement survived the merger of Austin Airways and Air Ontario Limited and defined the relationship that existed between Air Canada and Air Ontario Inc.

Approval of the Plan

It would appear that the board of directors' acceptance of the F-28 program came in its review of the Air Ontario five-year business plan, which contemplated the F-28's introduction. Although this plan and the Fleet Rationalization Discussion Paper were discussed at the August 12, 1987, Air Ontario board meeting, there was no documentary evidence indicating formal board approval of the program at that date.

Mr William Deluce testified that, in August 1987, he attended an auction at the Turkish national airline Turk Hava Yollari (THY) with the intention of purchasing two F-28 aircraft. He stated that it was fortuitous that he lost in his bidding on the aircraft to the French airline Transport Aérien Transrégional (TAT), because the final sale price was too high to make the aircraft economically attractive for Air Ontario. Having been unsuccessful in purchasing the aircraft, Mr Deluce, while he was at the auction in Turkey, made initial contact with TAT regarding the possibility of Air Ontario leasing the two F-28 aircraft. Further discussions with TAT took place in September 1987 and formal lease negotiations occurred in October–November 1987.

Mr Deluce testified on his involvement with the aircraft identification and acquisition:

> Q. And I believe that you then took steps to contact TAT in order to lease these two same aircraft, is that right?
> A. Yes.
> Q. And when did you do that, sir?
> A. That would have been done in September of '87 ... I actually made the initial contact while I was at Turkey at the auction. Followed it up in September and October and then actually went over ... for some formal meetings with the TAT representatives. I think it was October–November of '87.
>
> (Transcript, vol. 152, p. 141)

Mr Deluce also testified about the involvement of the executive committee and the board:

> A. Well, they were not involved in the detail. They were very much aware that we had a detailed implementation plan, but ... they were not in a position and they were not following the detailed orchestration of the plan.
>
> As significant events took place, i.e., the securing of aircraft either through lease or acquisition, they would be informed of those types of events. But we had a plan along which we were proceeding, along which management was proceeding, and if there was any significant change to that plan, we would highlight it for them and their main interest was that, you know,

> where was the plan that we had set out, did it still ... basically represent the line along which we were tracking.
>
> So, they weren't into the detail but they were following it on an overall basis.
>
> (Transcript, vol. 152, pp. 141–42)

At the October 8, 1987, meeting of the Air Ontario executive committee, a proposal to lease two F-28 aircraft from Transport Aérien Transrégional was reviewed. In the minutes to that meeting it was noted:

> After much discussion, upon motion duly made seconded and unanimously carried, The Executive Committee approved the leasing of two F-28 aircraft from TAT subject to obtaining approval from the Board.
>
> (Exhibit 935, p. 2)

The members of the executive committee who unanimously approved the F-28 lease were John McMurtry and William Rowe on behalf of Air Canada and Stanley Deluce and William Deluce on behalf of the Deluce family.

It appears that Mr William Deluce was very active in an attempted purchase and then lease of the aircraft in August 1987, prior to any board of directors or executive committee approval of an aircraft acquisition. Mr Deluce testified regarding board approval for the aircraft acquisition which was referred to in the October 8, 1987, minute of the executive committee:

> Q. And lastly, sir, it does say that,
>
> "... the leasing arrangement is subject to obtaining approval of the Board."
>
> So the board approval seemed to be a condition precedent to arriving at a final decision, is that right?
>
> A. That's correct.
>
> Q. So this was not something which you, Bill Deluce, would do on your own and then have rubber stamped, is that right?
>
> A. No, it required board ratification.
>
> Q. Now when we say "board ratification," would you view that ratification as a rubber stamp or something which you still had to leap through?
>
> A. It was ... something that I still had to go through, however, I guess historically, I can say ... that the executive committee was very thorough in ... the programs that we brought forward and there was no precedent for the executive committee recommending or approving something and the board not approving it.
>
> Q. So de facto it would have been a fait accompli upon a recommendation emanating from the executive committee?

> A. I could never count 100 percent on that, but historically that was the way it was.
>
> (Transcript, vol. 152, pp. 144–45)

A minute of the January 18, 1988, meeting of the Air Ontario executive committee noted that:

> Material was also distributed with respect to the proposed acquisition of F-28 aircraft by the Company and a discussion took place with respect to this issue.
>
> (Exhibit 939, p. 3)

The material referred to was the Air Ontario F-28 acquisition proposal (Exhibit 800). Although it was termed a "proposal" it would appear from the evidence of all witnesses involved that the project was well *under way prior to the discussions* of January 1988.

At the meeting of the Air Ontario board on March 29, 1988, the Air Ontario 1988 business plan[6] was tabled, discussed, and approved, subject to some amendment. In that business plan, the F-28 is one of the aircraft types referred to as part of the Air Ontario fleet. Although there was no documentary evidence clearly specifying the approval by the Air Ontario board of the F-28 program, at least by March 1988 there is clear acceptance by the board of the program.

The F-28 Project Plan

Once the acquisition of the F-28 aircraft was approved, steps were taken to develop a detailed implementation plan. The development of this plan was coordinated by Mr Thomas Syme, the group vice-president of operations and marketing.

The first implementation plan, The Air Ontario Inc. F-28 Project Plan (Exhibit 799), was finalized some time in September or October 1987 and was included in the F-28 acquisition proposal (Exhibit 800). The Project Plan consisted of identification of four broad categories of tasks that would have to be completed prior to the commencement of commercial service of the aircraft. These categories were:

- *administration*, which included tasks such as the preliminary inspection of the aircraft, the acceptance of the aircraft, and the negotiation of the aircraft lease with TAT;
- *maintenance*, which included all aspects of maintenance planning, such as the recruitment of F-28 maintenance specialists, the development of

[6] Exhibit 936, Air Ontario Inc. 1988 Business Plan (Revised), March 1988

a workable minimum equipment list, and the provisioning of spare parts for the aircraft;
- *flight operations*, which included all aspects of flight operations planning, such as the recruitment of experienced F-28 specialists and pilots, the preparation of an F-28 pilot training program, and the preparation and amendment of operating manuals; and
- *marketing*, which included tasks such as the preparation of schedules for the F-28, and the planning of the F-28 promotional launch.

Included with the description of the tasks was a schedule of completion dates. Mr Syme characterized the date of Transport Canada's approval of the inclusion of the F-28 on Air Ontario's operating certificate as the target date against which they scheduled the timing of all aspects of the plan.

A comprehensive revision to the Project Plan, dated December 28, 1987, was prepared by Captain Joseph Deluce (Exhibit 802). Although Captain Deluce had been working on various aspects of the F-28 plan since October 1987, he was formally appointed the F-28 project manager in January 1988. The Revised Project Plan reflected slippage in some of the previously projected dates for completion of the various implementation tasks. However, the projected commencement date of commercial service for the F-28 remained the same. Both the F-28 Project Plan and the Revised Project Plan anticipated a startup of late April to early May 1988.

The Air Ontario pilot strike from March until the beginning of May 1988 ultimately delayed the introduction of the F-28 into commercial service. While the original implementation date was to be May 1, 1988, commercial service for the F-28 actually began on June 1, 1988. Mr Syme commented on the delay in the introduction of the jet program:

> A. ... the ultimate test of the program being on track is the successful certification of the aircraft. The target date for implementation of the aircraft with the initial October plan was May 1. In the ... late December revised plan, the target date was May 1. After taking an almost three-month strike [sic], we put the aircraft into service early in June. From my perspective, that's a reasonable indication that the program, prior to the strike, was on track. We implemented the aircraft almost 30 days from the original target date, experiencing a three-month strike [sic] in between, which impacted on ... obviously, many areas of the operation.
>
> (Transcript, vol. 98, pp. 161–62)

Mr Syme was specifically asked to comment on the suggestion that the F-28 was introduced into commercial service at Air Ontario with several operational deficiencies in the F-28 program. He replied:

> A. Well, from my perspective, the aircraft was implemented under the approval of the appropriate regulatory agencies, which is an external test ...
>
> (*Transcript, vol. 98, p. 162*)

Having reviewed the Project Plan and the Revised Project Plan, I am of the view that Air Ontario had properly identified the significant tasks that had to be performed prior to commercial operation of the F-28. Further, Mr Syme's evidence suggests that Air Ontario intended these tasks to be performed before the F-28 was added to the Air Ontario operating certificate. The Commission investigation revealed, however, several material tasks identified in the Project Plans that either were not completed at all or were completed much later than scheduled and following the introduction of the F-28 into commercial service.

In the discussion of the implementation of the F-28 program, there is an analysis of various deficiencies in the program. Such deficiencies could have been prevented if the F-28 implementation had proceeded according to the Project Plan.

F-28 Project Team

An operational "F-28 Project Team" was assembled to acquire the aircraft and bring it into service. The members of the project team were Air Ontario director of flight operations Robert Nyman, Air Ontario vice-president of maintenance and engineering Kenneth Bittle, and pilots Joseph Deluce and Robert Murray. Each member of the project team was given responsibility for different aspects of the implementation plan.

On the recommendation of Mr William Deluce, Captain Joseph Deluce was appointed the project manager. As the project manager, Captain Joseph Deluce was the "prime coordinator of the plan,"[7] and it was his role to monitor the progress of the plan and ensure that its various elements were completed according to a timetable.

Mr Bittle was primarily responsible for the maintenance aspects of the Project Plan, which included, among other things, F-28 training of maintenance personnel, provisioning of spare parts and support equipment for the F-28, and developing a maintenance program for the F-28, including the development of a minimum equipment list for the aircraft.

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[7] Thomas Syme, Transcript, vol. 98, p. 53

Captain Murray worked with Captain Joseph Deluce and Mr Bittle in formulating the various elements of the revised Project Plan. Captain Murray was also responsible for ensuring that some aspects of the plan were completed. Captain Joseph Deluce and Captain Murray were the first Air Ontario pilots trained on the F-28 and, at the commencement of commercial service in June 1988, Captain Murray was the only Air Ontario F-28 pilot with company check pilot (CCP) authority. It should be noted that Captain Murray left Air Ontario in July 1988, approximately one month after commercial F-28 service commenced, to pursue an opportunity at another airline.

Although Captain Joseph Deluce was the F-28 project manager, it was the view of Mr Syme, confirmed by Captain Nyman, that the responsibility for all flight operations aspects of the Project Plan rested with Captain Nyman as director of flight operations. Given Captain Nyman's other activities during the implementation period, as shown below, it seems unlikely that he could have been supervising the project manager in any meaningful way.

It was the evidence of Captain Nyman that, in the months of October 1987 to March 1988, he and the vice-president of flight operations, Mr Peter Hill, devoted up to 50 per cent of their time to labour relations in an attempt to avert a pilot strike. When the strike commenced, it was the evidence of Captain Nyman that he returned as a management pilot to "essential flying" out of Pickle Lake in the North. The strike lasted from March 11, 1988, until May 1, 1988. The airline recommenced its normal scheduled operations on May 7, 1988. Throughout the month of June 1988 Captain Nyman was at the Piedmont F-28 course in Tampa, Florida. At the same time, as he would in the normal course, Captain Nyman was responsible for overseeing the entire flight operations of the airline, which included, as described earlier, the operation of many different aircraft, from small twin-engine aircraft to the HS-748 and the Convair 580, over a mix of scheduled and charter service spanning a very substantial route network.

Therefore, from October 1987 until July 1988, Captain Nyman was devoting the majority of his time to labour relations, essential flying, and F-28 training, in addition to his very substantial duties as the director of flight operations. It was precisely during this period when Captain Nyman was to have supervised all flight operations aspects of the F-28 plan. It is apparent from this evidence that the senior managers at Air Ontario retrospectively ascribed to Captain Nyman a supervisory function over Captain Joseph Deluce and the F-28 implementation which, owing to competing demands for his time, he did not effectively fulfil. I am of the view that the director of flight operations should have been overseeing closely the progress of the F-28 Project Plan.

The Role of Transport Canada: Amending Air Ontario's Operating Certificate

Section 700 of the Air Regulations states that:

> No person shall operate a commercial air service in Canada unless he holds a valid and subsisting certificate issued by the Minister certifying that the holder thereof is adequately equipped and able to conduct a safe operation as an air carrier.

The operating certificate is the document that certifies that an air carrier has been permitted to operate in Canada. Included in the operating certificate are a description of the air carrier's operation and a listing of the types of aircraft operated.

It is the responsibility of Transport Canada to scrutinize applications for operating certificates and to ensure that air carriers comply with their operating certificate and operations specifications. The Transport Canada Air Carrier Certification Manual describes the importance of the operating certificate:

> The public's protection ... is safeguarded by the *Aeronautics Act*, the *Air Regulations*, the *Air Navigation Orders*, operating certificates and Operations Specifications forming part thereof. These statutory requirements are the main instruments for ensuring that aircraft operations are conducted safely.
>
> (Exhibit 1026, p. 3)

To amend the operating certificate, the air carrier must obtain authorization from the minister. When Air Ontario sought to introduce the leased F-28 aircraft to its operation, it was required to apply to Transport Canada for an amendment to its operating certificate. In this regard, Air Ontario forwarded to Transport Canada a package of documents dated January 24, 1988. They included a number of required Transport Canada standard forms that detailed the specifications of the aircraft, the airports into which Air Ontario planned to operate the aircraft, the operations personnel involved with the program, and the maintenance facilities at Air Ontario.

In addition to its filing of these required standard forms, Air Ontario included a package of documents nominating Captain Claude Castonguay as a "B Authority" company check pilot. (See the discussion regarding the role of Captain Castonguay in chapter 20, F-28 Program: Flight Operations Training). Finally, in appendices A and B to the application, Air Ontario described the proposed F-28 deployment at Air Ontario.

This application was reviewed by Transport Canada, Ontario Region. Mr Martin Brayman, regional superintendent of large air carrier inspection, testified that it was his group at Ontario Region which initially reviewed the Air Ontario application. An approval checklist was tendered into evidence indicating that, between February 2, 1988, and May 30, 1988, Mr Brayman and others in Transport Canada were reviewing various aspects of the Air Ontario application (Exhibit 1024). Mr Brayman testified that the Certification Branch within Ontario Region identified on the checklist the tasks that must be completed by Air Carrier Branch in its review of Air Ontario's application. It was Mr Brayman's responsibility to ensure that the tasks were completed. The checklist was signed as completed on May 30, 1988, by Mr Wilf Bradbury of Ontario Region.

The various components of the Air Ontario application were signed and recommended for approval by Mr A. Bryson of Ontario Region Airworthiness Branch and Mr R.J. McKnight of the Certification Branch. On June 2, 1988, Mr McKnight and Mr Donald Sinclair, Ontario Region manager of the air carrier operations branch, recommended to Transport Canada headquarters that the requested amendment to the Air Ontario operating certificate be granted.[8] It was noted by Mr McKnight and Mr Sinclair that Air Ontario was given a temporary operating certificate valid from May 31, 1988, to July 31, 1988, pending the formal approval of the amendment by Transport Canada headquarters (Exhibit 968).

On June 10, 1988, the Air Ontario operating certificate was amended to include F-28 operations.

Amending the Operating Certificate: Related Issues

The application submitted by Air Ontario and approved by Transport Canada promised that certain steps would be taken by the company in support of the F-28 operation. These statements of intention may well have reflected Air Ontario planning as of January 28, 1988, the date of application. However, as of June 2, 1988, the date of approval, certain of the promises had not been fulfilled and, with respect to at least one undertaking, I am of the view that the omission was material to the crash of flight 1363.

The application states that:

> Operations Officers will receive training by Air Ontario supervisory pilots who are qualified on the F-28 to familiarize them with the

[8] The recommendation was made by Ontario Region to the Office of the Superintendent Air Carrier Certification, Standards and Legislation, at Transport Canada headquarters.

> aircraft and its systems with a special emphasis on flight planning, performance and MEL procedures.
>
> (Exhibit 855, p. 32)

It must be noted that, although it may have been their intention to train the operations officers fully as per the information contained in this application, in fact only duty operations managers (i.e., dispatch supervisors) received any F-28 training. The dispatchers, including the dispatcher responsible for flight 1363, received no F-28 training and acknowledged a lack of familiarity with F-28 systems.

The issue of dispatch and flight following is examined in detail in chapter 23, Operational Control, but for present purposes I note that in the three areas emphasized in the application to Transport Canada – flight planning, performance, and MEL procedures – there were serious deficiencies. Had these deficiencies been prevented it is unlikely the aircraft C-FONF would have been dispatched to Dryden on March 10, 1989. It appears from the application that Air Ontario properly identified the dispatch and operational control issues that required attention. The error was in failing to implement training in the manner promised.

Air Ontario's failure to fulfil an undertaking material to the application for an operating certificate amendment raises a number of issues:

- Was it the responsibility of the air carrier to advise Transport Canada of any change, or was it the regulator's responsibility to ensure the validity of the information contained in the application?

In my view, the regulator clearly should have scrutinized all aspects of the application to ensure that material changes would be detected prior to the approval of the application. Having stated this, I would also note that common sense would dictate that the air carrier should have informed the regulator of any such changes.

- Given that the regulator did have a group assigned to review the application, why did the group not identify a material deficiency regarding dispatch training?

It is observed by me in a subsequent chapter of this Report that operational control and dispatch are areas that were generally neglected by the regulator. The failure by the regulator to confirm that these undertakings had been discharged prior to the issuance of the amended operating certificate is simply another example of such neglect. If the regulator had regarded operational control and dispatch as important, then, at this early stage, many serious problems could have been avoided.

- Was the validity of the approved operating certificate amendment compromised by the incorrect information in the application?

In my view, even though the representations made by Captain Nyman were correct at the date of application, it must have been apparent to Air Ontario management prior to their receipt of the amended operating certificate that the information submitted in support of the requested amendment was erroneous. Further, there was nothing in the application that stated, though it may be implied, that the promised action would occur prior to the commencement of commercial services. Having stated this, I am of the view that the regulator should not have granted the requested amendment unless it assured itself that all aspects of the application were in place.

Throughout my assessment of Air Ontario's F-28 program, the role of Transport Canada and the certification process is examined. It becomes apparent that there is considerable room for improvement in Transport Canada's scrutiny and licensing of prospective air carrier operations.

Air Canada and the F-28 Program Planning

By correspondence dated November 19, 1987, Mr Thomas Syme forwarded to Mr Bruce Aubin, Air Canada vice-president of facilities and supply and chief technical adviser, a copy of the F-28 Project Plan for his review and comment. Mr Syme did this at the suggestion of Mr William Rowe, an Air Canada representative on the Air Ontario board.

Mr Syme testified as to his sending the F-28 Project Plan to the chief technical adviser at Air Canada:

> Q. Was the Project Plan itself reviewed at all by anyone at Air Canada, currently in situ at Air Canada?
> A. Yeah ... it was either raised at the executive committee or at the board. The shareholder rep of Air Canada suggested it might be helpful to forward a copy of the implementation plan or invited me to forward a copy of the implementation plan to one of their senior technical vice-presidents for review and comment.
> Q. And first of all, who was the shareholders' rep who made that recommendation?
> A. Bill Rowe.
> Q. And the senior technical vice-president to whom you sent the plan, who was that?
> A. Bruce Aubin.
>
> (Transcript, vol. 98, pp. 141–42)

Mr Rowe confirmed that it was he who suggested that the F-28 Project Plan be forwarded to Mr Aubin:

Q. And it seems we have a mention of the board on the 12th of August. Let's start there, and I will ask you who was doing the discussing at the board level and what was discussed with regard to the – and what literature, if any, was shown, or information given to the board at that time?
A. The subject would have been introduced by the chief executive officer, and supported by his staff. The discussion would have centred around the use of the aircraft, the economics and the expected return to the company.
Q. All right. And I take it it's – in the context of a five-year plan, it was considered a viable operation, from your point of view?
A. Yes.
Q. As a board member?
A. Yes, it was.
Q. The fact that it was a jet being introduced into a turbo prop and piston fleet, was that ever the ... the subject of any discussion?
A. Yes, it was. We were concerned that it be done in the proper manner and that the necessary adjustments to the operation of Air Ontario take place to allow the introduction of the aircraft itself.
Q. Was any thought given to the lack of jet expertise within the Air Ontario executive or operations group?
A. It would have formed part of a discussion, general discussion, on the introduction of jets in total.
Q. Do you remember anything specific about that discussion?
A. No specific concern, no.
Q. Was it a subject that was raised and dispelled or was it a subject that was considered worthy of further pursuit?
A. No, it was part of general discussion on the whole subject of introduction of the jet itself, because it was a major move on the part of the company.
Q. Was any thought given at the board level of going to Air Canada for any expertise?
A. I believe I referred Bill [Deluce] to Bruce Aubin of our company, that he would be available to Bill [Deluce] ... to consult with him if required.
Q. And indeed, we have Mr Aubin's correspondence before the Commission, and to summarize it, Mr Syme wrote to Mr Aubin, Mr Aubin wrote back to Mr Syme and Mr Aubin was provided with the F-28 Project Plan for his comment.
A. Right.

(Transcript, vol. 121, pp. 229–31)

By draft correspondence dated January 14, 1988, Mr Aubin provided his comments on the Air Ontario Project Plan. Mr Aubin provided constructive comment on various specific aspects of the plan, and in general his assessment of the plan was positive. Mr Aubin wrote:

> The overall scheduling of the program looks good, however, do you have anyone following-up progress which each division apart from yourself and does each division have its own set of jobs identified. Some of the above are specific activities. Very often a close follow-up can help a division solve some problems early and prevent delays.
>
> (Exhibit 804, p. 3)

It should also be noted that there was no flight operations input solicited from Air Canada, the area within which most of the operational deficiencies occurred.

By correspondence dated February 16, 1988, Mr Syme thanked Mr Aubin for his comments on the plan and provided further details on the F-28 implementation.[9] Mr Syme reported that:

> A project manager is in place to follow up and coordinate all the activities of the various divisions and has indicated that the program is well on track, including the following:
>
> a) Personnel Selection
> b) Pilot Training
> c) Spares Provisioning
> d) Test Ground Equipment and Maintenance Equipment Provisioning
> e) Transport Canada Paperwork Processing
> f) Aircraft Preparation
> g) Aircraft Ferry Flight Preparation
> h) Scheduling of Aircraft
> i) Program Training for Ramp, Counters and Dispatch
>
> (Exhibit 803, p. 2)

Evidently, between the correspondence of February 16, 1988, and the commencement of commercial service on June 1, 1988, events intervened to cause the Project Plan to go off track. The F-28 was added to the Air Ontario operating certificate and commercial service did begin June 1, 1988, yet several material components of the Project Plan were incomplete. Chapters 16–22 of this Report examine deficiencies in the F-28 program that were revealed by the accident investigation.

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[9] This was the last correspondence exchanged between Air Ontario and Air Canada on the subject of the F-28 Project Plan. In addition to Mr Aubin's review of the plan, it was the evidence of Mr Syme that a Mr Clayton Glen of Air Canada reviewed the Air Ontario commercial and financial analysis of the alternative aircraft candidates.

The Post-Accident F-28 Pilot Survey

In the period immediately following the crash of flight 1363, Air Ontario's flight safety officer, Ronald Stewart, decided to conduct a survey of the Air Ontario F-28 pilots to assess the F-28 program. Captain Stewart testified that, because he was not an F-28 pilot, he wanted to get some background information on the F-28 operation and, in particular, he wanted specific information on de-icing and hot refuelling procedures. Captain Stewart had attended at Dryden as an observer on the CASB investigation team, and de-icing and hot refuelling had emerged as two areas of immediate safety concern. Of further interest to him were rumours persisting at Air Ontario regarding various operational practices in the F-28 program. Captain Stewart testified that he "wanted to get to the bottom" of "fairly strong rumours that indicated a ... fairly poor operation" (Transcript, vol. 74, p. 98; vol. 95, pp. 153–54).

It had been Captain Stewart's intention to contact a large number of Air Ontario F-28 pilots for his survey. Over a period of approximately two weeks, Captain Stewart was able to interview five pilots.[10] These were Captain William Wilcox, Captain Erik Hansen, First Officer Christian Maybury, First Officer Monty Allan, and First Officer Deborah Stoger. Captain Stewart described this group of pilots as a random sampling of the F-28 pilot group.[11]

Captain Stewart canvassed the pilots' views on a variety of areas, including:

- the quality of the F-28 training program
- F-28 de-icing procedures
- fuelling practices
- F-28 standard operating procedures
- F-28 safety, and
- possible differences in operating practices of former Air Ontario Limited pilots and former Austin Airways pilots.

In addition to these fairly specific areas of inquiry, Captain Stewart asked the pilots if they had any additional concerns or comments about the F-28 program.

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[10] There were 25 Air Ontario pilots who received ground school and flight training on the F-28 aircraft. When Captain Stewart was conducting his survey in April 1989, he attempted to contact 18 active Air Ontario F-28 pilots. He was able to contact five pilots – two captains and three first officers – before the survey was terminated following Captain Stewart's discussions with the vice-president of flight operations.

[11] The F-28 pilot survey–related issues are discussed at length in chapter 42, Incident and Accident Reporting and Pilot Confidentiality.

It was in respect of these additional comments and concerns that I heard telling evidence regarding deficiencies in the F-28 program. Each of the five pilots was called as a witness before me to explain his or her answers to Captain Stewart's questionnaire. I found all the pilots to be forthright in their evidence and I commend them for their honesty in testifying under somewhat trying circumstances.

Certainly care must be taken in considering any post-accident assessments of the F-28 program. In this case, however, there was ample independent evidence to corroborate the assessments made by the pilots. After having considered the circumstances surrounding their testimony and the substance of the testimony itself, I place great weight on the observations of the five pilots regarding the F-28 program.

It is not my intention to review the details of the pilots' testimony at this point. Instead, such evidence is referred to throughout the analyses of the various operational deficiencies that follow.

16 THE F-28 PROGRAM: THE AUXILIARY POWER UNIT, THE MINIMUM EQUIPMENT LIST, AND THE DILEMMA FACING THE CREW OF FLIGHT 1363

By way of introduction to the discussion of the operational deficiencies facing the crew of flight 1363 on March 10, 1989, it is necessary to return to the circumstances leading up to the dispatch of the aircraft into Dryden. As described in Part Two of the Report, the evidence revealed that aircraft C-FONF was scheduled for operation on the day of the accident with its auxiliary power unit (APU) unserviceable. In this section there is a full explanation of the importance of the APU on C-FONF and the use of the minimum equipment list (MEL) by Air Ontario pilots, system operations control (SOC), and maintenance personnel.

The APU

Description

An APU is a small gas turbine engine installed on an aircraft to provide auxiliary power independent of the aircraft main engines or ground power sources. The APU can supply compressed air for engine-start purposes. It can also supply electrical power for the aircraft's electrical systems by way of a generator. On the F-28, the APU generator is designated as the number 3 generator, and it is used as a backup to generators 1 and 2, which are powered by the main aircraft engines.

The APU on C-FONF was manufactured by Garrett-Air Research Company. It was designated as model GTCP-36-4A with serial number P-37531.

The APU on the F-28 Mk1000 is installed at the rear of the aircraft fuselage behind the rear pressure bulkhead in a fireproof enclosure that

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The APU on the F-28 Mk1000 is installed at the rear of the aircraft fuselage behind the rear pressure bulkhead in a fireproof enclosure that

is ventilated during APU operations (figure 16-1). APU operation is virtually automatic, and it may operate unattended because of an automatic shutdown capability in the case of an "overspeed" situation,[1] low oil pressure, or fire.

The APU normally supplies compressed air for starting the aircraft engines and supplies the air-conditioning system while the aircraft is on the ground. The APU can be used in flight as a standby power source in the event of main generator failure.

Engine Starts

As previously stated, a source of compressed air is required to start the engines on the F-28. Normally this compressed air is supplied by the APU; however, when the APU is unserviceable, an external source of compressed air is required.

External compressed air can be supplied by three sources. First, an air bottle can be used (figure 16-2). This is a rechargeable source of compressed air which is often used at outlying stations where there may be only an occasional need for compressed air. Once spent, an air bottle may take several hours to recharge to a point where it can again start a jet engine.

Second, a ground air cart can be used. This is the method most often used at large airports. A ground air cart normally contains a small turbine engine from which compressed air can be bled to start an aircraft turbine engine.

Finally, in the absence of an air bottle or an air cart, another turboprop or turbojet aircraft can supply compressed air to an aircraft by way of a "buddy-start" method. The already running jet engines can be connected, with appropriate hoses and couplings, to an engine of another aircraft to provide the necessary compressed air for startup. Such hoses and couplings are not usually carried on board the aircraft and were not available to the crew of C-FONF at Dryden.

Auxiliary Electrical Power: Anti-Skid System

One important function of the APU is the provision of backup electrical power to the aircraft anti-skid system – particularly for landing or for a rejected takeoff on a contaminated runway. If there is a possibility of an overrun in either situation, an F-28 pilot will immediately reduce power to idle and apply full braking. If this procedure will not stop the aircraft before it reaches the end of the remaining runway, the pilot will shut down the main engines to eliminate the residual thrust of the idle

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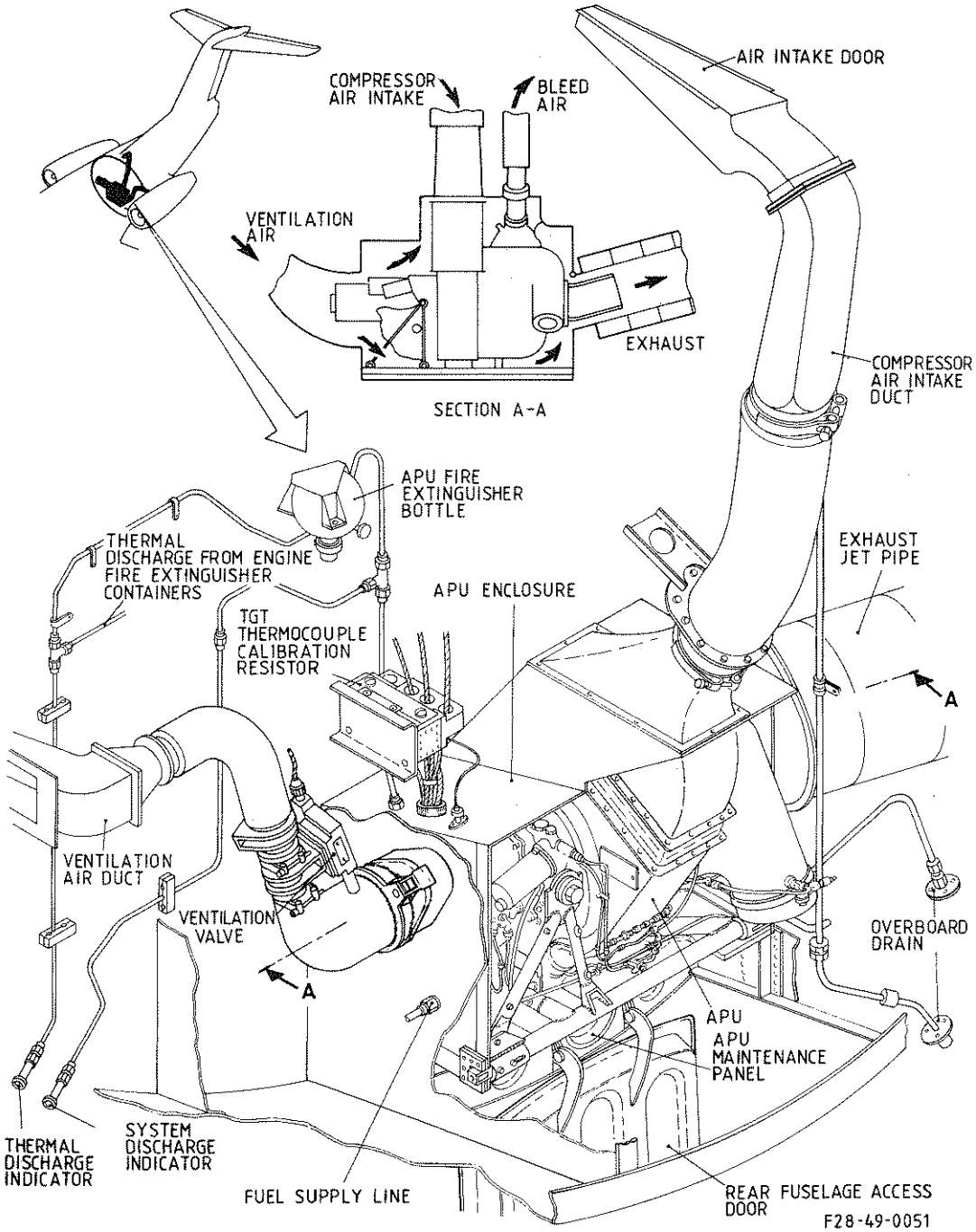
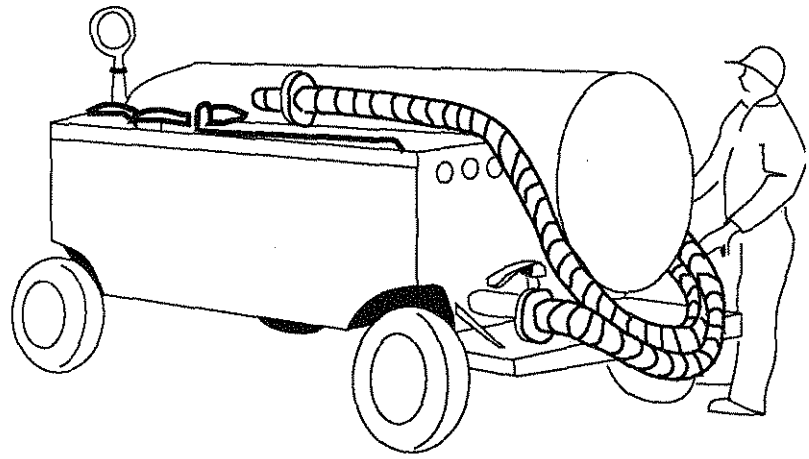
[1] When the APU exceeds 100 per cent of rated RPM

Figure 16-1 APU Installation



Source: Exhibit 322

Figure 16-2 Air Bottle: Single-Engine Air-Start Unit



power.[2] Shutting both engines down will result in a loss of electrical power from generators 1 and 2. In this critical situation, the electrical power from generator 3, which is powered by the APU, is necessary to operate the aircraft anti-skid system.

The significance of idle thrust to emergency stopping is specifically addressed in both the Piedmont F-28 Operations Manual and the USAir F-28 Operations Manual:

> When braking action is poor it is recommended to have the APU running and generator 3 on during takeoff and landing. When during a rejected takeoff or during landing skidding occurs which may result in a possible overrun of the available stopping distance consider shutting down the engines (idle thrust is approximately 800 lbs). In this case, generator 3 supplies the necessary electrics.
>
> (Exhibit 307, Piedmont F-28 Operations Manual, p. 3A-24-4; Exhibit 329, USAir F-28 Operations Manual, p. 3-125-7)[3]

A rejected takeoff or a landing on a contaminated runway where there is a possibility of an overrun is potentially more hazardous with an unserviceable APU. In the final moments of preparation for takeoff or

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[2] On a dry runway, the normal application of brakes on the F-28 will more than overcome the effects of residual idle thrust.

[3] The Piedmont manual and the USAir manual were used, respectively, by Captain Morwood and First Officer Mills. The use of F-28 manuals at Air Ontario is discussed in chapter 19.

for landing, the flight crew must assess its options in anticipation of a potential overrun. With an unserviceable APU, this assessment would include a choice between an anti-skid capability or the elimination of residual idle thrust to prevent overrun.

Fire Protection: Fire Detection versus Fire Extinguishing

Fire protection for the APU is provided by two independent systems. First, there is a fire-detection system, consisting of a continuous detector loop within the APU unit that activates an electrical relay when it is exposed to excessively high temperatures within the APU enclosure or the unit itself. Second, there is a fire-extinguishing system, consisting of an extinguisher bottle that is discharged into the unit. The extinguisher bottle can be discharged either by the automatic activation of the fire-detection relay or, manually, by way of the pilot's activation of a guarded APU fire switch located in the cockpit.

In the case of the fire-detection relay being activated, a fire-warning lamp on the glare shield of the cockpit will illuminate; a cockpit fire-warning bell will ring; the APU will shut down; the air intake door and ventilation valve of the APU will close; and, after five seconds, the extinguisher bottle will discharge.

Fire-Protection System Test

Prior to starting the APU, there is a procedure for ensuring that the fire-detection and fire-extinguishing systems are operable. The test is performed in the cockpit by means of a "test/reset" toggle switch located on the cockpit secondary instrument panel. The switch is spring-loaded and, when held in the "test" position for five seconds, the APU fire-warning light illuminates and the APU fire-warning bell rings, indicating that the system is serviceable. If the fire-protection system proves serviceable, the system is reset and the APU start sequence can commence.

In the absence of a successful check of the APU fire-protection system, the APU cannot be operated except under the conditions specified in the minimum equipment list (MEL). Simply stated, an MEL is a Transport Canada–approved document that permits air carriers to operate aircraft with certain "essential equipment" inoperative. In order to fly an aircraft with such inoperative equipment, the air carrier must make certain operational accommodations that are clearly specified in the approved MEL.

Significance of an Unserviceable APU for Flight 1363

An unserviceable APU, when considered in conjunction with the unsettled area weather on March 10, 1989, and the fact that the Dryden line station did not have a ground-start capability for F-28 aircraft, caused operational irregularities that had to be considered by the flight crew of Air Ontario flight 1362/1363 and Air Ontario system operations control (SOC). These operational considerations were:

- The unsettled weather necessitated the use of a more distant than normal alternate,[4] Sault Ste Marie. Because of the greater distance, a scheduled fuelling in Dryden was necessary.
- In the absence of a ground-start capability at Dryden and the unserviceable APU, the fuelling in Dryden had to be performed with one of the F-28's main engines running.
- Because one main engine had to remain running, any extended ground delay at Dryden would necessitate ongoing revision of fuel consumption calculations.
- If for any reason both engines on the F-28 had to be shut down, the only readily apparent way the aircraft could be restarted would be to transport into Dryden air-start facilities or an air cart from another airport, as well as qualified personnel to make the appropriate hose connections and to support the start.[5]
- Air Ontario policy stipulated that main engines on the F-28 had to be shut down during de-icing.[6]
- During takeoff from a contaminated runway, the APU generator provides backup power to the aircraft anti-skid system. A rejected

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[4] "Alternate" or "alternate airport" is a required alternative landing location to accommodate an en route change in conditions at the destination airport such that landing is not possible. By law, flight crews that file IFR flight plans must specify, among other things, at least one alternate (Air Navigation Order Series VII, No. 2, s.21). A turbojet aircraft must carry sufficient fuel to execute an approach and a missed approach at the destination airport, then fly to an alternate airport, and thereafter fly for a period of 30 minutes (ANO Series VII, No. 2, s.26). Further, the aircraft must carry sufficient reserve fuel to take into consideration meteorological conditions, anticipated air traffic control routings, and any other conditions that may delay the landing of an aircraft (ANO Series VII, No. 2, s.29).

[5] Although Air Ontario had performed "buddy starts" using air from a running Convair 580 aircraft to start another Convair aircraft, the necessary equipment to perform such a start on an F-28 was not readily available.

[6] Exhibit 317, Air Ontario F-28 de-icing memorandum, dated September 28, 1988, contained the following statement: "NEVER: Spray while main aircraft engine's are running!!!" The limited dissemination of this memorandum and the issue of whether pilots Morwood and Mills were aware of it are discussed in chapter 21, F-28 Program: Hot Refuelling and Ground De-icing.

takeoff from a contaminated runway with an unserviceable APU is more hazardous given that the anti-skid system would be inoperative in a two-engine shutdown situation. The stopping performance of the aircraft is less without the benefit of anti-skid.

- When Captain Morwood and First Officer Mills commenced their takeoff roll on the contaminated runway 29 in Dryden, they did not have the benefit of the APU generator backup to the anti-skid system. Prior to the takeoff roll, they would or should have known that in a rejected takeoff their stopping capability would have been diminished, either because of the inoperative anti-skid or the residual main-engine thrust.

Events Leading up to the Unserviceability of the APU

March 5 to 9, 1989

On the evening of Sunday, March 5, 1989, aircraft C-FONF arrived in Toronto after returning from a weekend charter flight to the western United States. The aircraft was under the command of Captain Bradley Somers. During one of his station stops of the trip, Captain Somers experienced difficulty getting sufficient air pressure from the APU to start the aircraft's main engines.[7] Captain Somers made the following entry in the aircraft journey log book for March 5, 1989: "For first start in morning air pressure was only 14 PSI with pack on and would not start engines. In MSP the pressure was normal and start was okay" (Exhibit 309, p. 09647). The entry would be interpreted by maintenance personnel to mean that, although Captain Somers had difficulty on his first start in the morning of March 5, the APU did produce sufficient air pressure to start the main engines later in Minneapolis–St Paul (MSP).

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[7] The aircraft C-FONF was scheduled to "turn-around" in Idaho Falls, Idaho, on the evening of March 4. The aircraft was late in arriving and, because of a misunderstanding, the tour operator sent the passengers back to their hotel. As a result, their departure was delayed until the following morning and the aircraft remained out on the tarmac in Idaho Falls throughout the night with its APU running. Captain Somers testified that he kept the APU running because it was a very cold night and he wanted to keep the interior of the aircraft warm. This procedure was authorized by SOC. On the morning of March 5, when the return trip was to get under way, the APU was not producing sufficient air pressure to start the main engines. Aircraft C-FONF departed Idaho Falls on the morning of March 5 and overflew its scheduled fuelling stop at Sioux Falls, Iowa, because there was no air-start unit there. Because of the lack of air start at Sioux Falls and the unserviceable APU, Captain Somers rerouted to Minneapolis–St Paul, where ground start was available, for his refuelling.

Captain Somers noted one other problem with the aircraft that day. His second entry in the journey log read: "On first takeoff of morning cabin fills with oily smell from air pack after approx. 5 min. smell dissipates and normal for rest of flight" (Exhibit 309, p. 09648).[8]

The aircraft, C-FONF, with these two noted defects, arrived in Toronto at 4:33 p.m. on March 5. The aircraft was to be "turned around" quickly since it was scheduled to depart from Toronto to Winnipeg. In fact, from the journey log, the "turnaround" in Toronto took 57 minutes.

As a matter of course, the defects entered by Captain Somers would be examined by Air Ontario maintenance personnel. In this case, Mr John Jerabek, a line maintenance supervisor, considered the snags. Mr Jerabek testified that he discussed the two journey log entries with Captain Somers. With regard to the first entry, Mr Jerabek confirmed that Captain Somers used an air cart to start the main engines on the Idaho Falls station stop because the APU was not producing sufficient air pressure. After conferring with Captain Somers, Mr Jerabek examined the APU. He could not duplicate the snag because he found that the air pressure output and pressure gauge readings were normal. Accordingly, he made the following entry under the "defect rectified" section of the journey log: "APU was left running all night. Suspect stuck valve. Normal in YYZ" (Exhibit 309, p. 09647).[9]

With regard to the second journey log entry, that dealing with an oily smell, Mr Jerabek made the following entry in the "defect rectified" section: "Suspect residual oil in air ducts after ACM change. Please advise future operation" (Exhibit 309, p. 09648).[10] By checking previous snags, Mr Jerabek found that the air-cycling machine had been changed because it was leaking oil, and he suspected some of this residual oil found its way into the ducting that connects the ACM with the cabin ventilation system. He believed this residual oil was being heated and causing an oily smell in the cabin.

Mr Jerabek did not actually check the ducting for residual oil. A check of this nature would take many hours of work and the aircraft had a scheduled departure out of Toronto at 5:30. Moreover, because Captain Somers had reported that the oily smell dissipated after five minutes, Mr Jerabek felt it sufficient to advise subsequent crews to notify mainten-

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[8] Flight attendant Sonia Hartwick also referred to an oily haze in the cabin at the beginning of flights on March 6 and March 8, 1989. She reported that the oily haze activated the smoke detectors in the rear of C-FONF.

[9] The designator YYZ indicates Toronto. Although Mr Jerabek had suspicions about the cause of the noted APU defects, it is inconclusive whether the low air-pressure production on the morning of March 5 was in any way related to the operation of the APU throughout the night of March 4.

[10] The acronym ACM stands for air cycle machine, which is part of the aircraft air-conditioning system used to cool the very hot air coming from the engines.

ance if the problem recurred. Mr Jerabek did no other work on C-FONF between March 5 and March 10, 1989.

Mr Jerabek's suspicion that residual oil may have leaked into the ducting may have been well founded; however, a review of the aircraft journey log would have revealed that a similar problem had been reported on two previous occasions. On January 21, 1989, smoke in the cabin of C-FONF was attributed to the air-conditioning system (the maintenance of the noted defect was deferred); and on February 27, 1989, thick oily smoke filling the cabin was again reported (the defect was rectified by correcting an oil leak in the duct work) (see chapter 10, Technical Investigation). The recurrent nature of this defect should have warranted the serious attention of Air Ontario's maintenance department.

What is even more troubling was what occurred after Mr Jerabek released the aircraft into service. The next day, on March 6, Captain Morwood noted in the aircraft journey log that the cabin became smoky, a passenger complained, and the smoke detector went off. He noted further that after 5 to 10 minutes the smoke dissipated. These observations were confirmed by the surviving flight attendant, Mrs Hartwick:

Q. Shortly after takeoff, what happened?
A. Right after takeoff, the smoke detector sounded from the back of the aircraft ... it is in the lavatory ...
Q. And was this a fairly loud sound?
A. Yes, it's a very high-pitched noise.
Q. And, when you heard that sound, what did you do?
A. At that time, I turned around to look for the light, and it was flashing, and I [rang] my chime system to get Katherine Say's attention, and she automatically looked at me, and I told her I was going to the back, because she noticed and heard the sound of the smoke detector.

So I ran to the back to fight a fire.

...

Q. Now, when you proceeded to the back of the aircraft, did you observe any kind of smoke or smell in the aircraft?
A. Yes.
Q. And could you describe that to the Commissioner, please.
A. Yes, there was a smokeyish haze throughout the cabin. You could see from the back of the aircraft all the way to the front, it was like a haze, smoky haze, and there was a horrible smell to this smoke.

...

Q. Now, when you got to the back right at the start, what did you do?

A. When I got to the back, the first thing I did was grabbed my Halon extinguisher, and then I felt the lavatory door with the back of my hand.
Q. With the back of your hand?
A. That's correct.
Q. Would you tell the Commissioner why you felt it with the back of your hand?
A. So that ... if I were to feel it with the front of my hand, meaning my palm, and if it were hot, I could possibly burn my hand, and then I would ... have problems holding my extinguisher and actually using my extinguisher, so I felt it with the back of my hand so that, if I did burn anything, it was on the back and I could still use the palm of my hands in order to hold it.
Q. Now, did Kathy Say relay to you what her understanding was of this smoke and smell? Was something indicated to her by the captain?
A. Yes, the captain had mentioned to her that, apparently in the captain's log book, the mechanics had made a little notation saying that they had changed the oil on the compressor – or some sort of droplets or something may have fallen on the compressor and that they could assume that, if a little bit of smoke came about because of this, that that was a good possibility ...
Q. And it was her understanding – and she conveyed this to you – that this was noted in the captain's log book; is that correct?
A. That's correct.
Q. And was there also a notation that possibly smoke could result from what was happening?
A. That's correct.
Q. Now, you feel the door with the back of your hand, and you have this Halon extinguisher with you. Was the door hot?
A. No, it was not.
Q. And what did you then do?
A. I opened up the door just a crack to peek in to see if I could see a lot of smoke or flames or anything, and there was nothing, so I opened it a little further until I finally opened it, and, at that point, I threw some ice cubes down the trash can and down the toilet.
Q. Why did you do that?
A. Just in case there was something in there that was burning.
...
Q. ... Did either Captain Morwood or First Officer Mills leave the cockpit to come to the back to see what was going on?
A. No, they did not.
Q. They did not, okay. And did they indicate any instruction to Kathy Say on what she should do?
A. Not to worry about it, that we can go about our duties.
Q. Okay. And how long did you stay at the back of the aircraft?

A. I stayed there about ten minutes, until the smoke cleared.
Q. What did you then do?
A. I then reset the fire alarm – or the smoke detector system.
(Transcript, vol. 10, pp. 126–32)

Maintenance rectified this snag as noted in the aircraft journey log by cleaning oil out of the APU outlet duct (see chapter 12, Aircraft Performance and Flight Dynamics).

Mrs Sonia Hartwick testified that on the morning of March 8, 1989, shortly after takeoff from Winnipeg to Dryden, the aircraft C-FONF, piloted by Captain Robert Nyman and First Officer Keith Mills, again filled with an oily smoke that triggered the smoke detector. Captain Nyman testified that he attributed the cause of the oily smoke – which he described as an "oily haze" – to the APU, and stated that it was a fairly common problem with that aircraft. He adopted the evidence of Mrs Hartwick that a circuit breaker was pulled to deactivate the smoke detector and that the circuit breaker was inadvertently not reset until they reached Thunder Bay, two flight legs later. Mrs Hartwick testified that smoke filled the cabin and the alarm again sounded during the return flight from Thunder Bay to Winnipeg. Captain Nyman did not note the cabin smoke incidents in the aircraft journey log because, as he put it, it was a recurring, intermittent problem of which maintenance was aware.

On five separate occasions – January 21, February 27, March 5, March 6, and twice on March 8, 1989 – an oily smoke, smell, or haze was reported in the passenger cabin of C-FONF. Maintenance attempts at rectifying the problem were obviously unsuccessful, and I am not at all confident that maintenance ever properly identified the cause of the problem.

I am not satisfied with Captain Nyman's explanation for not reporting the March 8 cabin smoke problems in the aircraft journey log. His failure to report the defects suggests that there may have been a breach of Air Navigation Order (ANO) Series VII, No. 2, the Aircraft Journey Log Order. The deactivation of the smoke detector on the morning of March 8 was a poor practice, and the evidence of Captain Nyman operating the aircraft with this essential aircraft equipment inoperative suggests that there may have been a violation of ANO Series II, No. 20, the Aircraft Minimum Equipment List Order.

I found Captain Nyman's characterization that the deactivation of the smoke detector was against "the legal letter of the law" (Transcript, vol. 109, p. 130) to be flippant and, at the least, ill-advised. While Captain Nyman was not the director of flight operations on March 8 when the incident occurred, he was recognized and respected among Air Ontario pilots as one of the most senior and experienced pilots in the company. All of the Austin Airways pilots would have worked for Captain Nyman

at one time or another, and First Officer Mills had worked in Captain Nyman's flight operations department for years prior to the incident. This mishandling of the cabin smoke incident reflects shoddy, lax flight-operations practices, and, coming from a pilot of Captain Nyman's stature, it most certainly would have sent the wrong signal to First Officer Mills, flight attendants Katherine Say and Sonia Hartwick, and anyone else in the organization who learned of it.

At the time of the occurrences, it was mandatory to report any in-flight incident involving smoke or fire to the Canadian Aviation Safety Board pursuant to sections 2 and 5 of the *Canadian Aviation Safety Board Act*. There is evidence that none of the described cabin smoke incidents were reported to CASB (Transcript, vol. 64, pp. 135–37).

The low APU air pressure for engine starts was again noted on March 8, 1989, while the aircraft was flown by Captain Robert Nyman and First Officer Mills. Captain Nyman made the following journey log entry: "[Entry] 164 APU air press low (MC042)" (Exhibit 309, p. 07104).[11]

Captain Nyman passed the aircraft over to Captain Alfred Reichenbacher in Winnipeg at the noon hour on March 8. Captain Reichenbacher carried on with First Officer Mills, flying the balance of the scheduled route for March 8. After arriving at Winnipeg, First Officer John Robinson replaced First Officer Mills. From Winnipeg, Captain Reichenbacher flew to Dryden, to Thunder Bay, to Sault Ste Marie, and finally to Toronto. The aircraft arrived at the Toronto maintenance base at 9:23 p.m. In the aircraft journey log, Captain Reichenbacher made the following notation regarding his March 8 flying segment: "Further to snag #164: engine starts are becoming more and more difficult (TGT 450°, normally would be 300–350°)" (Exhibit 309, p. 07105).

This journey log entry elaborates on Captain Nyman's earlier entry on low APU air pressure.[12] The entry describes an abnormally hot turbine gas temperature (TGT) during main engine start. This may have been symptomatic of an engine start where the engine compressor was not rotating fast enough at the point the fuel was ignited. The result would be an insufficient cooling airflow during the start sequence, causing high turbine gas temperatures. A reason that the compressor blades were not rotating fast enough may have been insufficient APU startup air pressure. Therefore, the observed high turbine gas temperatures were

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[11] The notation MC042 denotes the assignment by Air Ontario Maintenance Control in London of a maintenance control number. This allows the aircraft to be flown back to the Toronto maintenance base with the APU unserviceable. This procedure is laid down in the Air Ontario Maintenance Control Manual (Exhibit 319).

[12] Defect number 164 was addressed by maintenance personnel in Toronto on March 8 and 9.

apparently a result of deficient air pressure generated by the APU on startup.

The Events of March 9, 1989

The aircraft, C-FONF, arrived back at the Toronto maintenance base at 9:23 p.m. on March 8, 1989. It was scheduled to fly on the morning of Thursday, March 9.

Mr Channan (Ken) Ramnarine, a maintenance crew chief at Air Ontario Toronto maintenance base, gave evidence regarding the rectification of the low APU air-pressure defect. He testified that he arrived for work at approximately 7 a.m. on March 9. After having reviewed the APU problem, he proceeded to change the APU load control valve. This valve controls the pneumatics of the APU, and it was believed that a replacement of the valve would rectify the low-pressure problem. After changing the valve, he made the following entry in the aircraft journey log: "Control valve replaced SN ON P92 SN OFF, P-515" (Exhibit 309, p. 07104).[13]

Mr Ramnarine and Mr Steven Korotyszyn, an Air Ontario lead inspector at the Toronto maintenance base, then started the APU. Mr Korotyszyn testified as to the APU startup:

A. Well, the aircraft was towed out of the hangar, and it was parked. Ken [Ramnarine] and I walked over, and I did a walk-around, got in the airplane, and we prepared to start the APU.
Q. And where were you physically located when the APU was started?
A. I was in the co-pilot's seat.
Q. And where was Mr Ramnarine?
A. Ken was in the captain's seat.
Q. Was the fire shield on the APU at this time?
A. The fire shield was off.
Q. So was there a fire picket outside?
A. Yes, there was.
Q. Now, did you proceed or Mr Ramnarine proceed to fire up the APU?
A. Well, we went through the checklist, and we did the fire test first.
Q. Right, and what happened when you did the fire test?
A. Well, we got the light and the audible horn.
Q. Right. And then did you commence to fire up the APU?
A. We started to – we fired up the APU.
Q. And did it run successfully?

[13] The entry means that the existing valve – serial number P-515 – was removed and replaced by valve serial number P-92.

A. It did not.
Q. Now, we're talking sometime after 10 o'clock in the morning at this point?
A. Yes.

(Transcript, vol. 42, pp. 17–18)

The APU was still delivering the low air pressure, and Mr Ramnarine and Mr Korotyszyn continued troubleshooting. They electrically disconnected the load control valve, and the APU ran successfully. When they reconnected the load control valve, the APU did not operate successfully. On the suggestion of Mr Korotyszyn, Mr Ramnarine reinstalled the original load control valve, and the APU then ran successfully. He shut the APU down and had one of the maintenance helpers reinstall the fire shield to enclose the APU compartment. Mr Ramnarine noticed that three camlock fasteners were missing from the fire shield. He again performed a fire test and restarted the APU. Then he put a load on the APU by starting one of the F-28 engines. This would be the last time that the APU and the APU fire-detection system on aircraft C-FONF both tested serviceable.

After running the engines, Mr Ramnarine instructed his men to reinstall the fire shield. With his confirmation that the fire shield was installed with all fasteners in place, Mr Ramnarine and his crew completed their work on C-FONF on the morning of March 9, 1989.

Mr Kostas (Gus) Athanasiou was an Air Ontario crew chief at the Toronto maintenance base and an aircraft maintenance engineer (AME) endorsed by Transport Canada to work on the F-28 aircraft.[14] Mr Athanasiou was on duty at the base from 7:30 a.m. until 7:30 p.m. on March 9. His first involvement with C-FONF occurred at approximately 4:00 p.m., when he was asked to proceed to the hangar and to pick up the F-28 aircraft for a scheduled departure. Prior to startup he reviewed the aircraft journey log and satisfied himself that there were no outstanding defects. He then commenced the startup procedure. When he performed the preliminary step of testing the APU fire-detection system, Mr Athanasiou found that it was not operable – he testified that "it would not fire test at all" (Transcript, vol. 42, p. 90).

Mr Athanasiou then attempted to rectify the observed defect in the fire-detection system. He opened the APU enclosure and discovered a loose wire. After spending some time reconnecting the wire, he still could not get the APU fire test to work. He did not perform a systematic

[14] In order to get an F-28 endorsement, Mr Athanasiou took a course of approximately two weeks in duration at Piedmont Airlines in Winston-Salem, North Carolina, as did both Mr Korotyszyn and Mr Ramnarine. The amount of time on the course dealing with the APU was, to Mr Athansiou's recollection, about half a day.

tracing of this electrical defect, explaining that the electrical trouble-shooting could have taken hours and the aircraft was scheduled to depart. In his testimony, Mr Athanasiou was not able to identify the function of the loose wire or confirm whether it related at all to the serviceability of the APU fire-detection system. He simply explained that he observed a loose wire and he tightened it.

There was some speculation during the course of the hearings that, when Mr Ramnarine's crew tightened the fire shield for the final time, they may have pinched a wire in the fire-detection loop, which would render the fire-detection system unserviceable. Mr Ramnarine testified that, while he did not think this was the case, it did provide a possible explanation for the unserviceability observed later by Mr Athanasiou.

Given that Mr Athanasiou was not able to rectify the malfunctioning APU fire-detection system, Air Ontario maintenance and the scheduled flight crew were left with two options. They could ground the aircraft until the problem was solved. This option would have involved getting a substitute aircraft and crew for the displaced passengers. Alternatively, they could defer the maintenance of the APU fire-detection system pursuant to the minimum equipment list (MEL).

The option to defer the maintenance of the APU fire-detection system was discussed by Mr Athanasiou, Mr Korotyszyn, and Captain Robert Perkins in Toronto. They also discussed the matter by telephone with both Air Ontario system operations control (SOC) and maintenance control in London.[15]

The decision was to defer rectification of the APU fire-detection system malfunction pursuant to section 49-04 of the MEL, and an appropriate entry was made by Mr Athanasiou in the aircraft journey log. Mr Athanasiou's defect description reads, "APU will not fire test." He added under the "defect rectified" section, "Deferred as per MEL 49-04" (Exhibit 309, p. 07108).[16] After making the deferral entry,

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[15] Maintenance control and SOC perform complementary functions within the maintenance and flight operations departments of Air Ontario. It is the responsibility of Maintenance control to monitor the state of serviceability of the aircraft and to ensure that the required scheduled maintenance programs for the various aircraft are followed. It is the responsibility of SOC to coordinate crew, aircraft, and station facilities. Maintenance control and SOC work closely together to coordinate commercial scheduled service with scheduled and unscheduled maintenance of the company's aircraft. Reflecting this close integration is the fact that maintenance control and SOC are located in adjacent offices at Air Ontario.

[16] There were two possible deferral numbers under the APU section of the MEL (Exhibit 310): 49-01, which was a general section appropriate for an unserviceable APU; and 49-04, which was specifically designated for an unserviceable APU fire-extinguishing system. Mr Korotyszyn explained that because the unserviceability was the *fire-detection* system, 49-01 would have been a more appropriate deferral number than 49-04.

Mr Athanasiou placed a red placard on the cockpit APU panel of C-FONF that read "INOP."

It must be noted that Mr Korotyszyn, who was responsible for the deferral of the maintenance of the APU, was under the misapprehension that Dryden did have ground-support facilities. His testimony in this regard is significant:

> Q. You are the only one that is clothed with the responsibility of deferring this maintenance, right?
> A. That is right.
> Q. That is your decision?
> A. Right.
> Q. And I am putting it to you, in order to do that, in order to reach that decision, on an informed basis, you have to ask questions of other people such as the captain and SOC; don't you?
> A. I would have.
> Q. ... And specifically now on March the 9th, you did put questions to Captain Perkins about what kind of conditions the F-28 might run into, is that right?
> A. Well ... I made sure that there was equipment to support the aircraft.
> Q. ... Did you ... know that the aircraft might be going into Dryden where there was no air start?
> A. I knew the aircraft was going into Dryden. I did not know there was no equipment there.
> Q. ... Were you under the impression that there was equipment there?
> A. Yes.
>
> (Transcript, vol. 42, pp. 68–69)

Although Captain Perkins accepted the aircraft with the deferred maintenance of the APU fire-extinguishing system, he in fact used the APU to start the aircraft engines in Toronto prior to his departure. This was permitted by MEL section 49-04, which required that, with an inoperative fire-extinguishing system, the captain must arrange for constant monitoring by ground crew. In this case Captain Perkins had maintenance personnel standing by to act as a "fire picket."

It is clear, therefore, that when Captain Perkins accepted aircraft C-FONF on the afternoon of March 9, 1989, the APU was producing sufficient air pressure to start the main engines, although the APU fire-detection system was inoperative.

Events Following the Departure of C-FONF from Toronto

The aircraft, with Captain Perkins in command, left Toronto for Winnipeg via Sault Ste Marie, Thunder Bay, and Dryden at 6:49 p.m. EST on March 9. The aircraft was to remain overnight in Winnipeg and

to commence flying under the command of Captain Morwood at 7:30 a.m. on March 10.

Though he used the APU to start the engines on the aircraft in Toronto, Captain Perkins testified that, because the fire-detection system was inoperative, the APU was to be regarded as unserviceable and not to be used on line operations. Captain Perkins was questioned on his flight planning for the evening of March 9, 1989, given that his aircraft had an unserviceable APU and he would be flying through Dryden, where there was no ground-starting capability:

> Q: And maybe you can tell us at this point in time that being aware of no ground start capability in Dryden, did that have any bearing on your thought process at the time?
> A: It had not a lot, because we were not going to be required to fuel in there. As long as the ground people were aware of the fact that they were going to be operating through there with the one engine in operation. It was more of an advisory state for that station as opposed to a request for ground support.
> Q Assuming that weather would remain constant and favourable?
> A: Yes.
> Q: And you didn't have to de-ice?
> A: Yes.
> Q: Right?
> A: The weather was quite reasonable for our trip out, yes.
> Q: So essentially, Captain ... provided that the aircraft would be released from maintenance, you made a conscious decision that you would take it out on that flight, knowing that there was no ... ground serving capability at Dryden?
> A: That's correct.
>
> (Transcript, vol. 43, pp. 144–45)

Captain Perkins arrived with C-FONF in Winnipeg at 10:53 p.m. CST. He testified that he did not phone Captain Morwood to advise him of the problem with the APU because it was late and he did not want to wake him to "tell him something that he theoretically should already know" (Transcript, vol. 43, p. 182). He testified further that he would have expected SOC to have relayed the details of the APU unserviceability to Captain Morwood. I note that Captain Perkins, having been involved with the APU problem throughout the afternoon of March 9, was in the best position to give Captain Morwood a complete and accurate briefing regarding the APU problem. Instead, Captain Morwood had to rely on the limited and somewhat conflicting notations in the aircraft journey log and on a brief telex message from SOC the following morning.

The Role of SOC

As previously mentioned, one of the options available to Air Ontario SOC on the evening of March 9, 1989, was to replace the aircraft C-FONF with another aircraft. In fact, while maintenance grappled with the APU problems, a Convair 580 had already replaced C-FONF on its scheduled morning return flights to Sudbury and its afternoon return flight to Sault Ste Marie. According to Mr Danilo (Dean) Koncan, SOC duty manager working the afternoon and evening of March 9, the same Convair was available to carry on as a replacement for the balance of the day's flying to Winnipeg, but its crew would have exceeded its maximum duty day by the time they reached Dryden and therefore could not have completed the segment. Mr Koncan testified further that he would have had some difficulty in getting two Convair crews – a replacement crew to fly to Winnipeg on the night of March 9, and an additional crew to fly the aircraft back to Toronto the next morning – on short notice at that time.

The F-28 was not replaced for the evening flight to Winnipeg; instead, the decision was made to dispatch the aircraft with the unserviceable APU. Mr Koncan stated that prior to SOC and the flight crew agreeing that C-FONF would be dispatched to Winnipeg, they telephoned the line stations at Sault Ste Marie, Thunder Bay, and Winnipeg to confirm that ground-support equipment was serviceable. Mr Koncan testified that, because he was aware that there was no ground-support equipment at Dryden, he did not call Dryden prior to the dispatch of the aircraft on March 9.

The aircraft left Toronto for Winnipeg via Sault Ste Marie, Thunder Bay, and Dryden. Prior to the aircraft landing at Thunder Bay, Mr Koncan checked the Dryden weather. He explained his reasons for doing this:

> A. Prior to the aircraft landing in Thunder Bay from Sault Ste Marie, we had looked at Dryden weather, pulled up the last eight-hour history on it and alternates down line as far as Winnipeg and Thunder Bay still being the alternate for the last flight, all conditions were good. And based on the fact that as a standard on that particular flight between Thunder Bay and Winnipeg via Dryden, we tankered fuel ... in Thunder Bay.
> Q. By tankering fuel, could you just explain that for the record, please?
> A. Tankering fuel was carrying in excess of what was required so that in Dryden, no fuel uplift was required, based on economics of Thunder Bay being cheaper than Dryden.
> Q. That is, cheaper fuel in Thunder Bay than Dryden?
> A. That is correct ... And based on the passenger count and cargo that it would not exceed the max payload carrying so much fuel.

Q. ... Now, you say you were checking the weather for Dryden. Why?
A. Any indications that we would have any problems as a standard going so far down line to review the operation if there were any operational problems with the weather that we would not be dispatching it to Dryden, we would be overflying it.
Q. And what operational considerations would come into your mind with regard to dispatching to Dryden with no air start?
A. Runway conditions, the weight of the aircraft, adverse weather, the equipment available at Dryden.
Q. ... Did the possibility of having to de-ice in Dryden ever enter your calculations?
A. On that particular flight, no, it did not.

(Transcript, vol. 47, pp. 22–24)

Mr Koncan was asked about the dispatch of the F-28 aircraft under circumstances where there was the possibility of having to de-ice the aircraft. In particular, he was shown an Air Ontario memorandum of September 28, 1988, addressing the subject and asked for his comment on its contents. The document, a memorandum from Mr Robert Mauracher of London maintenance to the reliability committee of Air Ontario, dealt with winter operations generally and with de-icing of the F-28 specifically. A copy of the document was kept in London SOC and had been seen previously by Mr Koncan. Mr Koncan understood the document to be an instruction from Air Ontario management regarding de-icing practices for the F-28 aircraft. On page 3 of the document there is the following warning:

NEVER: Spray while main aircraft engine's are running!!!

(Exhibit 317)

Mr Koncan explained his understanding of F-28 de-icing policy:

A: Engines are to be shut down, as well as APUs are to be shut down while de-icing.
Q: Was there any further instruction given to you about the dispatch of aircraft, F-28s, [with] unserviceable APUs, into line stations where there was no air starts and the possibility of de-icing?
A: No, there was not.

(Transcript, vol. 47, p. 39)

Based on this understanding, Mr Koncan testified that he would not dispatch a jet aircraft with an unserviceable APU into a station where there was no ground-start unit if there was any possibility that the aircraft had to be de-iced.

With regard to the operation of C-FONF on March 10, 1989, Mr Koncan testified about the possibility of repairing the APU during the Winnipeg overnight stop:

> Q: ... Was the repair or maintenance to this APU on C-FONF in Winnipeg ever discussed?
> A: Yes, it was.
> Q: Could you describe that for the Commissioner, please.
> A: The Maintenance Controller had advised us that the trouble-shooting portion of that APU was not completed, they still were looking for the component, and, because of lack of parts, they were going to see if, overnight, maintenance in Winnipeg could repair.
>
> (Transcript, vol. 47, pp. 31–32)

It appears that Mr Koncan was misinformed. Mr Steven Brezden, the Air Ontario aircraft maintenance engineer on duty that evening in Winnipeg, testified that when he noted the APU snag in the aircraft journey log he considered no further action. He explained that "Winnipeg, being a line station and the type of job we were doing, we didn't normally do deferred defects" (Transcript, vol. 46, p. 116). Mr Brezden stated that his work on the F-28 was limited to routine service checks.

Prior to leaving work at 11:30 p.m., Mr Koncan left a note for Mr Martin Kothbauer, duty operations manager on the morning of March 10. This note advised Mr Kothbauer that the aircraft C-FONF was in Winnipeg and that he should confirm with maintenance control that the APU was serviceable. Alternatively, Mr Kothbauer should get in touch with Air Canada station operations control (STOC) in Winnipeg to ensure that an air start and AC ground power for the aircraft were available for the departure on flight 1362 on the morning of March 10.

Events of March 10, 1989

On the morning of March 10, 1989, Mr Daniel Lavery was on duty at Air Ontario SOC as a dispatcher, and Mr David Scully was on duty as a maintenance controller. When Mr Kothbauer reported for work at 5:00 a.m., he looked at the duty operations manager log that contained the note from Mr Koncan written the previous night. Further to these instructions, he asked Mr Scully to telephone Winnipeg to check on the status of the APU of C-FONF. Mr Kothbauer testified that Mr Scully made the call and advised him that the APU would be unserviceable for the balance of the day while Winnipeg maintenance awaited the arrival of a replacement part.

Mr Kothbauer then telephoned the Winnipeg, Thunder Bay, and Sault Ste Marie stations to confirm that they were able to provide air starts for the aircraft throughout the day. He provided further confirmation by sending a message to the same stations via the Reservac computer communications system. The message advised that air starts would be required in Winnipeg, Thunder Bay, and Sault Ste Marie, and that the aircraft would be operating with one engine running at the Dryden station stop. A similar message was sent at 10:57 a.m. for the afternoon operations of the aircraft. That second message read, in part:

> THE R/H ENG WILL AGAIN BE LEFT RUNNING WHILE THE ACFT OPS THRU YHD. IF [YOU] ARE UNABLE TO PROVIDE AIRSTARTS PLS ADVS US ASAP AS WE WILL THEN HAVE TO SET UP HOT-REFUELLING.
>
> (Exhibit 349)[17]

Mr Kothbauer testified that he looked at the Dryden area weather forecasts and, although they called for a risk of light freezing rain, he did not take any special steps regarding the dispatch of the aircraft into Dryden. He was aware of the company procedure not to de-ice the F-28 aircraft if its main engines were running, and he was aware of these de-icing restrictions on March 10 when he was preparing the line stations for C-FONF:

> Q. Did it come into your calculations or considerations that day with regard to the aircraft landing in Dryden?
> A. Not – not really. I was thinking later in the day, by the looks of the weather moving in from the west, that we might have a problem operating through Dryden in the evening, but not that morning.
> Q. You stated that you didn't have a concern, and what concern are you speaking of, the probability of the aircraft having to be de-iced in Dryden?
> A. Yes.
>
> (Transcript, vol. 49, pp. 39–40)

Mr Kothbauer was asked why he assumed that the freezing precipitation would occur later in the day on March 10:

> Q. Why, then, did you assume that this light freezing rain would occur later in the day?
> A. Just by the overall view that I got from the weather system that day.

[17] A copy of the first message was never located by Commission investigators. Mr Kothbauer testified that the second message (Exhibit 349) was similar to the first.

> Q. And your view of the overall weather system, I take it, included some other data than these two area forecasts in front of you?
> A. The first terminal forecast that was issued for Dryden just had light rain in the forecast.[18]
>
> (Transcript, vol. 49, p. 41)

The first terminal weather forecast for Dryden would have been received in London at SOC at about 8:45 a.m. EST. It would not have been available for consideration in the dispatch of flight 1362 out of Winnipeg at 7:35 a.m. CST.

Mr Kothbauer was questioned about the significance of forecasted freezing precipitation at a line station into which an aircraft with an unserviceable APU was operating:

> Q. If, in your opinion, there was freezing precipitation or snow or some other precipitation phenomenon that could have contaminated the wings of an aircraft, what would you do on the dispatch of that aircraft with no serviceable APU through a line station with no air start?
> A. I would have considered overflying that station.
>
> (Transcript, vol. 49, p. 43)

Events at Thunder Bay

Mr Kothbauer was informed by dispatcher Wayne Copeland of the 11:55 a.m. departure of flight 1363 from Thunder Bay Mr Kothbauer then accessed the latest station actual weather observation for Dryden (issued at 11:00 a.m. EST), which indicated VFR weather with scattered cloud at 4000 feet and overcast cloud at an estimated 8000 feet. This station actual observation would have been 55 minutes old by the time the aircraft left Thunder Bay.[19]

Significantly, an amended terminal weather forecast issued at 10:02 a.m. EST called for light freezing rain at Dryden (Exhibit 313, p. 10). Mr Kothbauer did not recall seeing the amended terminal forecast. He testified that this 10:02 a.m. amended weather forecast should have been available to him at the London SOC via the Reservac computer system prior to the departure of C-FONF from Thunder Bay at 11:55 a.m.

Mr Kothbauer was asked what the significance of the amended terminal forecast would have been had he seen it:

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[18] The first terminal weather forecast for Dryden issued at 1330Z (7:30 a.m. CST) did not indicate freezing rain (Exhibit 360).

[19] In fact, the next station actual weather observation at 12:00 EST indicated no significant difference in the observed weather.

Q. ... If you would have had occasion to look at that document, would this amendment including ... light freezing rain ... have influenced your decision one way or the other with regard to the continuation of Flight 363 to Dryden with an unserviceable APU?
A. Yes, sir, it would have.
Q. And what ... conclusion would you have come to?
A. Normally, if it was just an occasional as it is in that terminal forecast, I would at least confer with the captain to see what his thoughts on it were, but I would plan a no-stop or to overfly the station.

(Transcript, vol. 49, p. 75)

Mr Kothbauer acknowledged that there was a breakdown in the Air Ontario SOC weather watch/flight following procedure with regard to the dispatch of aircraft C-FONF on the morning of March 10. He and Captain Morwood should have had the benefit of the amended terminal weather forecast at 10:02 a.m. calling for freezing rain at Dryden. The evidence indicates that, with this information, the flight crew may have and SOC would have taken steps to overfly Dryden. The "overfly option" is discussed at greater length in chapter 23, Operational Control.

The MEL: Use and Approval

The previous section revealed a significant error in the dispatch of the aircraft C-FONF. Given that the APU was unserviceable, the aircraft should not have been dispatched into Dryden, where there were no ground-start facilities – particularly in a situation where freezing rain was in the forecast for the Dryden area. This error, which was acknowledged in evidence by the Air Ontario personnel involved, raised serious questions in my mind regarding the ability of Air Ontario to exercise proper operational control over its scheduled flights and led to a review of the dispatch function at Air Ontario (see chapter 20, F-28 Program: Flight Operations Training). The release of the aircraft from the Toronto maintenance base with an unserviceable APU gave rise to a deeper inquiry into Air Ontario maintenance practices.

The Role of Maintenance in the Commercial Air Transportation System

The Aviation Regulation Directorate of Transport Canada is charged with the responsibility of ensuring that air carriers comply with the Air Regulations and Air Navigation Orders. This responsibility encompasses

both the approval of new air carrier maintenance operations and the ongoing monitoring of existing maintenance functions.

The approval process involves the regulator reviewing the air carrier's maintenance organization, practices, and key personnel as a precondition to the granting of an operating certificate or an amendment to an operating certificate. Among the conditions precedent to the granting of an operating certificate, Transport Canada specifically requires that air carriers satisfactorily show that the director of maintenance and the chief maintenance inspector of the carrier are competent and qualified to carry out their functions. In addition, the regulations require that the regulator satisfy itself that the air carrier has sufficient ground-support equipment, parts, and adequate facilities to provide "the proper maintenance" of its aircraft (ANO Series VII, No. 2, s.12(1)).

An air carrier is required to submit to Transport Canada for approval a maintenance control manual (MCM) that

> shall contain a description of his maintenance system including the maintenance organization, inspection schedule and maintenance personnel responsibilities relating to servicing, rectification, inspection and certification.
>
> (ANO Series VII, No. 2, s.12(1))

Once approved, the MCM is intended to serve as the yardstick against which the maintenance of aircraft by an individual maintenance department is assessed and audited. In this regard the regulations state:

> No air carrier shall release for flight or operate an aeroplane unless that aeroplane has been maintained and released in accordance with the approved *Maintenance Manual* [MCM].
>
> (ANO Series VII, No. 2, s.12(3))

The regulator is able to revoke an air carrier's operating certificate for maintenance practices that contravene its MCM and hence the Air Regulations, but this sanction is extreme and not often used by Transport Canada.

As is the case with the flight operations component within the air transportation system, a strong interface between the regulator and the air carrier is required for the maintenance component to function effectively. The efforts of the carrier and the regulator meet first at the approval or certification stage and then during the ongoing monitoring of the carrier by the regulator.

In the certification stage, the regulator approves (or disapproves) a particular operation on the basis of the carrier's representations in its application for an operating certificate and on that of the regulator's independent evaluation of the carrier's ability to operate safely. This

approval is finalized by the granting of the operating certificate or the amendment of an existing operating certificate to reflect a change in the carrier's operations.

After the granting of the operating certificate, the regulator must ensure compliance with the terms of the approval by way of audits and inspections. In the case of the maintenance organization, the approved MCM is the basis for audit and inspection. Throughout the hearings of this Commission, the evidence confirmed for me that a greater emphasis on regulatory approval and certification will reduce the effort required for post-certification monitoring.

Once approval for an operation has been granted and the operation is under way, the maintenance function within the carrier assumes its responsibility to ensure the airworthiness of the aircraft fleet in accordance with the MCM. Essentially those functions divide into "scheduled" and "unscheduled" maintenance.

Scheduled maintenance consists of major and minor routine checks and overhaul of aircraft components that must be done pursuant to a set schedule prescribed by the aircraft manufacturer. This maintenance represents a benchmark around which the use of the aircraft must be scheduled. The program for the Air Ontario F-28 aircraft was the Fokker "Post Analysis Program" that was approved by Transport Canada.[20]

Unscheduled maintenance encompasses the rectification of defects that result from the day-to-day operation of aircraft. The rectification of these unexpected defects may require taking an aircraft out of service, with the obvious economic consequences. It is understandable that maintenance organizations are often under implicit or explicit pressure to do whatever it takes to get aircraft back into service. This conflict between safety and profitability is addressed directly in the introduction to the Air Ontario Maintenance Control Manual, which reads:

> The standards, practices and procedures as promulgated in this Manual are provided to attain the highest standard of aircraft maintenance in keeping with safety and efficiency. Economic requirements shall not take precedence over safety in the inspection and maintenance function.
>
> (Exhibit 319, p. 1.1)

Unscheduled Maintenance:
Defect Rectification and Maintenance Deferral

Unscheduled maintenance, according to the Air Ontario MCM, falls into two broad categories: defects entered into the aircraft journey logbooks by either flight crew or maintenance personnel, which had to be rectified

[20] Exhibit 319, Air Ontario Maintenance Control Manual, p. 4.18A

prior to the release of the aircraft into service; and defects whose maintenance could properly be deferred.

Maintenance deferrals are exceptions to the general rule that defects must be reported as soon as detected and rectified prior to further flight. Deferred maintenance is (or should be) taken very seriously by the regulator, since it represents regulatory permission for an operator to carry revenue passengers in aircraft that are less than completely serviceable. Maintenance deferrals of essential aircraft equipment are permitted within the Canadian regulatory scheme only if the carrier is in possession of a document known as a minimum equipment list (MEL), which is specific to each aircraft type and which must be approved by Transport Canada.

The subject of MEL approval and use received considerable attention during the course of the hearings, since the evidence disclosed not only that Air Ontario maintenance had incorrectly used the MEL in the deferral of the APU prior to the accident, but also that the F-28 had operated for the first six months of its revenue service without an approved MEL.[21] The evidence on the subject raised several questions:

- Why did it take so long for the MEL to gain Transport Canada approval?
- Bearing in mind that there is no legal requirement for an air carrier to have an approved MEL, should there have been approval of the amendment to the Air Ontario operating certificate to include the F-28 aircraft without an approved MEL in place?
- How effective was Transport Canada in monitoring Air Ontario's F-28 operation during the six-month period when there was no approved MEL in place, and the probability existed that the aircraft was being operated with unserviceable components and perhaps without a valid certificate of airworthiness?
- When the MEL was finally approved, were operational personnel at Air Ontario using it properly?
- Were Air Ontario personnel sufficiently trained on MEL use?

Description

In chapters 22, F-28 Program: Flight Attendant Shoulder Harness, and 34, Operating Rules and Legislation, I review the process behind the

[21] Air Ontario commenced its commercial F-28 service in June 1988 with one aircraft, C-FONF. The sister aircraft, C-FONG, arrived in Canada to begin service in November 1988. The MEL for the Air Ontario F-28 was verbally approved by Transport Canada on an interim basis in December 1988 and formally approved by Transport Canada in June 1989.

certification of aircraft types in Canada and how, after certification or "type approval" by Transport Canada, carriers may operate such type-approved aircraft subject to the Air Navigation Orders.

It has long been recognized by regulatory bodies that modern transport category aircraft are designed and certified with sufficient redundancies in their systems to ensure a margin of safety in their operation. It has also been recognized that, with such redundancies, it is within acceptable bounds of safety for carriers to operate an aircraft with some unserviceable components. If regulators insisted on complete aircraft serviceability prior to each flight, unnecessary groundings would occur, with a resulting loss of income to the carrier. Therefore, out of necessity and common sense, some leeway has been granted to air carriers in the operation of their aircraft with non-essential equipment in less than a completely serviceable state.

The carriers, for obvious reasons, would prefer this departure from complete serviceability to be generous and flexible. The role of the regulator within the air transportation system is to restrict variances from complete aircraft serviceability as narrowly as is necessary to ensure an acceptable level of safety in commercial air carriage.

A minimum equipment list (MEL) is a Transport Canada–approved document that authorizes an air carrier to dispatch an aircraft with specified essential equipment inoperative under the conditions specified therein. A functional definition of the MEL is provided by an internal Transport Canada policy document entitled MMEL/MEL (Master Minimum Equipment List) Policy and Procedures (January 1, 1990):

> The MEL is a joint operations and maintenance document prepared by an operator to:
> a) identify the required essential equipment to maintain the Certificate of Airworthiness in force and to meet the operating rules for the type of operation;
> b) define operational procedures necessary to deal with inoperative equipment; and
> c) define maintenance procedures necessary to maintain the required level of safety and procedures necessary to secure any inoperative equipment.
>
> (Exhibit 962, p. 21)

In order to fly an aircraft with inoperative essential equipment, the air carrier must make certain operational and/or maintenance accommodations that are clearly specified in the approved MEL.

The governing order on MEL approval and use is Air Navigation Order Series II, No. 20, CRCc.-25, *Aircraft Minimum Equipment List Order* (ANO Series II, No. 20). The essence of the order is contained in section 7, which states:

> s.7 No air carrier shall operate an aircraft if any essential aircraft equipment is inoperative unless he does so in compliance with a minimum equipment list.

A slight qualification is provided in section 8 of ANO Series II, No. 20:

> s.8 Notwithstanding section 7, no aircraft shall be operated where, in the opinion of the pilot-in-command, flight safety is or may be compromised.

"Essential aircraft equipment" is defined as:

> ... an item, component or system installed in an aircraft, that
> (a) has a primary role of providing information or performing a function required by regulation or order; or
> (b) is directly related to the airworthiness of the aircraft.
> (ANO Series II, No. 20, s.2[22])

In the absence of an approved MEL, a transport category aircraft cannot operate unless 100 per cent of its essential aircraft equipment is serviceable.

Using the Air Ontario F-28 MEL

An aircraft can operate on a revenue flight only if qualified maintenance personnel release it or "sign it out" as being airworthy. It is then the responsibility of the flight crew to satisfy itself that the maintenance personnel have appropriately addressed the defects noted in the aircraft journey log and either to reject or accept the aircraft for revenue service.

In the case of a defect or unserviceability, such as the problem with the APU, maintenance personnel will read the description of the problem in the journey log and assess whether the defect is one that must be fixed prior to release of the aircraft or one that can be deferred to be fixed at a later time. To determine whether defect rectification can be deferred, the MEL must be consulted.

Compliance with an MEL allows an operator to defer the repair of an aircraft component or system and to fly without all of the essential equipment operative, either to complete a flight segment or until repairs can be made. At the date of the accident on March 10, 1989, there were no specific limits on the length of time that the rectification of a defect

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[22] There was considerable testimony regarding the lack of clarity in the definition of "essential equipment" and the absence of definition of the term "airworthiness." This language of the ANO is discussed below.

could be deferred.[23] Instead, the Aircraft Minimum Equipment List Order puts the onus on the carrier to "establish, obtain approval for and publish internal procedures for making repairs or replacements to equipment specified in the minimum equipment list to ensure that the aircraft does not operate for an unacceptable period of time with specific aircraft equipment inoperative" (ANO Series II, No. 20, s.10).

In the preamble to the Air Ontario Inc. Minimum Equipment List F-28, the matter of persistent or indefinite deferrals was addressed as follows:

> The MEL was never intended to provide for continued operation of the aircraft for an indefinite period with inoperative items. The basic purpose of the MEL is to permit the air carrier to operate an aircraft with inoperative equipment within the framework of a controlled and sound program of repairs and parts replacement. It is important that the operator consider making repairs at the first airport where repairs or replacements may be made, but, in any case, repair should be accomplished at the first opportunity, since additional malfunctions may require the airplane to be taken out of service.
>
> (Exhibit 310, pp. ii–iii)

The most important consideration when using an approved MEL is prudence. To this end maintenance departments are cautioned not to have multiple deferrals; and, when there are deferrals, they should be rectified as soon as possible. Overriding these considerations is the necessity of having personnel who are well trained in the use of the MEL. On this latter point, each of the maintenance personnel involved in the subject deferral of the APU had received the F-28 course given by Piedmont Airlines and were F-28 qualified. Their mistake, described below, was one of misinterpretation of the MEL and not necessarily one of incompetence as aircraft maintenance engineers. I was impressed with the openness with which they acknowledged their oversight; I also took note of the fact that the deferral was done with the assigned flight crew waiting to get the F-28 into service after it had already missed several scheduled departures on March 9, 1989, because of the attempted repairs of the APU.

When interpreting an MEL, maintenance personnel must be aware not only of the function of the aircraft system being deferred but also of any operating restrictions imposed because of the deferral. Even though many individual systems may be deferred separately, there are restric-

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[23] In the wake of the accident, and after considerable evidence had been heard on the deferral of the APU on C-FONF, Transport Canada published its new MMEL/MEL Policy and Procedures Manual (Exhibit 962), which establishes specific limits on the length of time that a maintenance deferral can persist. I find this to be a sensible initiative which, if enforced, should all but eliminate indefinite maintenance deferrals.

tions on the deferral of multiple components and systems that are complementary. The MEL specifies what systems are needed as a minimum to dispatch the aircraft.

The MEL also describes the conditions under which the aircraft may be operated with specific unserviceabilities. Some operating conditions require action by maintenance personnel and are listed as maintenance (M) procedures. Other conditions require action by the pilots and are listed as operational (O) procedures. Not all items of aircraft equipment are included in an MEL. Obviously nonessential equipment such as galley equipment and interior trim are not listed. However, some essential items are also not included, as described in the preamble to the Air Ontario Inc. Minimum Equipment List F-28:

> For the sake of brevity, the MEL does not include obviously required items such as wings, rudders, flaps, engines, landing gear, etc. However, it is important to note that ALL ITEMS WHICH ARE RELATED TO THE AIRWORTHINESS OF THE AIRCRAFT AND NOT INCLUDED ON THE LIST ARE AUTOMATICALLY REQUIRED TO BE OPERATIVE.
>
> (Exhibit 310, p. ii)

What guidance exists that provides a clear definition as to which items are directly related to the airworthiness of the aircraft? This issue is addressed in detail later is this chapter in the section, MEL Approval and Use: Governing Legislation.

Deferring the Repair of the APU

The decision on March 9, 1989, to defer the repair of the APU fire-detection system pursuant to MEL number 49-04 rather than 49-01 was made collectively by aircraft maintenance engineer Kostas Athanasiou, maintenance inspector Steven Korotyszyn, and F-28 check pilot Captain Robert Perkins (see figure 16-3).

Mr Korotyszyn's evidence indicated a certain amount of confusion in his mind as to the operability of the APU, given the problem with the fire-detection system. On March 9 he agreed with Mr Perkins and Mr Athanasiou that 49-04 was the appropriate deferral number, but he advised Captain Perkins not to use the APU.

Figure 16-3 Excerpt from Air Ontario's F-28 MEL

SYSTEM & SEQUENCE NUMBERS	1. ITEM	2. NUMBER INSTALLED	3. NUMBER REQUIRED FOR DISPATCH	4. REMARKS OR EXCEPTIONS
49-01	APU	1	0	*(M)(O)May be inoperative for: (a) Air only, or (b) Electric only, or (c) Both, provided: (1) Inoperative function(s) not required for ground or flight operation, and [M] or [O] (2) If electrically inoperative, automatic bus transfer system is checked prior to each flight and found to be operating normally. (After both engines running, alternately switch generators 1 and 2 off and observe that remaining generator picks up the load.)
...				
49-04	APU Fire Extinguishing System	1	0	*(O) May be inoperative. [O] (1) Use APU for engine start only. (2) Pilot to arrange constant monitoring of APU by ground crew when operating. (3) Shut down APU immediately after engines started. (4) No passengers may be on board while APU operating.

Source: Based on Exhibit 310

Mr Korotyszyn was also concerned that some stations might not have fire pickets available, ground crew who stand by during startup with fire-extinguishing equipment. This would seem to be an operational consideration that would more properly be the responsibility of the captain. Mr Korotyszyn stated in testimony:

> Q. ... Did you obtain some information from Captain Perkins that in fact there may be somewhere along the path where there's no ground start? Did you obtain that information?
> A. I did not.
> Q. Why did you tell him not to use the APU, then?
> A. He may not have been able to get a fire picket at some of the stops.
> Q. Did you tell him that?
> A. I did not.
> Q. Was he supposed to know that?
> A. Well, he would – he would know that, yes.
>
> (Transcript, vol. 42, pp. 51–52)

During the hearings, all three individuals involved in the decision testified that the APU should have been deferred under MEL item 49-01. Mr Athanasiou explained the basis of his error:

> Q: ... In retrospect today ... after viewing the MEL and the entry in the journey log, do you remain of the opinion that 49-04 is the correct entry that the APU should have been deferred under?
> A: No, it's incorrect.
> ...
> The detection system and the extinguishing systems are actually two different systems.
> Now they fall under different ATA[24] chapters or the same ATA chapters but different subsections. So it is actually the wrong deferral, 49-04.
>
> (Transcript, vol. 42, pp. 107–108)

Mr Korotyszyn also acknowledged that, in the absence of any specific MEL provision regarding the APU fire-detection system, the appropriate deferral would have been under the general APU section, 49-01:

> Q. And 49-04 says what under the Item column?
> A. "APU fire extinguishing system."
> Q. It does not say, I take it, "APU fire detection system"?
> A. No, it does not.
> Q. Is there anything in section 49 relating to APU fire detection system?
> A. There is not.
> Q. And the information passed to you by Mr Athanasiou, I take it, was APU ... will not fire test; is that correct?
> A. That is correct.
> Q. And that document is the only document you relied upon that day to make the deferral; is that correct?
> A. Yes, it was.
> Q. And now, in retrospect, you say that 49-04 is not the appropriate item; is that correct?
> A. That is correct.
> Q. And is the reason you say it is not appropriate in that it doesn't say "fire detection system"; is that correct?
> A. That is correct.
>
> (Transcript, vol. 42, pp. 41–42)

[24] The Air Transport Association, which determines technical aircraft standards

It was normal procedure for Air Ontario pilots to operate the APU during every takeoff and landing. This was done because the APU provides electrical power backup in the case of an engine failure. Electrical power is normally provided by two generators that are driven by the main engines. The bus transfer system is designed to transfer all electrical loads automatically to the remaining generator should one generator fail. In the event of a problem with the transfer of electrical load when there is an engine or generator failure, the APU generator would be available as a backup.

When the APU is electronically inoperative or otherwise unserviceable, its maintenance may be deferred pursuant to MEL section 49-01, which requires the pilots to make certain that the bus transfer system is working prior to each flight. An F-28 cannot operate if both the APU and the bus transfer system are unserviceable.

A deferral of the maintenance of the APU fire-extinguishing system pursuant to MEL section 49-04 allows the APU to be used for engine starts only with conditions. This effectively eliminates the use of the APU to provide backup electrical power on takeoff and landing. Apart from the use of the APU on engine startup, a deferral pursuant to MEL section 49-04 renders the APU as inoperable as does a deferral pursuant to section 49-01; yet there is no provision under 49-04 requiring a pre-flight check of the serviceability of the bus transfer system.

Captain Perkins recognized the deficiency in the section 49-04 deferral and, on his own initiative, carried out a check of the automatic bus transfer system, which he referred to as a "cross-tie check." He explained this procedure:

> Q. And you operated the APU as if it was MELed under 49-01?
> A. We operated the APU as if it was not there.
> Q. All right, you did the cross-tie check as if it was MELed under 49-01?
> A. It's mentioned in 49-01, yes.
> Q. And could you tell me, then, again why you did this cross tie-check before every leg of that flight?
> A. Under a normal operation, the APU is considered in a standby mode; in other words, the number 1 engine generator and the number 2 engine generator are providing all the power supply for the aircraft.
>
> In the event that one of those generators or, in fact, one of the engines should stop producing electrical power, then the standby generator, which is attached to the APU, would pick up that load from that failed engine ...
> Q. And indeed, that third generator, sir, is a bit of a safety factor, is it not?
> A. It is. It is a safety factor.
> Q. And it is a safety factor particularly on takeoff?

> A. It's a safety factor at any time that it's on. It's an added buffer.
> (Transcript, vol. 43, pp. 166–67)

The aircraft could have been dispatched out of the Toronto maintenance base under either deferral number. However, the operational limitations facing Captain Morwood were different under 49-01 and under 49-04. A deferral under 49-01 means that the APU can be inoperative as a source of air or electricity or both only if

> (1) inoperative functions of air or electricity or both are not required for ground or flight operations; and
> (2) if electrically inoperative, the bus transfer system is checked prior to each flight and found to be serviceable.
> (Exhibit 310, s.49-01)

Section 49-04 does contemplate APU use under the following stated circumstances:

> (1) Use APU for engine start only.
> (2) Pilot to arrange constant monitoring of APU by ground crew when operating.
> (3) Shut down APU immediately after engines started.
> (4) No passengers may be on board while APU operating.
> (Exhibit 310, s.49-04)

Finally, to complete the deferral after the journey log entry was made, an "INOP" placard was stuck to the APU panel in the cockpit. An INOP placard is used by maintenance to ensure that the pilots or other maintenance personnel do not activate the affected system without checking the journey log for a description of the snag.

The INOP placard would have directed Captain Morwood to the aircraft journey log, where he would have noted the snag and the deferral via MEL item 49-04. On reading the journey log he may have discovered the inconsistency between the description of the snag ("will not fire test") and the deferral number ("Fire Extinguishing System"). How he would have reacted to this inconsistency is uncertain. It is possible he would have appreciated that the deferral was incorrect and favoured the instructions provided by 49-01 that the APU was not to be used except in the very limited circumstances described. What is known is that he did not contact SOC or maintenance to seek clarification. Further, he made no attempt at any time to use the APU. I am of the view that this latter point is most determinative of his state of mind. Had he considered that the APU was operable under the conditions described in 49-04, he would have had good reason to use the APU during the fuelling in Dryden and for de-icing if needed. Any thoughts Captain Morwood may have had that the APU was inoperable may have

originated or at least been reinforced by the SOC instruction that the APU was unserviceable and that the right engine was to remain running through Dryden.

Findings

After reviewing all of this evidence, I am left with the following conclusions:

- After a protracted approval procedure during which both Air Ontario and Transport Canada supposedly examined the MEL line by line, the resulting MEL was nevertheless misunderstood and misused by two experienced maintenance engineers and an experienced airline captain.

- Two further implications are suggested by the misuse of the MEL:

  First, prudent practice would dictate that aircraft C-FONF should not have been repeatedly dispatched out of the maintenance base with the APU unserviceable.

  Second, SOC personnel should have understood (a) that there would be no rectification of the defect until the aircraft returned to Toronto, and (b) that they should have planned to cancel all operations into Dryden until the APU was operational.

I will now examine the MEL approval process, which, as it turned out, was one of the most disconcerting aspects of this investigation.

MEL Approval

In its application to include the F-28 on its operating certificate, Air Ontario represented to Transport Canada that an MEL would be in place prior to the F-28 commencing revenue service. One such representation is the following:

> Prior to the assignment of the F-28 type to Revenue Service, each Operations Officer will receive a conversion course to familiarize him/her with the F-28 with emphasis on flight planning, performance, and minimum equipment list requirements.
>
> (Air Ontario Application To Amend Operating Certificate To Include F-28 Aircraft (Jan. 24, 1988), Exhibit 855, p. 41)

The amendment to the Air Ontario operating certificate was granted as of June 1988, immediately prior to the commencement of its F-28 commercial service. The F-28 was operated commercially without an approved MEL until December 1988.

An approved MEL is at present not a requirement in Canada for transport category jet operations; however, without an approved MEL,

an aircraft must be operated with 100 per cent of its essential equipment serviceable. If an air carrier does not have an approved MEL, and it operates an aircraft with unrectified defects in essential equipment, then the carrier, the aircraft maintenance engineer (AME) who released the aircraft, and the pilot who accepted the aircraft are in breach of the law. In such a situation, the carrier's operating certificate and the licences of the pilot and the AME are at risk of revocation.

The Air Ontario F-28, C-FONF, was an older aircraft[25] that had been mothballed in Turkey for two years prior to its importation to Canada. The aircraft was part of a new service that Air Ontario management – which was under some competitive marketing pressure – was intent to put in place as soon as possible. Transport Canada officials knew or ought to have been aware of these facts.

The continued commercial operation of the F-28 without any defects in its essential equipment was for all practical purposes impossible. It should have been similarly obvious that there would be a great temptation on the part of the carrier to keep the aircraft flying in spite of such inevitable unserviceabilities – even if that meant deferring the maintenance of the unserviceabilities in the absence of an approved MEL. The evidence revealed that such deferrals did indeed occur in the Air Ontario F-28 operation.

I am of the view that, from a practical flight safety perspective, the amendment to the operating certificate permitting F-28 operations should never have been granted without an approved F-28 MEL in place. In this regard, as in other instances, I found the explanation of Transport Canada and Air Ontario witnesses that it was "legal" to operate without an MEL to be entirely unsatisfactory. If an air carrier operation is not as safe and sound as the experience of an individual carrier or regulator would indicate that it should have been, then, in recognition of the duty owed to the travelling public, it is unacceptable for either the carrier or the regulator to justify its own inaction by relying upon a characterization of such an operation as "legal."[26]

The Role of the Regulator in Approving the MEL

A typical MEL approval requires the carrier to prepare an MEL for its particular operation, referencing the master minimum equipment list (MMEL) prepared by the aircraft manufacturer. The air carrier MEL

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[25] Aircraft C-FONF was manufactured and delivered by Fokker to its first owner, THY, in January 1973.

[26] It is significant that these deferrals, in the absence of an approved MEL, would not have occurred within the parent company, Air Canada. Approved aircraft MELs are always in place at Air Canada prior to the approval of operating certificate amendments authorizing commercial service.

must at least comply with the minimum standards set out in the MMEL and be "tailored to the carrier's specific operating environment."[27]

The MMEL is approved by Transport Canada during the aircraft type certification process. The MMEL serves essentially the same function as the MEL, representing what the manufacturer considers to be a level of aircraft systems serviceability required to maintain a necessary standard of airworthiness. Because the MMEL represents the standard against which all carrier MELs will be compared, the MMEL is scrutinized with great care by Transport Canada before its approval is granted.

Transport Canada's MMEL/MEL Policy and Procedures Manual provides the following explanation regarding the prohibition against carrier use of the MMEL:

> While the MMEL is for an aircraft type the MEL is tailored to the carrier's specific operating environment and may be dependent upon the route structure, the geographic location, and number of airports where spares and maintenance capability are available etc. It is for this reason that a MMEL cannot be approved for use as a MEL by an air carrier.
>
> (Exhibit 962, p. 21)

As described by Mr Martin Brayman of Transport Canada's Ontario Region, once the air carrier completes the MEL in the prescribed form, two copies are then submitted to Transport Canada, where it is reviewed by airworthiness personnel, who review the maintenance aspects of the MEL, and air carrier personnel, who review the flight operations components. In addition, some input is provided from passenger safety personnel.

In the case of the approval of the Air Ontario F-28 MEL, Mr Brayman was the principal air carrier inspector from Ontario Region who was involved in the approval process. The Air Ontario F-28 MEL was first submitted for approval on February 3, 1988, by Captain Robert Nyman, Air Ontario's director of flight operations. Within Ontario Region, the MEL was reviewed by Mr Brayman and Mr Ole Nielsen of the Airworthiness Branch. Shortly after the initial submission, the document was returned and Air Ontario was informed that the MEL had to be amended to conform with the required form. On September 15, 1988, more than seven months later, Air Ontario submitted a second draft of the proposed MEL to Transport Canada's Ontario Region. By this time, Ms Jacqueline Brederlow, the passenger safety superintendent, Mr Randy

[27] ANO Series II, No. 20, section 5, and Exhibit 962, Transport Canada MMEL/MEL Policy and Procedures Manual, January 1, 1990

Pitcher of the Air Carrier Branch, and Mr Alexander Brytak, an inspector in the London office of Ontario Region, became involved in the process.

On December 13, 1988, after Ontario Region and Air Ontario eventually agreed on its form and content, the MEL was forwarded to Transport Canada headquarters for final approval. At headquarters, Mr Ian Umbach and Mr William MacInnis reviewed the document. Shortly thereafter, Captain Nyman of Air Ontario and Captain Joseph Deluce received a verbal "interim" approval of the F-28 MEL from Mr Pitcher. Captain Deluce then issued a memorandum dated December 19, 1988, to Air Ontario F-28 pilots advising that the F-28 MEL had received interim approval and that MEL manuals had been placed on board the two aircraft.

The precise status of the interim approval was unclear from the evidence. Captain Nyman testified that, in December 1988, on the request of Captain Joseph Deluce, he took steps to amend an earlier draft of the MEL to satisfy the concerns of Mr Brytak of Transport Canada. While this amendment process was continuing, Mr Pitcher telephoned to indicate that the earlier draft of the MEL was approved. This incongruous situation of one Transport Canada employee requesting changes to the MEL while another Transport Canada employee provided interim approval was apparently of no concern to Captain Nyman and Captain Deluce. After many months of waiting, they understandably seized upon Mr Pitcher's "interim approval" and, without question or criticism, took immediate steps to place the MEL in their two F-28s for the use of their crews.

Formal approval of the MEL came in the form of a teletype message dated June 9, 1989, sent from Mr Umbach, via Mr B. MacLellan of Air Carrier Operations in Ottawa, to Transport Canada's Ontario Region. A copy of the message was sent to Mr James Morrison, Air Ontario's vice-president of flight operations.

The original MEL was submitted to Transport Canada in February 1988. More than ten months later, after at least seven individuals within Transport Canada had an opportunity to review and comment on the document, Air Ontario had "verbal interim approval" to use the MEL and, in June 1989, one-and-a-half years after the process started, Transport Canada issued formal approval for the document.

In the same month that the MEL was formally approved, Air Ontario discontinued its F-28 program. Air Ontario F-28 pilots had been deferring the maintenance of essential aircraft equipment in the absence of an approved MEL since June 1988, in apparent contravention of ANO Series II, No. 20.

I calculate approximately seven months of the delay – from February to September 1988 – to be primarily attributable to Air Ontario; and nine months of the delay – from September to the December "interim

approval" and from December 1988 to the June 1989 formal approval – to be primarily attributable to Transport Canada. I wish first to discuss the delay I assign to Transport Canada – particularly the period from September to December 1988, and then go on to look at Air Ontario's role in the preparation and approval of the MEL.

Mr Brayman provided the following explanation for the delay in the approval process:

> Q. Now, can you tell us why it would have taken so long, 10 months, to have an MEL approved for the F-28?
>
> A. There were two reasons. One, the original copies of the MEL as submitted by the company were unacceptable, and I can't speak for airworthiness, but I remember at the time speaking to Mr Nielsen about it several times. He had returned his copy of the MEL to the company with a specific request to change the format, and I gather the revised copy was a long time in coming back.
>
> I also believe that at that time, the responsibility for monitoring the company had been transferred from the Ontario regional office of airworthiness to the London office, and I think that the inspector down there, his name was Alex Brytak, I think he took over responsibility for ensuring the company produced a working MEL.
>
> We also had a major problem in headquarters ... I believe they had two different inspectors working on the MEL program. One was a gentleman called McInnis, and I do believe that he was so overloaded that at one time, he probably had 20 such documents sitting on his desk.
>
> An MEL is a very technical document and requires a great deal of checking. You have to go through it word for word, clause by clause, and I don't believe that there were sufficient bodies available to do the job that was needed.
>
> Q. Was there any pressure at your level from region to expedite the approval process of the MELs?
>
> A. Well, there was a considerable pressure from operations at Air Ontario. This is an ongoing process. And I'm sure Mr Nyman was on the phone numerous times asking me, you know, what was happening with the MEL.
>
> But we could only refer him to his own maintenance department, who were partly responsible, and basically tell him we would follow up and see what we could get for him. We weren't very successful a lot of times.
>
> Q. In attempting to assist Mr Nyman?
>
> A. In attempting to get these documents pushed through so they were approved.
>
> (Transcript, vol. 131, pp. 131–32)

With great respect to Mr Brayman, whom I found to be a forthright and credible witness, I am not at all persuaded by the reasons offered for the delay. It seems to me that the problem was not simply one of "overloading" any one individual, but was also one of an unnecessarily complicated and bureaucratic approval process.[28] Mr Brayman described some seven individuals in three Transport Canada offices who were involved, communicating with each other and the carrier via written memoranda and correspondence.

I have reviewed the F-28 MEL, the MMEL, and the Aircraft Minimum Equipment List Order, and I do not believe I am being overly simplistic in saying that the entire approval process could have been finalized in the course of a single constructive meeting among an airworthiness and air carrier representative from Transport Canada and a flight operations and maintenance representative from Air Ontario. I heard the evidence of Messrs Brayman, Nielsen, Nyman, and Kenneth Bittle and I feel confident in saying that, if Air Ontario had put forth an honest effort in producing a reasonable first draft of the document, these four gentlemen could have effected its approval to everyone's satisfaction in a much shorter period of time.

The process simply should not be so complicated. Transport Canada correctly devotes much time and effort to the approval of the MMEL. Once this MMEL standard is accepted by the regulator, then the process of MEL preparation and review should be straightforward.

The MEL should be "tailored to the carrier's specific operating environment," but how idiosyncratic can such operating environments be? Air Ontario's proposed deployment of the F-28 was modest, operating initially from Toronto to Sault Ste Marie, Thunder Bay, Dryden, and Winnipeg, with Toronto representing the main maintenance base and Winnipeg providing routine line maintenance. Any peculiar accommodations for such line operations should have been narrow and easily identified.

What is particularly galling is that, in spite of this protracted process of review and amendment, the approved MEL was significantly deficient. The APU deferral sections 49-01 and 49-04 were inconsistent with each other and they contained no restriction on line operations into stations without ground-start facilities using an aircraft with an unserviceable APU.

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[28] Transport Canada MMEL/MEL Policy and Procedures Manual, Exhibit 962

Transport Canada's MEL Approval Policy: Recent Developments

Since Commission investigators made their first inquiries about the deficiencies in the approval and use of the Air Ontario F-28 MEL, Transport Canada has published its MMEL/MEL Policy and Procedures Manual. I would like to express my support for three significant initiatives in this new policy document, which, I believe, will improve MEL approval and use.

First, a time limitation has been placed on deferrals through a program of amending approved MMELs such that maintenance deferrals are categorized according to set schedules of required defect rectification. Air carriers have 120 days to amend their own MELs to conform with the MMEL containing the new categorized repair limits. This program would eliminate the practice of indefinitely deferring the maintenance of certain items, which was discouraged but not prohibited by the former policy. I commend this initiative, and I hope that the program proceeds to a prompt conclusion.

Further, I note that the new Transport Canada MEL policy manual specifically prohibits "interim approvals" while the MEL is undergoing the review process. The confusion surrounding the verbal interim approval of the Air Ontario F-28 MEL supports the idea that an "interim approval" is really no approval at all. The regulator must satisfy itself that the MEL is acceptable, and then promptly issue a formal approval and authorization of use. This view was supported by Mr William Slaughter, director of flight standards at Transport Canada headquarters, who agreed that the verbal approval of MELs is unacceptable and has now been discontinued.

Another commendable aspect of the initiative is the delegation to regional managers of the responsibility and authority to approve MELs within their jurisdiction. In so doing, Transport Canada headquarters is removed from the decision-making process. In the case of Air Ontario's F-28, the additional step of sending the MEL to Mr Umbach would have been avoided under the new policy.

While this streamlining of the approval process is certainly a positive step, I am perplexed that Transport Canada still insists upon a review process involving so many people. Under the new policy, when the MEL is received from the air carrier, the regional manager of air carrier operations forms an MEL Review Group to assess the proposed MEL and work with the carrier until the group is able to recommend to the regional manager that the MEL be approved. The MEL Review Group is to consist of:

- a chairman who is the principal air carrier inspector for the carrier;

- the lead air carrier inspector on type;
- the principal airworthiness inspector for the carrier;
- the lead airworthiness inspector on type (if required);
- a passenger safety inspector (if required);
- a regional MEL coordinator (if required); and
- a regional airworthiness avionics inspector operators [sic].

(Based on Exhibit 962, app. E)

There are therefore anywhere from four to seven people involved at the regional level in the review of the MEL. By way of explanation the policy states that "[t]he purpose of forming such a group is two-fold. Firstly, authority; secondly, proper coordination between Airworthiness and Operations is formalized to ensure approvals can be achieved in a timely manner" (Exhibit 962, app. E).

To reiterate my earlier comment, it seems to me that the process should be fairly straightforward. The carefully approved MMEL should be the starting point, against which the carrier MEL deviates only to the extent that the carrier and the regulator seek to make operational and maintenance limitations more restrictive to reflect idiosyncrasies in the carrier's operation. On the regulatory side, I do not believe that MEL approval requires the involvement of more than one individual each from air carrier and airworthiness who are familiar with the particular aircraft type.

Throughout these hearings I heard much disturbing evidence regarding the lack of resources available within Transport Canada during a period of economic deregulation of the airline industry. For the reasons elaborated upon below, there were undoubtedly resourcing problems within some areas of Transport Canada. In the present case, however, I am firmly of the view that staffing problems were not the root cause of delays in the MEL approval process; rather, the delays were attributable to an unnecessary duplication of effort. Why have eight people reviewing each other's work when two competent individuals can do the job?

Air Ontario's Role in the Preparation and Approval of the MEL

I will now deal with Air Ontario's involvement in the MEL preparation and approval. More specifically, I am concerned with the actions of Air Ontario management prior to the February 1988 submission of the first-draft MEL to Transport Canada and during the months from February to September 1988 when the rejected first draft was back in its hands.

Air Ontario management recognized that it would require an MEL for the F-28 in order to operate its aircraft efficiently and effectively. Accordingly, the initial plan was to have a Transport Canada–approved

MEL in place before the F-28 aircraft was put into service. This was documented by the Air Ontario Inc. F-28 Project Plan 1987, which stated:

> The Vice President of Maintenance and the Director of Flight Operations would develop workable MEL for our environment and obtain MOT approval. Fokker's, Piedmont's Norcan Air's and Quebecair's MELs will be used as reference.
>
> (Exhibit 799, p. 3)

According to the original October 1987 Project Plan, the MEL was to be developed and approved by the final week of March 1988. In the Revised Project Plan of December 28, 1987, the projected completion of the development and approval of the MEL was advanced four weeks to February 29, 1988.[29]

Captain Robert Nyman was director of flight operations during this period and, as such, had co-responsibility with the vice-president of maintenance, Mr Kenneth Bittle, for production and approval of an MEL. By correspondence dated February 3, 1988, Captain Nyman submitted the first draft MEL for approval to Transport Canada. Mr Brayman testified that this first document was immediately sent back to Air Ontario for rewriting because it was unacceptable (Transcript, vol. 131, p. 131).

Captain Nyman, while acknowledging responsibility for production of the F-28 MEL, stated that he delegated the task to Captain Joseph Deluce. Captain Nyman provided no clear reason why there was such a delay in the production of the second draft of the MEL (Transcript, vol. 107, p. 199). He testified that, having delegated the task of producing the MEL to Captain Deluce, he did not monitor the progress regularly. His recollection of the events surrounding the MEL approval was vague:

> Q. So you knew that ... operating the aircraft without an MEL would be a problem, and it was a full year from the striking of the implementation plan to the approval of the MEL –
> A. Yeah.
> Q. – and, yet, you recall no specific steps taken to monitor the progress of the MEL ... [I]s there an explanation for that?
> A. ... I do not recall personally taking specific steps. There was during that time, of course, the pilot strike, during which – I think it was for a couple of months. That certainly would have occupied much of my time and much of Joe Deluce's time also.

[29] Exhibit 802, Air Ontario Inc. Revised F-28 Project Plan, p. 104 (December 28, 1987)

> I'm not sure what progress maintenance may have been making on the MEL during that period. I really can't say.
> (Transcript, vol. 107, p. 200)

Captain Nyman acknowledged that, although the plan was to have an MEL in place prior to commencing F-28 service, Air Ontario was "a little bit optimistic" in its projections (Transcript, vol. 107, p. 201).

Captain Deluce's evidence on his involvement with the production of the MEL was equally unclear and seemingly not forthright. He acknowledged that, as F-28 chief pilot, he was concerned with the timely production of F-28 standard operating procedures and the F-28 MEL (see chapter 19, F-28 Program: Flight Operations Manuals). He provided the following explanation: "I pursued the MEL and the standard operating procedure in the best manner that I could" (Transcript, vol. 111, p. 183). Captain Deluce also pointed out that he officially became the F-28 chief pilot in December 1988, the same month that the MEL was verbally approved on an interim basis. He seemed to be suggesting that he believed he had no responsibility over the MEL until he officially became F-28 chief pilot. This would contradict the evidence of Captain Nyman that the matter had been delegated to Captain Deluce; and it would also contradict Captain Deluce's own correspondence as the "F-28 Project Manager" to Mr Brayman dated September 15, 1988, wherein he enclosed the second draft MEL for approval (*Exhibit 818*). In any event, Captain Deluce did not provide any satisfactory explanation as to why the draft MEL remained at Air Ontario from February until September 1988.

Mr James Morrison took over as vice-president of flight operations in July 1988. He testified that, within weeks of his arrival at Air Ontario, Captain Nyman advised him that the F-28 had no approved MEL and that a revised draft was in the hands of Transport Canada. Mr Morrison stated that he did nothing to follow up on the status of the F-28 MEL, though he was aware that Air Ontario's two F-28 aircraft were operating without an MEL until the verbal interim approval came in December 1988 (Transcript, vol. 115, pp. 110–11).

Mr Bittle testified that, in early March 1988, he delegated to Mr Teoman Ozdener, the Air Ontario F-28 maintenance manager, the responsibility of working with flight operations to produce an MEL (Transcript, vol. 103, pp. 134–41). Mr Ozdener testified that he attended at Norcan Air/TimeAir on March 29–30, 1988, to observe their facilities. He was advised by personnel at that airline that their MEL was being approved by Transport Canada and that, when approval was obtained, they would forward a copy of the MEL to Air Ontario for reference. Mr Ozdener advised Mr Bittle that they would be in receipt of the Norcan

Air MEL by the end of April 1988.[30] Mr Ozdener testified that as of June 1988, Captain Robert Murray of Air Ontario asked him for assistance in the "finalization" of the MEL. Mr Ozdener stated that Captain Murray had rewritten the February 1, 1988, version of the MEL, which was "no good," to produce a second draft dated May 14, 1988. Mr Ozdener, with the assistance of Mr Murray Keith of Transport Aérien Transrégional (who was in London, Ontario, to assist with the importation of C-FONF), prepared their maintenance-related restrictions on the MEL. Mr Ozdener had no further evidence on the status of the MEL other than his best recollection that, based on "second-hand information," he understood that verbal approval of the MEL was achieved in late October or early November 1988 (Transcript, vol. 101, pp. 86–87).

These five individuals within the Air Ontario flight operations and maintenance departments – Messrs Nyman, Deluce, Morrison, Bittle, and Ozdener – had varying degrees of responsibility for the timely completion of the MEL. Their evidence on the subject was vague and somewhat contradictory.

Findings

After considering all the evidence on the subject, I make the following findings:

- The F-28 project plans of October and December 1987 identified the director of flight operations, Captain Robert Nyman, and the vice-president of maintenance, Mr Kenneth Bittle, as being responsible for the production of the F-28 MEL.

- Captain Nyman delegated the flight operations component of the MEL to Captain Joseph Deluce. Mr Bittle, as of March 1988, delegated the maintenance component of the MEL to Mr Teoman Ozdener.

- A first draft MEL was submitted by Captain Nyman to Transport Canada in February 1988 and was found to be unacceptable.

- In June 1988, on the eve of the introduction of the F-28 into commercial service, Captain Robert Murray, with the assistance of Mr Ozdener and Mr Murray Keith of TAT, rewrote the February MEL to produce a second draft of the document.

- Mr Morrison became the vice-president of flight operations in July 1988 and was advised by Captain Nyman that the second draft of the

[30] Transcript, vol. 101, p. 68. See also Exhibit 817, Report of Mr Teoman Ozdener re: trip to Norcan Air/TimeAir March 29–30, 1988.

MEL was in the hands of Transport Canada. In fact it was not until September 15, 1988, that Captain Joseph Deluce, as the F-28 project manager, submitted the second draft of the document to Transport Canada.

- Witnesses Nyman, Deluce, Morrison, Bittle, and Ozdener were questioned at length on the subject, yet no one could offer an explanation for the delay between the rejection of the first-draft MEL in February 1988 and the increased activity of Captain Murray and Mr Ozdener in June 1988. Similarly, no explanation was offered for the delay following the rewrite by Captain Murray and Mr Ozdener and the submission of the second-draft MEL to Transport Canada in September 1988.

- I am left with the conclusion that the timely production of the F-28 MEL was simply one of many items that were neglected in the F-28 implementation plan. In spite of Captain Deluce's claim that he pursued the MEL in the "best manner" he was able, I am of the view that, as F-28 project manager, he bears a large measure of responsibility for the delay.

- Further, as Captain Nyman and Messrs Morrison and Bittle were the senior managers in the flight operations and maintenance departments, they knew or ought to have known that maintenance deferrals on their F-28 aircraft were occurring between June and December 1988 in apparent violation of ANO Series II, No. 20. Each of these individuals should have independently taken whatever steps were necessary to ensure that
  - the MEL was prepared in a timely manner; and
  - there were no deferrals of the maintenance of essential aircraft equipment in the absence of an approved MEL.

An Alternative Approach: Air Canada Procedures

Among all the evidence I heard regarding the operational procedures of the parent company, Air Canada, there were two practices that are particularly germane to this discussion on the APU and the MEL:

Air Canada Practice: Operating with an Unserviceable APU
Captain Charles Simpson, Air Canada vice-president of flight operations, testified that it is the policy of his company that an aircraft with an inoperative APU will not be dispatched to a station where ground-start equipment is not available. This restriction is clearly described in the sections dealing with APU unserviceability in each individual aircraft MEL.

Air Canada Practice: Operating without an Approved MEL

Captain Simpson testified further that Air Canada would never operate a transport jet aircraft in commercial service without an approved MEL. The MEL is submitted by Air Canada to Transport Canada for approval at the same time that Air Canada applies for approval of a new aircraft type within its operations. Captain Simpson provided the following evidence on the importance of the MEL to Air Canada's operations:

> Q. Sir, why is it important for an airline to have an MEL at the time an aircraft is put into operation? Why is that important?
> A. Well, in order to be able to operate the airplane, you from time to time will have some minor deviations on it where you may want to move the airplane back to a main station to get it fixed. It may be something of an insignificant nature, but without any document that allows you to do it, you're not allowed to operate the airplane.
>
> So it's a straight case of – and, as far as the pilot is concerned, both pilots and maintenance personnel need some guidance, so this is the document by which they can look at their airplane and decide if it can be dispatched in that condition.
>
> For example, you might ... have a problem with the reverse mechanism on an engine. It's not required, it's not part of the certification, but to operate the airplane, there are certain things that have to be checked.
>
> So you go to the MEL list. It says what maintenance have to do. It says what operations have to do. And then the airplane may be moved.
> Q. To the best of your knowledge, sir, has Air Canada ever operated an aircraft in revenue service without an approved MEL?
> A. Not to the best of my knowledge.
> ...
> Q. Captain, with your background and knowledge and experience, how would you view the operation of a new aircraft for six months with no MEL?
> A. Well –
> Q. When I say the operation, I'm talking revenue operation.
> A. Yeah. Well, I would be surprised that Transport Canada would allow that to go on, as the regulatory authority.
> Q. Would you permit that as a senior officer ... of your airline?
> A. No. We would not accept that, as an airline.
>
> (Transcript, vol. 118, pp. 112–13, 116–17)

The evidence is that Air Canada had no involvement with the production of the proposed F-28 MEL first submitted for approval by

Air Ontario. Given the experience that Air Canada has in the production of MELs for transport category jet aircraft, any assistance to its regional feeder would certainly have expedited the process. In particular, to the extent that the first draft was as deficient as was represented by Mr Brayman and Mr Ozdener, some Air Canada assistance would have helped enormously in producing a document that would have been acceptable to Transport Canada. Further, Air Canada assistance in the drafting of the MEL would, in all probability, have included the standard Air Canada operational restriction on deferred APU maintenance: that aircraft with unserviceable APUs are not to be operated into stations without ground-start facilities.

MEL Use and Approval: Governing Legislation

ANO Series II, No. 20, prohibits the operation of an aircraft if any "essential aircraft equipment" is inoperative unless such operation is in compliance with an approved MEL. In reviewing the deferral practices of Air Ontario, I was struck by the confusion and uncertainty among commercial pilots and Transport Canada air carrier inspectors regarding the interpretation of "essential equipment." Such confusion is not surprising when the regulatory definitions are considered.

Essential aircraft equipment is defined as:

> an item, component or system installed in an aircraft, that
> (a) has a primary role of providing information or performing a function required by regulation or order; or
> (b) is directly related to the airworthiness of the aircraft.
>
> (ANO Series II, No. 20, s.2)

Although "airworthiness" is not defined, "airworthy" is defined in the Air Regulations as "in a fit and safe state for flight and in conformity with the applicable standards of airworthiness" (Air Regulations, s.101(1)).

These are the only definitions found in the *Aeronautics Act*, the Air Regulations, or the Air Navigation Orders that have any bearing on the term "essential aircraft equipment." The evidence revealed that these definitions are of little practical assistance to pilots and aircraft maintenance engineers in their consideration of maintenance deferrals. In the absence of an approved MEL, which, in effect, describes what is essential aircraft equipment for the purposes of that aircraft type, most of the pilots who testified had difficulty describing what they considered essential equipment.

Mr Randy Pitcher, Transport Canada's air carrier inspector assigned to Air Ontario, provided the following evidence on "essential aircraft equipment":

A. As a matter of fact, Mr Commissioner, my interpretation is that any component that was required for certification in terms of interior, in the cockpit, be it an instrument, a light bulb, et cetera, must be serviceable at all times if the aircraft is to be operated, whether it's private or commercial.
Q. And where did you get this understanding of essential aircraft equipment?
A. I practised it, when I was an operating pilot.

(Transcript, vol. 127, p. 102)

Mr Ole Nielsen, Transport Canada's principal airworthiness inspector who assisted in the importation of Air Ontario's F-28 aircraft, explained the difficulty in working with the term "essential aircraft equipment":

Q. ... How does the guy on the shop floor know what is essential equipment in the absence of an MEL?
A. Very difficult. As a matter of fact, in certain cases, it's quite possibly impossible to tell for the AME on the floor.

If you look at the definition of "essential," depending on whose definition you use, our definition within airworthiness will be that it is that equipment called up by the type approval for the product as being essential for flight, and also, those regulatory statutes that require operation of certain equipment, such as a third horizon in turbo jet aircraft and the installation of lavatory smoke detectors and that sort of thing. Those are all essential for flight.

But the primary one that is hard to assess for the AME is the certification basis of the airplane, because ... all the essential equipment is called up in the certification basis, either CAR 4(b) or FAR 25.[31]

(Transcript, vol. 129, pp. 194–95)

An example of the Air Ontario F-28 operating with unserviceable "essential aircraft equipment" concerned the master warning light. This component is located on the instrument panel within the pilot's area of primary scan. When illuminated, it alerts the pilot that a warning light on the enunciator has been activated. The pilot would then reset the master warning light and look to the enunciator panel located down and to the side for more specific information about the problem. It was universally agreed among the experienced pilots who appeared before me that the master warning light fell within the definition of "essential aircraft equipment." In other words, even with the approved Air Ontario

[31] Aircraft certification is discussed in chapter 22, F-28 Program: Flight Attendant Shoulder Harness.

F-28 MEL in place, an unserviceable master warning light requires the aircraft to be grounded. Nevertheless, it became clear from the evidence that on April 5, 1989, Captain Robert Perkins operated the F-28 on a revenue flight from Winnipeg to Toronto without a serviceable master warning light. When questioned about this, Captain Perkins gave the following evidence:

> Q. ... you have said that, but in fact, if there was a problem, you have also told us that the first thing that would alert you to the problem likely would be the master warning light, is that right? That is the first thing that would warn you?
> A. Under normal condition, yes.
> Q. Right. You have also testified that you would want to know as soon as possible that you had a problem, right?
> A. That's correct, yes.
> Q. Correct, and you have also told us that the enunciator panel does not fit within your normal scan when you are in clouds?
> A. That's correct.
> Q. So I don't understand how you can say that the absence of a functioning master warning light does not affect the airworthiness of the aircraft.
> A. I'm saying today that as far as I'm concerned, it does.
> Q. Fair enough.
> A. Yes.
> Q. How could you understand it otherwise a year ago?
> A. That is a very good question. I don't have an answer for it.
> Q. When were you made a line check pilot? When was that?
> A. February of '88.
> Q. So you would be operating as a line check pilot with this misapprehension about the importance of the master warning light, is that right?
> A. I guess that's correct, sir.
>
> (Transcript, vol. 44, pp. 105–106)

This improper deferral came to the attention of Mr Morrison. The ensuing investigation by Mr Morrison prompted Captain Joseph Deluce to write a memorandum of April 25, 1989, to Mr Morrison defending Captain Perkins's decision on the basis that Captain Perkins was "comfortable with the warnings that were available" and "comfortable with maintenance decision to defer this item as he did not consider it an airworthiness item" (Exhibit 337). Captain Deluce went on "with hindsight" to question whether the item should have been deferred. He further undertook "to get a better interpretation from Transport Canada on what and how items can be deferred and when they cannot."

In the face of testimony of numerous experienced pilots that the master warning light is clearly an airworthiness item, I find it particular-

ly disturbing that an F-28 line check pilot, the F-28 chief pilot, and maintenance personnel at Air Ontario were all confused about the fundamental issue of what unserviceabilities legally necessitate the cancellation of a flight.

In this context I was not surprised to learn that there may have been confusion in Captain Morwood's mind about what constituted a "no go item." Flight attendant Sonia Hartwick gave a sworn declaration to this Commission (Exhibit 742) in which she said that on the morning of March 10, 1989, she and her colleague, Mrs Katherine Say, conducted a preflight check of the cabin emergency equipment on board C-FONF. Among others, the following defect was found:

> Katherine Say then proceeded to switch on the switch of the emergency lights and then we proceeded to check the emergency exit lights over the main entry door of the aircraft and the cabin entry door (passenger side). The emergency exit lights over both these doors were not working.

In her sworn statement, Mrs Hartwick also attested:

> Katherine Say then switched the emergency light switch back to the normal position and proceed to the flight deck. I followed her.
>
> Katherine Say informed Captain Morwood of the emergency exit lights which were not working, that there were three missing altitude compensating oxygen masks, and that there was two-way tape on the handle of the main entry door. I overheard Katherine Say mention these matters to Captain Morwood.
>
> Captain Morwood was not visibly impressed, and said words to the following effect "Oh God more snags." At this time, Captain Morwood reached for a book which I believe was the Minimum Equipment List for the aircraft.

Captain Perkins was questioned about the significance of such an unserviceability:

> Q. And I referred you to item number 33 in the MEL which is in front of you to see if we could both find emergency exit lights. Do you remember we went through that, Captain Perkins?
> A. Yes.
> Q. And when we had a look at item 33 in Exhibit 310, we couldn't find emergency exit lights, right?
> A. That's correct.
> Q. And I asked you what happens then, and you said that means it's a "no-go item"; that's the phrase you used?
> A. Yes.
> Q. Now, what does a "no-go item" mean? Could you tell the Commissioner that, please.

A. Well, that would mean that it would have to be rectified prior to the next flight.

(Transcript, vol. 43, pp. 116–17)

It is apparent from Captain Perkins's evidence that he considered the emergency exit lights to be essential aircraft equipment for which there were no alleviations in the MEL, yet the aircraft was flown on March 10 without repairs first being made to this essential equipment.

Captain Joseph Deluce testified that, in the absence of an approved MEL, pilots would rely on maintenance personnel to make the determination of what is and is not essential aircraft equipment for the purposes of maintenance deferrals (Transcript, vol. 113, p. 131).

These varying views on the interpretation of ANO Series II, No. 20, are significant in that, from June until December 1988, Air Ontario pilots accepted F-28 aircraft into service with inoperative components. Whether such deferrals were legal depended on an interpretation of the term "essential aircraft equipment." As it happened, many of the deferrals during this period appear to have violated ANO Series II, No. 20, and the pilots, their supervisors, and Transport Canada inspectors knew or ought to have known about it.

Operating without an Approved MEL

During the period from June until December 1988, when Air Ontario was operating its F-28 without an approved MEL, personnel in maintenance and flight operations devised their own methods of maintenance deferral – methods which appear to have been in clear violation of ANO Series II, No. 20.

Mr Ozdener testified that maintenance deferrals became a problem almost immediately following the introduction of C-FONF into commercial service in June 1988. He recalled that "on the 9th of June there was a panic in Toronto" because there was a pilot snag and the maintenance group did not know how to deal with it without an MEL (Transcript, vol. 101, p. 72). Mr Ozdener testified that maintenance personnel began a practice of using a section of the Fokker F-28 Flight Handbook[32] known as a list of "allowable deficiencies" to defer the maintenance of essential aircraft equipment (Exhibit 825). If the allowable deficiencies document did not provide a ready solution to the deferral problem, maintenance personnel would telephone Transport Canada airworthiness

[32] The Fokker F-28 Flight Handbook (Exhibit 314) is also referred to as the F-28 Aircraft Flight Manual, or AFM. See chapter 19, F-28 Program: Flight Operations Manuals.

personnel, on an ad hoc basis, for verbal approval.[33] Mr Ozdener testified that it was his understanding that these deferral practices were sanctioned by Transport Canada; however, he conceded that this was somewhat of a grey area (Transcript, vol. 102, p. 113), and I heard no other independent evidence that corroborated such a regulatory approval. In any event, Mr Ozdener testified that the allowable deficiencies document was used by Air Ontario maintenance as a resource document to assist in the deferral of maintenance in the absence of an approved MEL (Transcript, vol. 101, pp. 72–83).

The evidence revealed that the allowable deficiencies document was, in fact, section 10 of volume 1 of the Fokker F-28 Flight Handbook. This section was described as an embryonic MEL that was superseded in 1983 by the Fokker F-28 MMEL. By a manufacturer's amendment dated April 15, 1983, the allowable deficiencies section was deleted from the F-28 Flight Handbook. On August 1, 1983, the F-28 MMEL was issued by Fokker as a separate document approved by Dutch Aviation Authorities. The MMEL functionally replaced the allowable deficiencies section of the F-28 Flight Handbook. This allowable deficiencies section, which was circulating throughout the Air Ontario maintenance department, was four years out of date when the company took delivery of the C-FONF and should never have formed any part of the documentation governing the operation of the aircraft.

Mr Ozdener stated that he and other maintenance personnel photocopied the allowable deficiencies section from the aircraft flight manual that arrived with the aircraft C-FONF. Unfortunately, that original document was destroyed in the wreckage; however, if Mr Ozdener's recollection was accurate, the Fokker F-28 Handbook on board C-FONF was likely not amended since at least April 1983. This fact would call into question the thoroughness of Transport Canada's certification of C-FONF prior to its importation into Canada.

Mr Bittle gave evidence on maintenance deferrals that were ongoing in his department during the period from June until December 1988:

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[33] It should be noted that Mr Ozdener originally testified that maintenance deferrals were conducted pursuant to a document entitled the "CDL" or Conformity Deviation List (Transcript, vol. 101, pp. 74–75). Later in his testimony he corrected himself, stating that the document which was used for maintenance deferrals during this period was a section from the Fokker F-28 Flight Handbook entitled "Allowable Deficiencies" and not the CDL (Transcript, vol. 102, pp. 119–24). Mr Ozdener was shown a copy of the "Allowable Deficiencies" section and I am satisfied from his evidence and the later evidence of Mr Bittle that, indeed, some maintenance personnel were using that document for the purposes of maintenance deferrals during the period prior to the approval of the MEL.

Q. Now, it was Mr Ozdener's evidence that Exhibit 825, which is in front of you, was indeed this Deficiencies List that was being referred to.

Now, Mr Ozdener did not make the entry, obviously, but that was his understanding –

A. Right.
Q. – of the volume that was being referred to.
A. Right.
Q. Now, do you remember this practice being done at Air Ontario, using this particular volume for deferrals?
A. I don't have a clear memory of that particular situation. This exact volume being used ... since briefing myself for this testimony, it became evident that people were using it. At the time, was I aware of it? I am sorry, I cannot recall.
Q. You don't recall whether or not there was an approved MEL?
A. I know there was no approved MEL.
Q. Okay. And you did not know what deferral practices were going on?
A. I – I knew what the rules said, yes.
Q. No, no, did you know what actual deferral practices were going on in your department?
A. Not every one of them, no.
Q. Okay, which ones did you know about?
A. Well, I didn't check every log book of every airplane, if that's what you mean. And we had a system in place whereby people were delegated to do that. And, if someone felt something was going on that shouldn't have been going on, they had the option to bring it to my attention.
Q. Did anybody ever bring to your attention the use of Exhibit 825 for deferrals?
A. No, not that exhibit.
Q. Did anybody bring to your attention this procedure of phoning *Transport and getting approval?*
A. No, no, at that time, no, I – no one ever said, that I can recall – now, someone may say, well, they told me or I knew about it, and if that's the case, I'm sorry, I've just forgotten that.

And it's quite possible that someone told me, it's quite likely someone told me, but I can't remember who or when.

(Transcript, vol. 103, pp. 155–57)

In spite of his uncertain recollection, I am of the view that Mr Bittle knew or ought to have known that such deferral practices were ongoing in his department. He, along with Captain Nyman, was charged with the responsibility of preparing an MEL for the F-28 program. He clearly knew that the aircraft was operated from June until December 1988 without an approved MEL; and he should have known that if the strict rules of ANO Series II, No. 20, were followed, it would have been

virtually impossible to maintain any regular operations of the aircraft without an MEL.

On the flight operations side of Air Ontario, there were similarly innovative solutions to the dilemma of jet aircraft operations with no MEL. I have already recounted the evidence of the F-28 project manager and chief pilot, Captain Joseph Deluce, who testified that his pilots relied on maintenance personnel to determine what items might properly be deferred (Transcript, vol. 113, p. 131); and it is clear from the evidence that the maintenance group was relying on an unapproved, out-of-date document to assist them in deferrals. The evidence also revealed that the F-28 pilots, when flying the line, took the initiative in deciding how to operate the aircraft with unserviceable essential equipment.

Some Air Ontario F-28 pilots testified that they relied on their common sense and experience in assessing whether the aircraft was safe to fly with certain items unserviceable. Captain William Wilcox of Air Ontario explained his recollection of the situation:

> Q. You were happy just to exercise your own judgement and determine whether or not, if you had a landing light out or an APU not working or anti-skid not working, you were happy just to exercise your own judgement and decide whether or not the aircraft could safely be flown with that item not working, correct?
> A. That's correct, yeah.
> Q. All right. And you thought that, even once the MEL came into being, it was just there for your guidance, you could still exercise –
> A. No.
> Q. – your own judgement?
> A. No.
> Q. All right. You now agree that, once the MEL was approved, you were bound to comply with the MEL, are you?
> A. Then it becomes your reference, source of reference.
> Q. Well, it becomes the law, doesn't it? You're bound –
> A. Yes, your source of reference, something to fly the airplane by.
>
> (Transcript, vol. 93, pp. 211–12)

I find that, during the six months between June and December 1988, there was an understanding among Air Ontario F-28 pilots that they required an MEL to operate with inoperative essential aircraft equipment; they understood that without some deferred maintenance their aircraft would frequently be grounded; and they made a conscious decision to rely on their experience and whatever tools were available to them to operate their aircraft safely with unserviceable components.

One "tool" that pilots used in assessing the efficacy of a maintenance deferral was the MEL that appeared in their Piedmont F-28 Operations

Manual (Exhibit 307). Pilots apparently used this Piedmont MEL as they would any approved MEL. When they were at a line station and an aircraft component became unserviceable, they consulted the Piedmont MEL to assess the seriousness of the snag and whether they could continue flying, subject to operational restrictions. If the Piedmont MEL operational restrictions were met, then they would not note the defect in the aircraft journey log and would continue flying the aircraft (see, for example, Captain Erik Hansen at Transcript, vol. 94, p. 166).

Apart from the apparent illegality of not formally recording the snags in the aircraft journey log[34] as soon as they were detected, another problem was presented – namely, how to inform subsequent flight crews of the state of serviceability of the aircraft. To overcome this difficulty, the pilots devised a system whereby one crew would record defects on loose notes that were passed on to following crews. In the course of a flying day, the crews would accumulate these loose notes containing information regarding the unserviceability of aircraft components. At the end of a flying day, or before the aircraft was due to spend the night at the Toronto maintenance base, these defects would be formally recorded in the aircraft journey log. In so doing, the flight crews avoided a written record of operating with inoperative essential aircraft equipment. While the aircraft was at the Toronto maintenance base, the maintenance crews endeavoured to rectify all of the defects. To the extent that some defects were not rectified, the maintenance crews consulted the allowable deficiencies list and formulated a deferral.

This situation was clearly described by Air Ontario pilot, Christian Maybury. Captain Maybury was questioned regarding a comment he

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[34] The Air Regulations provide that:

s.826(1) Every owner of an aircraft, other than an ultra-light aeroplane, registered under these Regulations, shall maintain for the aircraft an aircraft journey log and an aircraft technical log.

(2) The Minister may, by order, prescribe the form of the aircraft journey log and the aircraft technical log to be maintained pursuant to subsection (1) and the particulars to be entered in such logs.

s.827 Every entry log maintained pursuant to section 826 shall be made accurately and in ink by a competent person and signed by that person as soon as possible after the events they record.

Air Navigation Order Series VIII, No. 2/CRCc.-24, the Aircraft Journey Log Order, provides that the particulars of any defect in any part of the aircraft or its equipment and the rectification of such defect must be recorded in the aircraft journey log:

"Forthwith upon the defect occurring and upon rectification having been made" (ANO Series VIII, No. 2, Schedule s.3).

made to Captain Ronald Stewart[35] that he felt he was "fighting hard to maintain ... standards." On this point I feel it worthwhile to quote Captain Maybury at length:

> A. Air Ontario Limited[36] had very high standards, and it seemed to me that we were having to maintain – when I say maintain standards, it was maintain the standards that were set by Air Ontario Limited, which I think were very good ones to be setting our eyes on.
>
> There were just some – just operating the airplane – we've already really discussed it, really – operating an airplane with a level of experience that we had in our supervisory and maintenance people and we just ran into a lot of stuff that just didn't go down right.
>
> Q. In the regard of fighting hard to maintain standards, would you tell us a bit about the practice of passing snags from pilot to pilot.
>
> A. Well, that was one thing that didn't go down well at all. We went through a period where we did not have an officially approved MEL on the airplane, and it makes it very, very difficult to operate an aircraft under these standards, because ... there is equipment on the aircraft that is not required for safe flight. It's good stuff to have, but you can still operate an airplane very safely without it, and that's what the MEL covers.
>
> And, according to air regulations, if you don't have an MEL, the aircraft is grounded, any snag, even a light bulb out. Like, if you wrote up the light's burned out ... down in the cabin, according to air regulations, you're grounded.
>
> Q. If you don't have an MEL?
>
> A. If you don't have an MEL ... So the practice started, and I don't know exactly where it – I wouldn't want to say where it started *from, but some of these Mickey Mouse type snags started* getting passed by little bits of paper instead of it being officially entered in the log book.
>
> Q. When you say being passed, sir, are you saying that, when one crew would get off and another crew got on, they would pass pieces of paper noting snags on these pieces of paper so they wouldn't have to be entered into the journey look; is that right?
>
> A. Yes, that did occur.
>
> Q. Okay, and you're aware of that practice?
>
> A. Yes, I –

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[35] Exhibit 744, "F-28 Pilot Questionnaire – Summary." See chapters 15, F-28 Program: Planning; 24, Flight Safety; and 42, Incident and Accident Reporting and Pilot Confidentiality.

[36] Captain Maybury was a pilot from the Air Ontario Limited side of the merged Air Ontario Inc.

Q. And are you personally aware if this practice was adopted and followed by Captain Joe Deluce?
A. Yes, it – I – it occurred at least once with his coming off of a line indoc flight and we were taking over the flight.
Q. And who was the captain of the aircraft when this occurred?
A. I believe it was Bill Wilcox.
Q. Okay. In hindsight, sir, what's your view of that practice?
A. Well, it's very frustrating. Once again, never at any time ... did we ever operate the airplane with something not operating that would have been on the MEL. ... [A]s a guideline, actually, we did have the Piedmont MEL available to us, so –
Q. That's the one in the back of the Piedmont manual?
A. That's right, yeah. So we had that available to us. It certainly isn't the way I feel comfortable flying the airplane.

It's unfortunate that these things take so much time with Transport, and once again getting into the field of Transport Canada, but why did it take months to approve an MEL ... when Piedmont already ... if they had an MEL, then they could have – it – I don't understand these things ... but I just don't understand why it has to take so long so companies and personnel working for these companies are put into this uncomfortable situation for such a long period of time.

Q. As a pilot, sir, did that make your life a little more difficult?
A. Yeah, it added to the stress level.
Q. In relation to the MEL, you noted a moment ago that you did have the Piedmont MEL to fall back on.

Did anyone at Air Ontario ever instruct you or are you aware if anyone in Air Ontario ever instructed F-28 pilots to use the Piedmont MEL?

A. No, no, it –
Q. This simply grew up?
A. This is something that just kind of grew within the system.
Q. Okay. And just to come back one more time, the passing of snags on pieces of paper, then, would mean that these snags would not be noted in the journey log; is that right?
A. That is correct.
Q. And if they're not noted in the journey log, then there is no continuity of snag deferral and rectification?
A. Often, the last crew of the day would enter them. This was more or less done to keep the airplane flying that day, and then the last crew of the day would enter them.

(Transcript, vol. 92, pp. 35–39)

On further examination, Captain Maybury explained why the Air Ontario pilots engaged in these deferral practices:

Q. Captain, my friend Mr Jacobsen asked you about why you didn't report to anyone within the company that these notes,

these maintenance notes, were being passed, and I want to ask you:

Did the fact that Joe Deluce, a member of the management, the fact that he countenanced – or appeared to countenance this activity, did that influence your decision somewhat about whether or not you should complain about it and report it?

A. It influenced it somewhat, but I think the – to be quite frank, the main motivation was the fact that we as a pilot group wanted the operation to be a success.

(Transcript, vol. 92, pp. 206–207)

Captain Deluce provided a lengthy explanation as to the use of the "yellow sticky pads" in Air Ontario F-28 operations. I will refer to his testimony on the subject:

THE COMMISSIONER: Go ahead and explain.

THE WITNESS: We used, it was these yellow sticky pads, for a number of things in the aircraft. We used them for communicating information between the crews.

For example, they would write down clearances or weather or stuff like along those lines, and stick them on the console between the two pilots, and what that enabled crews to do was to, you know if while one person was flying, the other one was taking a clearance or weather, it would enable that information to be readily available to the other pilot. With time he could read it rather than – so we used it for those types of purposes.

We also used the note pads to note observations and at times, defects. It was a quick way en route to jog it down, and it was something that a person could use to write in the snags when they are on the ground in more detail with more explanation that would be of better assistance to maintenance in troubleshooting the particular snag.

So it was convenient that way to keep track, because you always – at times, you would write them right into the book, if it was that phase of flight where you could do that. At other times, you would just make note of it.

Now, the normal practice was to enter these defects, if they were defects, into the log book. At times, maintenance would meet the aircraft and you would review it with them there and they would in fact write it in the log book.

At times, you would write it into the log book and go in to see maintenance on your way home and you would ... bring this sticky pad in to review it with maintenance to make sure ... if there was any additional information they would need before you went home.

At times ... you would slip it in your pocket. You would also use it if you bumped into a crew to just review with them what kind of problems you were having. It might enable them to –

alert them to the fact that they may need a little more time to ensure that maintenance clears something off before ... they take the aircraft.

So there was a number of uses ... of these note pads.

At times, I passed on what I considered observations that were not necessarily – or that weren't what I considered a defect yet, and at times, I may have even passed on other information that I did not consider essential operating equipment, and I had a reason when I did that, because I recall one specifically.

But I think before we get into the questioning much further, I would also like to take a moment to describe, in my estimation, what a snag or a defect is, because I think it's a very complicated thing, and I think some people might feel that it's really something that's black and white, and I don't believe that it's that case.

So I have heard some testimony with regard to snags and defects, and I have done a lot of thinking about it to try and ... recall what we did and to help, but I think, if you don't mind, I will take a few minutes to describe what ... I believe a defect to be.

THE COMMISSIONER: All right. We will hear you.

THE WITNESS: The reason why a defect is a complicated thing, because you have to – it's just not black and white. It's ... actually a decision-making process.

And basically, you can have a continuum whereby the pilot is flying and he is observing things, he is making observations, and at times, the observations and the evidence that he has from that observation is very cut and dry ... there's no question about it, we've got a defect, and that may be at one end of the spectrum.

There's another part of the spectrum where pilots are observing things, but the fact that they are not really at the point of time where they would consider that observation an actual defect.

An example of that might be – you might be doing an approach ... or you might be flying along and one of your VORs,[37] for example, flags.

Now, at that moment in time, you know that you are not getting information from that unit, but you don't know whether it's a problem on the ground or a problem with the unit itself. And it comes back on.

Now, you ... still don't know whether it was a problem on the ground or whether it was an intermittent problem with your

[37] VOR: very high frequency omni-directional range, a navigational aid used in the cockpit of aircraft

unit, so there's some realm here of what I consider strictly observations.

At some point in time, you reach a line where the evidence is that you have a defect. For me, the evidence might be here. For another pilot, it might be there. (Indicating.)

I believe, and ... from going through the testimony and going through the log sheets, I believe that in fact, I did pass on some information that was what I considered observations.

And I believe that in one particular case, that I passed on something as information, but it wasn't essential operating equipment, and I did that because we were troubleshooting the particular unit, and I had just done one flight and maintenance had wanted some troubleshooting information on that unit, and I felt it would be more useful for – and I talked it over with the crew, and they could have considered it a defect at that point in time, but there was a purpose for it, so –

But there wasn't what I considered a practice where crews passed on essential operating equipment.

I have been through the testimony and some crews – some crews indicated that they might have carried some snags. I don't believe that it was a practice.

I know for certain, on occasion, I carried some things that were observations, and I do admit on – I believe that I have, on occasion, maybe even carried something that was in the realm of a defect, but in that realm, I believe that it was something that was deferable.

You know, I'm trying to ... I have gone through log sheets and tried to jog memories of what happened, and I listened to people say things, and that's the best way I can describe what we had done.

At the time, I understood that we could operate the aircraft ... without an MEL if we did not fly it with a defect that was ... essential operating equipment, and I had expected ... because of the nature of part of that which is the airworthiness items, that that was a decision that maintenance would make technically, that I would also satisfy myself that it was safe.

If in fact they deferred something that was – and I accepted it as being non-airworthiness, I would ... probably consult the – I know I would consult the Piedmont MEL to see if there were any procedures covering ... that particular deferral.

I don't believe that just because something is in the MEL, that it's necessarily airworthiness or essential operating equipment. Or I don't believe that it's essential operating equipment.

That's – I don't know if that helps, but I'm trying to tell you how it worked now.

The use of those notes was something that we observed, and it seemed quite handy, when we were at TimeAir. I think ...

> – as far as conveying information ... it worked well. The paper – the information was handy.
>
> Anyhow, I will leave it at that, if you want to ask me some questions about whatever ...
>
> THE COMMISSIONER: All right. Thank you for giving us an overview –
>
> (Transcript, vol. 113, pp. 135–41)

Captain Deluce's lengthy explanation of the deferral practices at Air Ontario is revealing. The following points are particularly significant to this analysis:

- He conceded that he may well have deferred something via the "yellow sticky paper" that was "in the realm of a defect," but he stated that at no time did he operate the aircraft with essential aircraft equipment that was inoperative.
- When he made such deferrals, he would consult the Piedmont MEL to see if there were any special operating procedures covering the particular problem.
- He expressed his view that equipment listed in the MEL is not necessarily essential aircraft equipment.
- When he testified he understood that some crews may have carried forward snags via the note passing, but he did not think it was a practice.

The law requires that all defects be noted in the journey log as soon as they are detected. If Captain Deluce was consulting the Piedmont MEL for instruction on accommodating an operational problem, then clearly this was something that was more than "in the realm of a defect." It was a defect, and the practice acknowledged by Captain Deluce appears to have been in violation of ANO Series VIII, No. 2.

Indeed, there is some scope to include items in an MEL that are not essential aircraft equipment. If such were the nature of Captain Deluce's note deferrals, there should have been no reason why they were not immediately recorded in the aircraft journey log. The explanations offered by Captain Maybury and others were more plausible. The note deferrals were made because the pilots wanted to keep the aircraft flying.

In chapter 10, Technical Investigation, there is a detailed review of the aircraft journey log of C-FONF. In that analysis, I concluded there were many maintenance deferrals involving essential aircraft equipment during the period when there was no approved MEL. This suggests that there may have been violations of ANO Series II, No. 20. On the basis of the evidence reviewed in this chapter, I find that there were instances when the F-28 was operated with essential aircraft equipment inoperat-

ive, and the description of such inoperative equipment was contained on the loose notes passed by Captain Deluce and others.

Captain Nyman testified that he was not aware that such note deferrals were going on. He stated that the practice was not a good one and, had he been informed of it, he would have ordered that it be discontinued (Transcript, vol. 107, pp. 191–94).

Mr Morrison stated that he knew the maintenance department was deferring snag rectification pursuant to "some sort of document," but he was not fully aware of the deferral procedure ongoing when the F-28 was operated without an MEL (Transcript, vol. 115, pp. 111–12). Mr Morrison testified that he was not aware of the practice of note passing, as described by Captain Maybury, and he acknowledged that such a practice would have jeopardized the operating certificate of Air Ontario. If he had known the practice was ongoing, he would have put a stop to it and Captain Deluce would have been severely disciplined for having participated in the practice (Transcript, vol. 116, pp. 158–60).

During the period from June to December 1988 there were three significant non-standard and apparently illegal practices ongoing at Air Ontario with respect to maintenance deferrals. These were:

- the practice by maintenance personnel of deferring the maintenance of aircraft unserviceabilities pursuant to the obsolete "allowable deficiencies" section of the Fokker F-28 Flight Handbook;
- the practice by some F-28 pilots of writing up aircraft defects on pieces of paper and passing them along from crew to crew instead of recording them in the aircraft journey log; and
- the practice by some F-28 pilots of relying upon the MEL appearing in their Piedmont F-28 Operations Manual in the operation of the aircraft with inoperative equipment.

These practices were not officially sanctioned by the company, but the F-28 chief pilot and project manager knew of and took part in at least two of them. While the pilots and maintenance personnel were relying on their experience as they improvised solutions to the problems of operating without an MEL, this situation was clearly unacceptable in a properly functioning commercial air transportation system.

I must presume that the procedures established by the Air Regulations and the Air Navigation Orders are founded upon sound operational experience. The regulator is attempting to ensure standardized practices of timely defect rectification and prudent maintenance deferrals.

What is most troubling is that Air Ontario put its operational personnel in a position where they felt obliged to improvise these solutions to the MEL problem. The evidence revealed that Air Ontario personnel, in particular the pilot group, were enthusiastic about their

first jet transport operation and they wanted to make it a success. In their enthusiasm, they carried out operational practices that were in apparent violation of ANO Series II, No. 20, and ANO Series VIII, No. 2. When faced with these practices, it was the responsibility of flight operations and maintenance management to step in and put an end to them. They did not.

Findings

- Problems with the APU of aircraft C-FONF were recurring throughout the week from March 5 to March 9, 1989, and maintenance control personnel in London and personnel at the Toronto maintenance base were aware of the situation.

- On March 5, 1989, Captain Bradley Somers made note of two problems connected with the APU:
  - he noted that the APU was not producing sufficient air pressure to start the aircraft main engines; and
  - he noted that an oily smell filled the cabin shortly after takeoff.

- Maintenance supervisor John Jerabek addressed the snags as follows:
  - he could not duplicate the air pressure problem, and made an appropriate notation in the journey log;
  - he suspected that the cause of the oily smell was residual oil in the duct work connecting the Air Cycle Machine with the cabin ventilation system; and
  - he did not attempt to rectify the problem because it would have taken several hours to do so, and the aircraft was scheduled for imminent departure.

- Mr Jerabek's suspicion may have been well founded; however, a review of the aircraft journey log would have revealed that a similar problem was noted on two previous occasions. On January 21, 1989, smoke in the cabin of C-FONF was attributed to the air-conditioning system (the maintenance of the noted defect was deferred); and on February 27, 1989, thick oily smoke filling the cabin was again reported (the defect was rectified by correcting an oil leak in the duct work). The recurrent nature of this alarming defect should have warranted the serious attention of Air Ontario's maintenance department.

- What is even more troubling was what occurred after Mr Jerabek released the aircraft into service. The next day, on March 6, Captain

Morwood noted in the aircraft journey log that the cabin became smoky, a passenger complained, and the smoke detector went off. Maintenance did respond to Captain Morwood's journey log entry, noting that the defect was rectified by removing oil from the APU outlet ducting.

- Flight attendant Sonia Hartwick testified that on the morning of March 8, 1989, shortly after takeoff from Winnipeg to Dryden, aircraft, C-FONF, piloted by Captain Robert Nyman and First Officer Keith Mills, again filled with an oily smoke which triggered the smoke detector. Captain Nyman testified that he attributed the cause of the oily smoke – which he described as an "oily haze" – to the APU, and stated that it was a fairly common problem with that aircraft. He adopted the evidence of Mrs Hartwick that a circuit breaker was pulled to deactivate the smoke detector and that it was inadvertently not reset until they reached Thunder Bay, two flight legs later. Flight attendant Hartwick testified that smoke filled the cabin and the alarm again sounded during the return flight from Thunder Bay to Winnipeg. Captain Nyman did not note the cabin smoke incidents in the aircraft journey log because, as he put it, it was a recurring, intermittent problem of which maintenance was aware.

- On five separate occasions – January 21, February 27, March 5, March 6, and twice on March 8, 1989 – an oily smoke, smell, or haze was reported in the passenger cabin of C-FONF. Maintenance attempts at curing the problem were obviously unsuccessful, and I am not at all confident that maintenance properly identified the cause of the problem.

- I am not satisfied with Captain Nyman's explanation for not reporting the March 8 cabin smoke problems in the aircraft journey log. His failure to report the defects appears to have breached ANO Series VIII, No. 2. The deactivation of the smoke detector on the morning of March 8 was a poor practice and the evidence of Captain Nyman, that he operated the aircraft with this essential aircraft equipment deactivated, suggests an apparent violation of ANO Series II, No. 20.

- I found Captain Nyman's characterization that the deactivation of the smoke detector was against "the legal letter of the law" to be flippant and at least ill-advised. While Captain Nyman was not the director of flight operations on March 8 when the incident occurred, he was recognized and respected among Air Ontario pilots as among the most senior and experienced pilots in the company. All of the Austin Airways pilots would have worked for Captain Nyman at one time or

another and, indeed, pilot Keith Mills, who was his first officer on March 8, had worked in Captain Nyman's flight operations department for years prior to the incident. This mishandling of the cabin smoke incident reflects shoddy, lax flight operations practices and, coming from a pilot of Captain Nyman's stature, it most certainly would have sent the wrong signal to First Officer Mills, flight attendants Say and Hartwick, and anyone else in the organization who learned of it.

- At all material times, it was mandatory to report an in-flight incident involving smoke or fire to the Canadian Aviation Safety Board pursuant to sections 2 and 5 of the *Canadian Aviation Safety Board Act*. There is evidence that the described cabin smoke incidents were not reported to CASB (see chapter 10, Technical Investigation).

- The aircraft C-FONF arrived at the Toronto maintenance base on the evening of March 8, 1989, with APU air-pressure problems noted by Captain Nyman and Captain Reichenbacher. Captain Nyman contacted maintenance when the APU defect became known to him, and maintenance control assigned a maintenance control number to the defect. Captain Nyman recorded the maintenance control number in the aircraft journey log, which authorized the continued flight of the aircraft with an unserviceable APU until it reached the Toronto maintenance base. Once at the maintenance base, it was the responsibility of an aircraft maintenance engineer to rectify the defect, or, if conditions or circumstances made it impossible to rectify the defect, the supervising maintenance inspector could re-defer the maintenance of the defect.

- The evidence of the attempted repair of the APU air-pressure defect suggests that the maintenance personnel were not adequately familiar with the F-28 APU system. The evidence of Mr Athanasiou, in particular, suggests that he was never certain of the cause of the aberrant signal from the APU fire-detection light.

- Ultimately, the maintenance of the APU was deferred pursuant to the wrong MEL number.

- The handling of the two APU defects – the air-pressure problem and the cabin smoke – reflects poorly on the Air Ontario maintenance and flight operations departments:
  - The failure to rectify the snags after repeated attempts suggests a lack of expertise in the repair of the F-28.

- The willingness to defer repeatedly the maintenance of the defects for lengthy periods suggests that the maintenance group was under some pressure to keep the aircraft flying, was simply lax in its practices, or both.
- The handling of the cabin snag defect by Captain Nyman reflects poor judgement.
- The ultimate deferral of the APU fire-detection defect pursuant to MEL number 49-04 instead of 49-01 suggests a lack of familiarity with both the F-28 MEL and the APU system.

- On March 10, 1989, there was poor coordination between SOC, maintenance, maintenance control, and line pilots regarding the accommodation for the lack of ground-support facilities in Dryden:
  - Mr Steven Korotyszyn, the maintenance inspector ultimately charged with the responsibility of deferring the maintenance of the APU, was under the mistaken impression that there was a ground-start unit in Dryden.
  - Mr Danilo Koncan, SOC duty operations manager, the SOC supervisor involved in the APU deferral decision, was under the mistaken impression that the Winnipeg line maintenance facility had the ability to rectify the APU defect.
  - Mr Martin Kothbauer, the SOC duty operations manager who supervised the operational control of C-FONF on the morning of March 10, 1989, and Mr David Scully, the maintenance controller on duty on the morning of March 10, 1989, were also of the view that the Winnipeg facility was working to rectify the APU defect.

- Both Mr Kothbauer and Mr Koncan were aware of the company policy not to de-ice with main engines running; and both expressed a view that if weather threatened such that de-icing was a likelihood, they would direct the crew of an F-28 with an unserviceable APU to overfly Dryden, where there was no ground-start facility. Mr Kothbauer chose not to direct flight 1362/1363 to overfly Dryden because his assessment of the area weather was such that he did not view de-icing as a likelihood. He was aware of the possibility of freezing precipitation, but it was his opinion that the freezing drizzle would not occur until later in the day. I am of the view that Mr Kothbauer's retrospective meteorological assessment was simply too restrictive. Mr Kothbauer knew the limitations of operating an F-28 with an unserviceable APU into Dryden. He knew, from the early morning area and terminal forecasts, that there was unsettled weather moving into the Dryden area from the west. He should have directed the dispatchers responsible for flight 1362/1363 to monitor developments in the Dryden weather very closely. As it happened, an

amended terminal weather forecast for Dryden at 10:02 a.m. EST called for freezing drizzle. Mr Kothbauer stated that he should have been aware of this forecast and acknowledged a breakdown at Air Ontario SOC. When C-FONF was at the Thunder Bay terminal between 10:35 a.m. and 11:55 a.m., Mr Kothbauer should have directed flight 1363 to overfly Dryden on its return flight to Winnipeg.

- Complete line station ground support would have included an air-start facility in Dryden. As a regularly scheduled stop, it was less than satisfactory that there was insufficient equipment in Dryden to accommodate reasonably probable contingencies. Air Ontario may have made a reasonable commercial decision to delay the placement of ground-start equipment in Dryden. Having made such a decision, there should have been an operational accommodation for the deficient ground-start facility. Namely, it should have been operational policy at Air Ontario that an F-28 with an unserviceable APU was not to be dispatched into Dryden or any other station without ground-start facilities.

- An appropriate place for the promulgation of such a policy would have been in the APU deferral sections of the F-28 MEL. In those sections there should have been an operational limitation that aircraft with unserviceable APUs were only to be operated in stations with ground-start equipment.

- Non-standard and slipshod MEL practices were ongoing at Air Ontario almost from the inception of F-28 service.

- The F-28 C-FONF was repeatedly operated with inoperative essential aircraft equipment during the period from June until December 1988 when there was no approved MEL in place. This suggests an apparent violation of ANO Series II, No. 20.

- During this same period, there was a practice among Air Ontario F-28 pilots of recording defects on pieces of paper and handing them from crew to crew until, at the end of the day, the defects were entered in the aircraft journey log. This practice was apparently spawned by the pilots' desire to keep the F-28 aircraft flying and by a recognition by the pilots that, without an approved MEL, the proper recording of the defects in the aircraft journey log would have effectively grounded the aircraft. The failure to record defects in the journey log promptly appears to have been in violation of the provisions of ANO Series VIII, No. 2.

- These sorts of practices were or should have been known to Air Ontario maintenance and flight operations management and to Transport Canada air carrier and airworthiness inspectors.

- While there is no excuse for these operational practices, I am of the view that they were partially prompted by frustration on the part of line pilots and operational management with delays in the approval by Transport Canada of the Air Ontario F-28 MEL.

- I find that the MEL approval process is unnecessarily bureaucratic and complicated. This Transport Canada problem forms a partial explanation for the lengthy delay in the approval of the Air Ontario F-28 MEL.

- In addition, I find that Air Ontario operational management contributed to the delay in MEL approval. The need for an MEL was identified in the earliest stages of F-28 planning, yet the production of the document was disorganized and tardy.

- I find that had the parent carrier, Air Canada, taken more of an operational interest in its feed carrier, Air Ontario – and indeed its feed passengers – many of the problems associated with the MEL and the APU on March 10, 1989, could have been avoided.

RECOMMENDATIONS

It is recommended:

MCR 49 That Transport Canada proffer for enactment legislation which would require that approved minimum equipment lists be in place for all aircraft certified under United States Federal Aviation Regulation 25, predecessor regulations, or equivalent legislation, prior to the use of such aircraft in commercial service in Canada.

MCR 50 That Transport Canada not issue an operating certificate or amendment to an operating certificate to an air carrier operating aircraft certified under United States Federal Aviation Regulation 25, predecessor regulations, or equivalent

legislation until required and approved minimum equipment lists are in place.

MCR 51 That Transport Canada ensure that the repair of an unserviceable aircraft auxiliary power unit be deferred only with an operational restriction requiring approved engine ground-start facilities to be available at all airports into which that commercial aircraft is expected to operate. This operational restriction should be included in the aircraft minimum equipment list.

MCR 52 That Transport Canada issue to all pilots a warning pointing out the dangers inherent in pulling circuit-breakers on board an aircraft in order to silence an alarm that may in fact be giving a valid warning.

MCR 53 That Transport Canada require that air carriers have in place appropriate policies and directives to ensure that flight crews, at the time they receive an operational flight plan, are informed of any aircraft defects that have been deferred to a minimum equipment list.

MCR 54 That Transport Canada require all air carriers that operate aircraft having minimum equipment lists (MELs) to provide approved training to all pilots, maintenance personnel, and dispatchers on the proper use of an MEL.

17 THE F-28 PROGRAM: LACK OF GROUND-START FACILITIES AT DRYDEN

On March 10, 1989, Air Ontario's F-28 jet service, flight 1363, found itself in the operational predicament of flying with an unserviceable auxiliary power unit (APU), under weather conditions that could necessitate de-icing, into Dryden, a station without F-28 ground-start capability. The lack of an F-28 ground start in Dryden is an important link in the chain of events that ended in the crash of C-FONF. Indeed, had there been a ground start in Dryden on March 10, 1989, all other things being equal, the accident might have been averted.

In order to start the main engines of the F-28, a source of compressed air, normally supplied by the APU, is required. Should the APU be unserviceable, an external source of compressed air, referred to as a ground start or an air start,[1] is required to start jet engines.

There are no Canadian regulations requiring an air carrier to keep ground-start equipment at stations through which they operate. Instead, it is left to the individual carrier to decide, based on operational and commercial factors, whether its operation requires a ground-start facility at all of its scheduled station stops.

By way of a documentation package dated January 24, 1988, Air Ontario applied to Transport Canada to amend its operating certificate to reflect the addition to its fleet of the two F-28s. The application to amend the operating certificate included the following reference to ground support:

> The company has determined that existing terminal facilities, buildings, lighting, ground support, power units, refuelling facilities, communications and navigation aids, dispatch, weather service and ATC are adequate for the proposed operations. However, the company may require certain improvements as F-28 operations develop.
>
> (Exhibit 855, p. 33, para. N)

[1] The terms "ground start" and "air start" were used interchangeably in the hearings of this Commission. In actuality, a ground start can be either air powered or electrical, depending on the type of aircraft. The F-28 requires an air start. Alternative methods of air start are discussed in chapter 16, F-28 Program: APU, MEL, and Dilemma Facing the Crew.

It was not as a result of an oversight that there was no ground start at Dryden. Evidence presented before this Inquiry indicated that prior to making application to amend the operating certificate, Air Ontario had indeed considered, and decided against, acquiring ground-start equipment for Dryden. Chief operating officer Thomas Syme testified that in late 1987, which was prior to acceptance of the first F-28, Air Ontario's F-28 implementation team, including representatives from the airports, marketing, maintenance, and flight operations groups, considered the matter of a ground start at Dryden airport. The matter was also considered by Mr Syme in his capacity at that time as group vice-president, operations and marketing. Because of the high cost of a ground-start unit, approval by Mr Syme and the president, Mr William Deluce, would have been required. According to Mr Teoman Ozdener, former F-28 maintenance manager at Air Ontario, a ground-start unit would have cost approximately "$60–$70,000" (Transcript, vol. 102, p. 37).

In his testimony before the Commission, Mr Syme recalled that the cost of acquiring a ground-start unit for Dryden, along with the operational considerations discussed below, had been a factor in the decision not to furnish Dryden with ground-start equipment:

> Q. Do you recall specifically why it was decided not to put a ground start unit in Dryden?
>
> A. The rationale was that the aircraft had an APU ...
>
> Dryden was a through stop which meant the aircraft was on the ground for a very short period of time. And that with a serviceable APU, there wasn't a requirement for a ground start unit.
>
> ...
>
> A. ... I was made aware that without an air-start unit, if the APU was unserviceable and in circumstances if weather forecasts were extreme, that the aircraft would not operate into Dryden.
>
> (Transcript, vol. 98, pp. 82, 83–84)

It is indisputable that the safer practice would have ground-starting facilities at all scheduled station stops for all aircraft that might require them. (In the case of a turbojet such as the F-28, a ground air-start unit would be required.) With such facilities, a flight crew would have the option of shutting down the aircraft for any reason – including de-icing – without fear of stranding its passengers. However, commercial realities being what they are, it is understandable that, for a number of reasons, a carrier may not want to invest in ground-power units for all of its scheduled stations. Having stated this, I would hasten to add that, if a carrier makes such a commercial decision, there clearly must be an

operational accommodation for the lack of ground-start facilities at the individual stations.

According to Mr Syme, Air Ontario's operational accommodation for not providing a ground start in Dryden was to overfly that station in "extreme" weather (Transcript, vol. 98, p. 84). If indeed this was the policy at Air Ontario, its failure was in not committing this "operational accommodation" to a standardized, unambiguous directive contained in all appropriate manuals and communicated to all flight crews and dispatchers. In testimony, Mr Syme, Captain Robert Nyman, and Captain Joseph Deluce each conceded that there was no written policy directing pilots to overfly Dryden in circumstances where their APU was unserviceable.

Although there was no written policy, Captain Deluce was of the view that Air Ontario pilots were well enough equipped to respond to operational situations of this sort:

> Q. ... Now, as chief pilot, would you not agree with me that, if it was your view that, in a given situation, pilots could overfly Dryden, that that situation should be brought to the attention of the pilots?
>
> A. ... I think that there's no question about it, that I did not provide them with specific direction on that specific issue. But ... [by] the same token, I don't think it would be reasonable for me to document every possible scenario that – and make every possible decision that a pilot would ever be expected to make. To me, that is a reasonable decision for a pilot to make
>
> ...
>
> A. I believe that all pilots would know that they could do whatever they had to do to operate in a safe manner.
>
> (Transcript, vol. 111, pp. 204–205)

Captain Deluce's statement ignores the very real, and usually competing, choices with which an airline pilot is often confronted. On the one hand there is the corporate goal of getting passengers to their destinations on time and, especially, avoiding groundings. On the other hand, there is the imperative to operate as safely as possible. Recognizing this basic conflict, it is the air carrier's responsibility, within the air transportation system, to provide clear advice to its pilots for all reasonably foreseeable operational contingencies. The Dryden scenario, in my view, was reasonably foreseeable.

Captain Nyman, Air Ontario's director of flight operations and an F-28 company check pilot, was not aware of any company policy, written or otherwise, in this regard, and his view, in contrast to that expressed by Captain Deluce, was that company guidance was required. Moreover,

Captain Nyman admitted that at Air Ontario the pilots were alone when it came to these crucial, stressful decisions:

> Q. ... So just as a circumspective line pilot, if you had been faced with a decision of either, A, overflying Dryden, or B, possibly getting stuck in Dryden because you don't have an APU and it's snowing and so on, that's something that you just simply would have considered on your own, is that right, without any guidance from the company?
> A. I think that there should have been guidance from the company. That's not what I'm saying.
> Q. No, I understand that.
> A. I – yes, I would have considered that on my own, and I have often wondered, in fact, what I would have done.
>
> (Transcript, vol. 109, p. 236)

It is of utmost importance, as illustrated by the events of the Dryden accident, that maximum support be afforded flight crews in making difficult operational decisions. Clear policies must be put in place by air carriers to ensure that flight crews are not left to decide, in stressful, Dryden-type situations, whether to overfly a scheduled stop or ground an aircraft and strand a planeload of passengers, or to attempt a potentially hazardous takeoff. Having well-developed and understood company policy on which to base their decisions, pilots would be more easily able to make correct choices.

The preferred policy in my view, and the one employed by Air Canada, is simply not to dispatch a turbojet aircraft with an unserviceable APU into an airport lacking appropriate ground-start capability. Captain Charles Simpson, Air Canada's vice-president of flight operations, testified that Air Canada did not operate aircraft with unserviceable APUs into Fredericton, New Brunswick, a station with no ground-start facilities. This policy is in place in order to avoid the possibility of being unable to restart the aircraft engines if for some reason they had to be shut down.

In keeping with my earlier comments regarding the APU and the minimum equipment list (MEL), it is my view that this policy could be clearly stated in individual aircraft MEL sections dealing with APU unserviceability. For example, where the MEL provides relief to operate with an inoperative APU, the MEL could include a precondition of operation that necessary ground-start facilities be available at destination airports.

Findings

- Air Ontario failed to ensure that an operational policy was in place and communicated to all operational personnel so as to prevent the dispatch of an F-28 with an unserviceable auxiliary power unit into a station without ground-start facilities.

- Given the Air Ontario F-28 support facilities that actually were in place at Dryden, Transport Canada failed to ensure that there was an operational accommodation in place at Air Ontario. Such an operational accommodation would have prevented the dispatch of an F-28 aircraft with an unserviceable APU into Dryden.

RECOMMENDATIONS

It is recommended:

MCR 55 That Transport Canada ensure that air carriers have operational policies that require the availability of appropriate ground-support facilities at individual airports where the air carrier intends to operate.

MCR 56 That Transport Canada ensure that the operational policies referred to in Recommendation MCR 55 above be contained in the air carrier's operations manuals, such as its flight operations manual and its route manual, and/or the individual aircraft minimum equipment list.

MCR 57 That Transport Canada ensure that, when it is reviewing an air carrier application for an operating certificate or an amendment to an operating certificate, there be a scrutiny of the air carrier's intended aircraft support facilities. Transport Canada then should satisfy itself that operational policies contained in the air carrier's operations manuals adequately accommodate the air carrier's identified and existing aircraft support facilities. No operating certificate or amendment to an operating certificate should be issued unless Transport Canada is so satisfied.

18 THE F-28 PROGRAM: SPARE PARTS

From the evidence it became clear that one of the requisites for the safe and efficient operation of an aircraft in scheduled commercial service is an adequate supply of supporting spare parts (spares). This is particularly true with regard to the introduction of a new aircraft type into a carrier's fleet.

Transport Canada, through its legislation and airworthiness inspectorate, is charged with the responsibility of ensuring adequacy of spares before approving an aircraft type for operation by any carrier. Prior to the licensing by Transport Canada of an air carrier's proposed aircraft operation, the carrier must establish that it has either an adequate in-house supply of spares or ready access to another supply of spares sufficient to support the intended operation.

Evidence was called both from Transport Canada as to the necessary compliance with the governing legislation and from Air Ontario as to the adequacy of its planning for spares to support the F-28 program.

Governing Legislation

Air Navigation Order (ANO) Series VII, No. 2, Part II, entitled "Aircraft Maintenance," sets forth the requirements of support equipment for the proper maintenance of aircraft. Section 12(1) reads:

> An air carrier shall provide adequate shelter, workshops and facilities, and such equipment as may be necessary for the proper maintenance of aeroplanes and auxiliary equipment in use.

Mr Ole Nielsen, superintendent, Air Carrier Maintenance Division, Airworthiness Branch, of Transport Canada's Ontario Region, was principal inspector for Air Ontario from mid-1987 until June 1988, when he became superintendent. (The introduction of the F-28 into the Air Ontario fleet occurred in June 1988.) Mr Nielsen was asked to describe his understanding of section 12(1):

> Q. Now, is my understanding correct that your authority, the authority imposed on you, is to look at the governing ANO for large air carriers in commercial operation and make this determination?

A. Yes. We make a determination of the air carrier's ability to maintain the airplane based on these requirements.
Q. Right. And I take it that equipment, et cetera, means that they will have enough spares to run?
A. Equipment runs the gamut from ground support equipment through the spares inventory that the air carrier maintains.
Q. Right. And can I take it from your answer that ... before this thing gets put on the operating certificate ... you have to be satisfied that there are adequate spares to provision it?
A. That is correct.
Q. Right. And indeed, it's in evidence that it was put on the operating certification on the 3rd of June of 1988.
A. Yes. Although they did have problems with the spares as you are aware.

(Transcript, vol. 129, pp. 110–11)

Serviceability Difficulties

A number of the pilots employed by Air Ontario were asked questions about the reliability of the F-28 and the availability of spare parts.

Captain Christian Maybury, a commercial pilot since 1968 with 15,000 hours' experience, stated his understanding of the availability of spares for the F-28, as follows:

Q. ... What was your view as an operating F-28 pilot of the degree and level of expertise of maintenance that was helping you?
A. Not very good. There were some ongoing problems, and I think they – for one thing, there was a great shortage of spare parts. It seemed to be an ongoing problem.

(Transcript, vol. 92, p. 43)

Captain Erik Hansen, an Air Ontario pilot with more than 19,000 hours' experience, was questioned on the adequacy of spare parts for the F-28. He testified that Air Ontario "didn't have very many [spares for the F-28]," and cited the ongoing unserviceability of the F-28 radar altimeter and autopilot pitch control as examples of the inadequacy of the F-28 spare parts supply (Transcript, vol. 94, p. 139).

Captain Monty Allan, an Air Ontario pilot with more than 6000 hours' flying experience, gave testimony on the subject of the maintenance and reliability of the F-28:

A. ... As a result, we had some snag deferrals that seemed to lag on for quite awhile. The deferrals were perhaps based on in part that they were troubleshooting it which is not unusual or in part more often the case is a lack of parts.

Since at the outset, we were only operating one aircraft and even at the end just two, it's very expensive, I guess, for the company to keep a large inventory of spare parts for the aircraft. And quite often, legal deferrals were made related to nil parts available which meant that they did not have the part in stock and they would have to look to other carriers or manufacturers to secure the part, which took any length of time, a day or several days or weeks, I guess, in some cases.

Q. From time to time, sir, during the time that you were flying the F-28, was it your view that there were excessive deferred defects?

A. I don't think excessive defects would appropriately reflect the way I felt. I think it was defects that were deferred for an excessive amount of time, so specific defects which probably exceeded that reasonable time period for being rectified.

(Transcript, vol. 91, pp. 47–48)

Plan to Provide Spares

Captain Joseph Deluce formally became the F-28 project manager in January 1988 and, in this capacity, oversaw the implementation of both the original and the revised F-28 project plans. Both project plans called for the provision of spares to have been the responsibility of the vice-president of maintenance and engineering, Mr Kenneth Bittle. Nevertheless, president and CEO William Deluce, because of his experience in aircraft and spare parts procurement, initially took charge of this aspect of the F-28 implementation project.

The critical path of the original F-28 Project Plan indicated that the provisioning of spares would be completed by the twenty-sixth week of the program or by the fourth week of April 1988. In the Revised Project Plan of December 1987, parts and equipment provisioning was described as simply "ongoing."

The original plan was to purchase a package of spares from the Turkish airline Turk Hava Yollari (THY), which was the previous owner and operator of the Air Ontario F-28s. This spares package was understood by Mr William Deluce to be sufficient to maintain up to a six-aircraft fleet, which was the number of F-28s that Air Ontario eventually planned to acquire.

A second option was to purchase a spares package from Transport Aérien Transrégional (TAT), the lessor of the Air Ontario F-28s and itself an F-28 operator having spares for sale. Mr William Deluce confirmed that the TAT spares option would have been more expensive than the THY spares package.

THY Spares Package

On October 30, 1987, Mr Kenneth Bittle wrote to Mr Alex Bryson of Transport Canada, informing the regulator of Air Ontario's intention to acquire the THY spares and requesting that a Transport Canada inspector go to Turkey, audit the THY parts overhaul facility, and approve the THY certification of its spare parts.[1] In the letter it was anticipated that, although the purchase was still under negotiation, this inspection should be done prior to the end of 1987.[2]

Upon receipt of this letter, Transport Canada replied to Air Ontario that it was not in a position to have an inspector travel to Turkey; however, advice was given as to the steps that would have to be taken if Air Ontario intended to import these THY spare parts.

Mr Bittle, when questioned on his October 30, 1987, correspondence to Mr Bryson, testified that he understood the carrier had to show that spare parts were available as part of the operating certificate application; however, he did not consider this letter to have been official notification of spares availability.

Mr Bittle accompanied Mr William Deluce to Turkey in January 1988 to survey the spares. By the end of their trip, Mr Bittle understood from William Deluce that the deal for the THY spares was so imminent that both Mr Bittle and Mr Deluce contemplated chartering a DC-8 cargo aircraft in England to facilitate the transfer of the parts to Canada.

On March 4, 1988, Mr Teoman Ozdener, who had been hired as an F-28 maintenance specialist, outlined for Mr Bittle what options were open to Air Ontario management with regard to the spare parts situation. Mr Ozdener explained to Mr Bittle that, if the THY deal were completed, the spares problem would be solved. If the THY deal did not

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[1] In order for spare parts to be used in Canadian-registered aircraft, it is necessary for Transport Canada to satisfy itself of the soundness and integrity of the parts. Regulatory authorities of most countries will inspect and certify domestic maintenance and overhaul facilities as capable of maintaining and reconditioning parts to a sufficiently high standard for use in domestic aircraft. Canada and other countries have bilateral arrangements whereby one country has confidence in and will rely upon another country's inspection and certification of its domestic maintenance and overhaul facilities – and the spare parts emanating from such facilities. In such circumstances, the parts will be "tagged" as having been maintained or overhauled by a facility certified by a foreign regulatory authority; and other countries, like Canada, will respect the "tags" and allow for the importation and use of such parts in domestic aircraft. There was no such bilateral arrangement between Turkey and Canada. Therefore, in order for Air Ontario to use the THY parts, it was necessary for it to request that a Transport Canada airworthiness inspector attend at the Turkish overhaul facility and provide a Canadian approval for the use of the Turkish parts.

[2] It was also intimated in this letter that the first aircraft "could be ready" by January 1988 and the second by March 1988.

go through, alternative sources of spares would have to be found, either by pooling parts with other F-28 operators or by buying parts independently from another source. Mr Bittle testified that, by March 4, 1988, he was still expecting the THY deal to go through.

On March 28, 1988, Mr Ozdener once again outlined for Mr Bittle his thoughts on the spares issue. Mr Ozdener wrote in his report to Mr Bittle: "THY DEAL IS 'VERY' CRUCIAL FOR OUR OPERATION" (Exhibit 813, p. 8). Mr Ozdener continued to plan for the contingency of the THY deal failing, which in simple terms meant that if the THY deal failed, Air Ontario had to look for spares from alternative sources, either from TAT or from some other source. Mr Bittle testified that during this period of time he was in frequent contact with Mr William Deluce – the "main man," to use his words, when it came to the THY spares deal. They were expecting delivery of the first aircraft around May 1, 1988, and Transport Canada certification of the parts could have taken up to six months.

On April 4, 1988, Mr Bittle wrote to Mr John Aguiar, his materials supervisor, and to Mr Ozdener, his F-28 specialist: "It would appear that the purchase of spares and equipment from THY is at least two to three weeks away and as such we must make a firm or alternate arrangements via TAT for renting of the bare minimum of rotables and test equipment" (Exhibit 828). Mr Bittle went on to say that the consumables should be purchased in small quantities and expressed the belief that the THY inventory would eventually be Air Ontario's.[3]

Mr Bittle explained in general terms the actions taken as a result of the delay in the THY deal:

> A. ... When it became evident that the THY deal was not happening, it certainly wasn't happening under the speed that we originally anticipated, and then, eventually, maybe it wasn't going to happen, so we re-activated some of those original plans and started to source out parts and equipment from other places and in – in anticipation of either having to keep them on a long-term basis or, on a short-term basis, to cover us until these THY parts came in-house, were certified and usable.
>
> (Transcript, vol. 103, pp. 82–83)

Mr Bittle contacted TimeAir, an F-28 operator, for the purpose of accessing its spare parts inventory. After agreeing to provide Air Ontario

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[3] Aircraft spare parts can be categorized under the broad headings of "consumables" and "rotables." Consumables are items such as gaskets, oil filters, hoses, or brake pads, which are used and then discarded when no longer serviceable. Rotables are items like fuel or hydraulic pumps, or generators, which can be overhauled or serviced and then used again.

with such access, TimeAir's maintenance manager, Mr Ritchie Rasmussen, at the request of Mr Bittle, wrote a short letter to Transport Canada addressed "To Whom This May Concern," dated April 19, 1988, and stating as follows:

> Time Air Inc. have an agreement to supply spare parts, including tools and equipment in reference to Fokker F28 MK1000 aircraft to Air Ontario.
>
> We have a working agreement operationally to support Air Ontario to do with the maintenance and support of the Fokker F28 aircraft in conjunction with our operation.
>
> We have also agreed to assist Air Ontario with the installation of 18 parameter FDR to meet M.O.T. requirements.
>
> (Exhibit 829)

According to the evidence of Mr Ole Nielsen, the principal Transport Canada airworthiness inspector for Air Ontario, the letter of Mr Rasmussen satisfied the spare parts prerequisites for putting the F-28 on Air Ontario's operating certificate. However, it must be pointed out that this three-sentence letter is the only documentary evidence of any such arrangement between Air Ontario and TimeAir. Mr Nielsen testified as follows on this subject:

> Q. ... was this directed to you by the author of the document, Mr Rasmussen?
>
> A. It was not specifically addressed to us, and I can't give you the specific dates when we were informed that ... there were not going to be any Turkish parts available.
>
> And we subsequently informed Air Ontario, Mr Commissioner, that we would not add the airplane to their operating certificate without them having adequate spares to maintain the aircraft.
>
> The determination of adequate spares is not made by us, it's made by the organization's quality control people, who certainly know the aircraft much better than we do.
>
> But at the same time, without any spares whatsoever in the organization, we were not in a position to add the airplane to the operating certificate.
>
> So Air Ontario subsequently went to TimeAir and requested the use of their spares while they were negotiating – I believe they were negotiating on some other spares from Europe.
>
> But in the interim, we told them that they had to have spares, and this letter was then produced to us by Air Ontario.
>
> Q. And this was satisfactory to you as the inspector that spares were –
>
> A. Yes.
>
> Q. – not an issue?

A. We ... can't advise the carrier that they must have spares at their ... base of operation. I mean, they could have it at some other base.

So for all intents and purposes, this satisfied the requirement for spares.

...

Q. ... is this a normal procedure for Transport Canada?

A. No, and it's not encouraged. This was a rather unusual circumstance where they had spares lined up in Turkey, and I believe the deal fell through. And now to operate the airplane, they needed some coverage for spares.

So this type of letter is not usually provided to us. We normally have formal contracts with other carriers. If one carrier is contracting all its maintenance to a third person, then there would be a specific contract in place for that provisioning of spares.

(Transcript, vol. 129, pp. 115–17)

After writing to Mr Aguiar and Mr Ozdener on April 4, 1988, with regard to contingency planning for spare parts, Mr Bittle wrote to chief operating officer Thomas Syme on the same subject. Mr Bittle's April 5, 1988, memorandum to Mr Syme indicated that certain decision dates had to be put in place regarding the spares situation. The memorandum emphasized that if the THY deal did not go through by May 15, 1988, "a firm order of between $1.5–$2 million" had to be placed elsewhere to ensure required provisioning for continued operation (Exhibit 814).

In his testimony, Mr Bittle described the memorandum as a timetable, given the impending delivery date of the aircraft:

A. ... [W]e requested from TAT on a rental basis a minimum stock of rotables, parts and equipment to support one airplane – and these ... should be coming over with the airplane – and that we ... also purchased, a ... minimum stock of consumables, consumables being filters, nuts, bolts, O-rings, things you use up and throw away, rotables being things you can overhaul or repair.

... April 11th ... we should be in a position to start looking at another alternate arrangement for a parts package, towards a possible firm order on May 15th.

May 15th was my final date for decision on the THY spares. If we don't have any, then we should go and start ordering – the parts that we would have started negotiating to buy on April 11th we should start ordering on May 15th.

(Transcript, vol. 103, pp. 92–93)

Parts Situation as F-28 Entered Revenue Service

As of May 31, 1988, following an inspection of the Air Ontario maintenance facilities by Transport Canada, the F-28 aircraft was included on the Air Ontario operating certificate. The inspection apparently satisfied the regulator that there were adequate equipment, parts, and facilities "necessary for the proper maintenance" of the newly acquired F-28s. As noted by Mr Nielsen in testimony, the decision on what constituted adequate spares was left to the quality control personnel of the airline.

The parts situation may have been adequate to meet the broad Transport Canada guidelines but was not sufficient to satisfy the marketing department of Air Ontario.

By June 17, 1988, Mr Bittle was very concerned about the lack of spare parts and expressed these concerns in a memorandum to Mr Syme. He stated in the memorandum:

> John Aguiar, myself and others are taking a lot of heat lately from various departments in the company with respect to the F-28 part situation. As we discussed before, it is well known that this part situation came upon us in a somewhat unusual way. The employees' belief that we "just forgot to order parts" or "didn't want to order parts" is a mistaken belief. It is causing a lot of hardship for all of us and ruining the credibility of this department. It is essential that the memo which you indicated would be issued from Bill is sent out immediately so that people understand the situation.
>
> (Exhibit 815)

According to Mr Bittle's testimony, the explanatory memorandum requested from Mr William Deluce and promised by Mr Syme was never issued.

When asked the source of the criticism of his department, Mr Bittle explained:

> A. [They were] people in marketing and – primarily in marketing ... they had sold this airplane to the public and it was on service and not reliable, and we were reporting back in a very, very concise form, you know, the airplane was late or it didn't go, parts on order or no parts or whatever, and this is where they were saying, what's the matter, Bittle you asleep at the switch, here? You forgot to order parts?
>
> And no, they don't go down to the stores and look at the shelf and see what's there. They don't have access to that.
>
> (Transcript, vol. 103, p. 109)

On the same date, June 17, 1988, Mr Bittle wrote a memorandum to Mr Aguiar and Mr Ozdener, with a copy to Mr Syme, stating that the "F-28 part situation is critical," and asking them to reply to him no later than June 22, indicating what plans they had in place to purchase an inventory of spare parts (Exhibit 816). At the date of Mr Bittle's two memoranda, the F-28 had been in revenue service for more than two weeks.

When asked why he used the word "critical" in his memorandum to Mr Aguiar and Mr Ozdener on the F-28 parts situation, Mr Bittle explained:

> A. Well, I just felt that reliability was to the point where it was not a very viable operation financially to operate the airplane as it was.
>
> We needed more parts, and so I guess the word "critical," from my point of view, was that we had reached a point where we have to make a decision here.
>
> Q. ... Or what was to happen?
>
> A. Well, I just didn't think we could operate waiting for these THY parts. It wasn't practical to keep beg[ging], borrowing and stealing from other companies. It wasn't a good way. There was too many delays, too many cancellations.
>
> (Transcript, vol. 103, p. 118)

F-28 project manager Joseph Deluce also identified the spare parts shortage as a significant cause of the poor reliability of the aircraft in its first month of commercial service. In his F-28 status report written in late June 1988, Captain Deluce wrote:

> The single most significant problem with the F28 is its reliability in our system. The various problems in this area include the following:
>
> a) Relatively inexperienced flight crews on this type of aircraft. (It will take some time for crews to learn the peculiar[ities] of operating an F28.
>
> b) Insufficient spares availability.
>
> c) Low level of expertise on the technical side in maintenance and troubleshooting the F28.
>
> d) Poor follow-up system of grounded F28 aircraft.
>
> (Exhibit 807, p. 044)

During this period of time, Mr Aguiar and Mr Ozdener attempted to secure a spare parts inventory from a variety of sources around the world. By mid-June 1988, Mr Aguiar and Mr Ozdener confirmed access to a supply of spare parts from sources in Norway, Sweden, and The Netherlands. On June 17, 1988 – the same day that Mr Bittle wrote to Messrs Syme, Ozdener, and Aguiar regarding the issue of spares – Air

Ontario's chief maintenance inspector, Mr Douglas Christian, wrote to Mr Ole Nielsen of Transport Canada requesting that Air Ontario be granted approval to certify and use the parts to be obtained from Norway, Sweden, and The Netherlands.

On June 27, 1988, Mr Nielsen responded to the request of Air Ontario by granting a limited approval (100 hours) for Air Ontario to use some of the parts from the named European sources.

Mr Nielsen was questioned on his impressions of the Air Ontario spares situation and his reaction to Air Ontario's correspondence to him of June 17, 1988:

> Q. When you received this letter on June 17th, Mr Nielsen, what, in a general sense, did this tell you about the parts situation at Air Ontario?
>
> A. Specifically, we knew they had the contract with TimeAir for parts, but we also knew that their – I believe about the same time that their parts situation with Turkey had come to an end.
>
> So this was ... their initial attempt at obtaining – perhaps not their initial attempt, but it was one of their attempts to obtain provisioning for the aircraft.
>
> The spares that they had obtained ... from these three facilities were not acceptable for import at the time, based on existing regulation.
>
> Q. ... And this is what I take it you told them in Exhibit 999 ... your letter dated June 27th, 1988.
>
> A. Yes, I spelled out the reasons why ... initially those spares were not acceptable. Braathens, the ones from Braathens in Norway weren't acceptable because we did not have a bilateral agreement with Norway.
>
> ...
>
> A. ... [A]nd the inventory from FFV Sweden was a similar problem. With no bilateral agreement, we could not accept the parts.
>
> The items ... from Allen Air Motive, although they came from Holland ... were not acceptable because they were released to the operator by means of Allen Air Motive's Federal Aviation Agency foreign repair station certificate. And we did not recognize ... FAA foreign repair station certificates.
>
> If they had been received with Dutch certification, we would have accepted that because we did have a bilateral agreement with Holland at the time.
>
> (Transcript, vol. 129, pp. 120–22)

When questioned further about allowing Air Ontario to operate with these now-acquired spares from Norway, Sweden, and The Netherlands, Mr Nielsen testified:

> A. – I had contacted our headquarters, Henry Dyck specifically, and we requested that – either we requested that an exemption be made to allow the use of these parts because we had actually – we had gone to Toronto and – at Pearson and witnessed the parts and we were satisfied that the parts would have been quite acceptable, but due to the regulatory requirements, they were not.
>
> So we requested that headquarters consider an exemption, which came, they allowed the use of the parts for 100 hours – we allowed the use of the parts for 100 hours ... pending the resolution of that request. And that is not outside the realm of normal day-to-day business. We do allow the use of foreign parts for up to 100 hours on any aircraft in Canada.
>
> (Transcript, vol. 129, pp. 122–23)

Mr Nielsen testified that the spares obtained by Air Ontario for the maintenance of the F-28 aircraft by June 1988 were "very limited" and that it was a "certainly limited inventory to maintain a jet type airplane" (Transcript, vol. 129, p. 124).

Ongoing Spares Provisioning

The efforts of Air Ontario maintenance to improve its spare parts supply continued throughout the period of time when the airline operated the F-28 aircraft. As stated, in the early stages of F-28 operations, while there was still a possibility that Air Ontario would acquire the THY spares inventory, Air Ontario's parts acquisition was limited to "bare minimum" renting from Fokker, ad hoc borrowing from TimeAir, leasing from parts supply companies, and small-scale purchasing from other sources.[4] When it became apparent that the THY deal would not be completed, spare parts were acquired from many international sources; and, in September 1988, Air Ontario took a significant step by exercising its option to purchase parts that it had been leasing pursuant to a June 1988 lease agreement with a company called Satair.

The evidence reveals, without any doubt, that there were insufficient spare parts to support the Air Ontario F-28 aircraft during the first weeks of commercial service. However, Mr Ozdener and Mr Bittle were of the opinion that there were adequate supporting spare parts as they expanded their inventory in the months that followed.

Mr Ozdener, in defence of the spares sourcing and acquisition that he ultimately coordinated, gave the following evidence:

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[4] Exhibit 828, memorandum dated April 4, 1988, from Kenneth Bittle to John Aguiar and Teoman Ozdener, Re: THY Parts

A. We never grounded an aircraft. Whenever we need a part, within 24 hours, we could bring anything from any place in the world.

There's a system called AOG.[5] You just call AOG and within 24 hours, the fastest way you will have the component or piece in your hands, sir.

(Transcript, vol. 101, p. 162)

Mr Bittle elaborated upon the complaints that Air Ontario maintenance was receiving from other departments in the company regarding the spares situation:

A. In my experience, in the parts department, you never have enough parts unless you have another airplane parked right beside the one you have and everything is there because ... Murphy's law says the part you need you don't have. Doesn't matter how much you spare up for it.

And so when you are lower than you would like to be, that situation is ... amplified even more, so sure, guys say, gee, we had to cancel a flight today or delay a flight because we didn't have the part. That ... reflects back on them and they expressed that to me.

Q. And is this the "ruining the credibility of the department" you are talking about?

A. Yeah. Yeah.

(Transcript, vol. 103, pp. 110–11)

Mr Bittle was questioned further on his opinion regarding the adequacy of Air Ontario's spare parts support. Given that he accepted responsibility for the spare parts situation at Air Ontario, I feel that it is necessary to quote from Mr Bittle's evidence at length:

Q. And I take it you would agree with me that the ... two F-28 aircraft that you brought into your fleet were not new aircraft?

A. That's right.

Q. They were used aircraft?

A. That's right.

Q. They had been, for example, we have heard evidence, parked in Turkey for a considerable period of time without being used?

A. Yes.

Q. And in those circumstances, being used aircraft and aircraft that had not flown for an extensive period of time, you would agree with me that it's all the more important to have a very good

[5] AOG Aviation Supply Inc. is an international aviation parts supplier based in Scottsdale, Arizona.

spares package when you are buying such an aircraft or two such aircraft?

A. ... [A]ny airplane needs a good spares package.

Q. But particularly an older airplane where, in your own words, you have to work out the bugs?

A. It becomes useful, yes. It's – you know, I wouldn't differentiate, because on a new airplane, number 1, the cost of operating or cost of acquiring it is higher.

So if you are trying to say that a new airplane, you wouldn't need as many spares, I disagree. Because when you are down with a new airplane, it becomes even more exciting.

Q. But with an old airplane – let's leave the new airplane aside. With an old airplane that's been parked, particularly one that's been parked for two years and not used, you need a good spares package because you are going to have problems?

A. Yes.

Q. And because it's been parked for two years, you are going to have more problems than if it had been in regular use and regularly maintained?

A. Yes.

Q. And for that reason, you need – all the more reason to need a good spares package?

A. Sure.

Q. Okay. And you didn't get that, did you?

A. I had adequate spares. I felt we had adequate spares.

Q. Were not spares a problem throughout the F-28 program?

A. As I said yesterday, spares are always a problem, and someone will always say to you, we didn't have enough spares.

I felt we had the correct level of spares.

Q. Would you not agree with me that a number of other people in management positions in Air Ontario identified the lack of adequate spares as being a specific problem to the F-28 program?

A. Unqualified people, but yes.

Q. Okay. You call Joe Deluce unqualified?

A. Yes. When it comes to that, yes.

Q. He was wrong in identifying the problem of obtaining spares?

A. He was not aware fully of what the problems are associated with it.

He was not a – he is not an individual that's in that kind of business, so he doesn't – you know, if any pilot, if any person wanted to dispatch a flight and there wasn't a part, they are going to say we don't have enough parts. They don't know why, they just say that.

Q. And it's your position, then, that with respect to the F-28 program, you consider as vice-president of maintenance that that would have been one of your areas of responsibility, wouldn't it, as vice-president?

A. Yes.
Q. The buck would stop at your desk with respect to spares?
A. Yes.
Q. That you had adequate spares throughout the operation of the program at Air Ontario?
A. Yes, I do.

(Transcript, vol. 104, pp. 159–62)

These comments by Mr Bittle and Mr Ozdener regarding the adequacy of spare parts are revealing. Both men were of the view that the spare parts support for the F-28 was adequate. Yet pilots who were flying the aircraft on the line – including the F-28 project manager and chief pilot – were of the view that insufficient spare parts caused delays and cancellations of F-28 flights. The evidence certainly indicated a difference in perception between the maintenance managers and others at Air Ontario regarding this issue. I accept the evidence of Mr Bittle when he commented:

A. ... if any pilot, if any person wanted to dispatch a flight and there wasn't a part, they are going to say we don't have enough parts. They don't know why, they just say that.

(Transcript, vol. 104, p. 162)

The statement would also appear to be applicable to the perceptions of both dispatch and marketing personnel; and, in the present case, perceptions are important. In particular, I am focusing on the perceptions of line pilots who were eager to make the jet program a success and who were subject to pressure, from many sources, to maintain on-time performance. In such circumstances, the reactions of pilots to perceived inadequacies in maintenance support may certainly vary.

It would appear that in the eyes of some – for example, Mr Bittle – the maintenance department lost some credibility over the spares situation. The comments of some F-28 pilots – for example, Captain Maybury, who described the ongoing assistance provided by Air Ontario maintenance as " ... [n]ot very good" (Transcript, vol. 92, p. 43) – would indicate that Mr Bittle's concern was well founded.

In chapter 10 of my Report, Technical Investigation, I identified 28 instances when maintenance deferrals were noted in the aircraft journey logbook of C-FONF during the period of time that Air Ontario had no approved MEL for the F-28. Of the noted deferrals, on at least five occasions the absence of parts or equipment was given as the reason for the deferral. The most recent of these "parts on order" deferrals occurred on November 23, 1988.

The following defects were recorded in the journey log of C-FONF as of the morning of March 10, 1989, prior to departure from Winnipeg:

1 September 22, 1988 – Captain's panel does not have a lighted time piece. Deferred IAW ANO Series 2-20. Licence ACA 87077. (Note – This deferral had been carried for almost six months).
2 February 8, 1989 – Roll and yaw not working properly in autopilot. Licence ACA 87118. Deferred.
3 February 8, 1989 – First Officer windshield wiper creeps up in flight. Licence ACA 87118.
4 February 23, 1989 – Pilot reports LH fuel gauge still intermittent (reads full). Licence ACA 87015. Carried Forward – Deferred.
5 February 24, 1989 – Number 1 Constant Speed Drive warning light tests but won't come on after shut-down. Licence ACA 87042. Deferred MEL 02-24.
6 March 9, 1989 – APU will not fire test. Licence ACA 87101. Deferred MEL 49-04.

(Exhibit 492, para 1.2, pp. 3–4, and Appendix 17 (Records Report))

There were also other discrepancies that were brought to the attention of the flight crew by the cabin crew prior to the first flight on March 10, 1989, but were not entered in the journey logbook (or any other log as far as can be determined). These included:

1 The exit light over the main entry door was not working.
2 The exit light over the cabin door, on the cabin side, was not working.
3 The cabin emergency floor lighting was dimmer than normal and had a bluish colour rather than a bright white colour.
4 There were three altitude-compensating oxygen masks missing from the back of the aircraft.
5 There had been some difficulty closing the main entry door in Winnipeg. A plastic surclip that normally held the door handle in the stowed position when the door was closed had broken, and, as an expedient, the handle was being held in place by double-sided tape. The difficulty in closing the door could have been attributable to the fact that the door operating handle was being held in the stowed position by the tape while an attempt was made to close the door. Neither the tape itself nor the fact that the surclip was broken apparently posed any danger of the door opening inadvertently.

(Transcript, vol. 55, pp. 78–85; based on testimony of Mr Gregory Morrison)

It is not known if any other problems developed during the flights on March 10, 1989.

Whether any of these maintenance deferrals can be attributable to insufficient spare parts is not altogether clear. In some instances, as described, there is specific mention of "parts on order," while in other instances the maintenance notation is simply "carried forward" or "deferred." I believe it is likely that some of the "carried forward/deferred" notations can be attributed to the lack of a replacement part. For instance, I can think of no other reason for the captain's panel to be without a lighted timepiece for a period of more than six months, except that Air Ontario maintenance did not have a replacement timepiece to effect a rectification.

Flight attendant Hartwick was questioned on Captain Morwood's reaction to these unserviceabilities:

> Q. Now, when these things were brought to Captain Morwood's attention, what was his reaction?
> A. He said, Oh, God, more snags. He was a little – he was frustrated things weren't being fixed.
> Q. So this would have been early Friday morning, right?
> A. That's correct.
> Q. And these things were put before him, and he was frustrated, and the words, to the best of your recollection ... is something like – what did –
> A. Damn it, more snags, this type of expression.
>
> (Transcript, vol. 10, pp. 168–69)

Insufficient supporting spare parts can contribute to the protracted deferral of necessary aircraft maintenance. When aircraft are operating with the maintenance of essential aircraft equipment deferred, pilots must contend with the operational constraints inherent in the unserviceabilities. When aircraft are continually operated with unrectified unserviceabilities, pilots can lose confidence in their maintenance organization and become frustrated in the operation of their aircraft. Based on the evidence before me, it would appear that some Air Ontario F-28 pilots, including Captain Morwood, were losing confidence in their organization and were frustrated with the F-28 operation.

Spare Parts: How Much Is Enough?

The spare parts requirements set out in Air Navigation Order Series VII, No. 2, are vague and unhelpful. No guidance is provided to the good-faith operator in determining what constitutes "such equipment as may be necessary for the proper maintenance of aeroplanes" (ANO Series VII,

No. 2, Part II, section 12(1)). Similarly, the regulator is given little assistance in the exercise of its discretion on this issue.

It is to be noted that there is no specific reference to "parts" or "spare parts" in the ANO. The requirement for spare parts, as identified by Transport Canada personnel, is based on the broad interpretation of section 12(1) of the order, which uses the language " ... adequate shelter, workshops and facilities, and such equipment as may be necessary."

Presumably, an airworthiness inspector will attend at an air carrier's maintenance facility to determine whether, in his or her judgement, there is an adequate supply of spare parts to support a given operation. However, the words of the ANO, "adequate" and "necessary," certainly invite diverse interpretation and defy enforcement.

Mr Nielsen, the airworthiness inspector who reviewed the Air Ontario spares situation, stated that the decision regarding sufficiency of spares was left to the quality control personnel of the individual airline because, as he put it, they know best the requirements of their operation. This may be true, but surely there should be some clearly articulated minimum standard that both Transport Canada and an air carrier could refer to in assessing whether a prospective operation has an adequate supply of supporting spare parts. Such an assessment must occur before a prospective operation is licensed; and the minimum standard would necessarily involve more than a "to whom it may concern" letter from another airline.

Mr Nielsen was questioned further on the TimeAir letter that Air Ontario produced in the purported fulfilment of its spare parts supply obligations:

> Q. Now, you are saying that this is the type of practice that is not encouraged by Transport Canada.
>
> A. No, it's not, no.
>
> We want the carriers to have their own parts. Whether through a ... contract agreement or actually purchased, that's entirely up to them, but we certainly want them to have readily available spares to conduct line maintenance at the least, and preferably those spares required to support their MEL requirements.
>
> (Transcript, vol. 129, pp. 117–18)

I note that when Transport Canada accepted the "to whom it may concern letter" as evidence of Air Ontario's ability to access " ... those spares required to support [its] MEL requirements," Mr Nielsen knew that Air Ontario had no approved F-28 MEL; and, as it happened, Air Ontario continued revenue service until December 1988 without an approved F-28 MEL.

Mr Bittle may have been absolutely right when he said that "... you never have enough parts"; however, the experienced judgement of senior maintenance management must certainly be brought to bear to determine how much is enough.

It may be argued that it is appropriate for an air carrier to make its own determination as to what constitutes an adequate supply of supporting spare parts for the purposes of operating its aircraft. Further, it may be argued that this determination is a strictly economic matter; and, if an airline wishes to risk the grounding of aircraft at inappropriate times and suffer the economic and marketing consequences of such groundings, then an airline should be able to make such an assessment and accept such a risk. I am of the view that such reasoning ignores the reality of day-to-day airline operations.

There is always a danger that the purely commercial risk of aircraft groundings and flight cancellations will be translated into operational risks taken by those immediately responsible for the safe operation of the aircraft. The evidence before this Commission indicates that inadequate spare parts support can put pressure on mechanics and pilots to defer aircraft maintenance for long periods of time in order to maintain on-time performance. I am of the view that this tendency was to a certain extent exacerbated at Air Ontario because operational personnel were themselves enthusiastic about the F-28 program and eager for it to succeed and because usual standards of scrutiny and conservatism were allowed to wane.

Findings

- Transport Canada has a legal obligation to determine whether adequate spare parts are available to an air carrier for the "proper maintenance" of aircraft used by the air carrier (ANO Series VII, No. 2, Part II, section 12(2)).

- Unless Transport Canada is satisfied that adequate spare parts are available for a given aircraft, approval of the air carrier to use that type of aircraft should not be granted.

- Transport Canada temporarily allowed Air Ontario to use spare parts from other countries although regulations did not allow those parts to be imported into Canada and approved for use on a long-term basis.

- Transport Canada personnel satisfied themselves that sufficient spares for "proper maintenance" existed by simply relying upon the judgement of Air Ontario quality control personnel and by accepting

at face value a brief letter from TimeAir. This letter merely indicated that TimeAir agreed to supply spare parts to Air Ontario and gave no further details whatsoever.

- Air Ontario did not have an adequate supply of spare parts in house at the time the F-28 was added to the operating certificate and started in commercial service.

- Lack of spares, combined with enthusiasm for the F-28 project, brought pressure to bear upon Air Ontario maintenance personnel and pilots to carry maintenance snags for long periods of time.

- ANO Series VII, No. 2, Part II, section 12(2) is vague in that it does not assist Transport Canada airworthiness personnel to determine what equipment and spares are necessary for the "proper maintenance" of aircraft.

RECOMMENDATIONS

It is recommended:

MCR 58 That Transport Canada direct its airworthiness personnel to determine themselves whether an air carrier has adequate spare parts for the proper maintenance of aircraft. Under no circumstances should this decision, in effect, be delegated to any person employed by the applicant air carrier.

MCR 59 That Transport Canada proffer for enactment an amendment to Air Navigation Order Series VII, No. 2, Part II, section 12(2), that assists Transport Canada airworthiness personnel to determine whether sufficient spare parts exist. Alternatively, an approved written departmental policy should be promulgated to assist airworthiness personnel to make this determination.

MCR 60 That Transport Canada under no circumstances issue an operating certificate or an amendment to an operating certificate until it is satisfied that all spare parts requirements established by Transport Canada are fulfilled.

19 THE F-28 PROGRAM: FLIGHT OPERATIONS MANUALS

Well-developed and up-to-date flight operations manuals are necessary for the safe and efficient operation of commercial aircraft. Such manuals are required both to establish standard procedures in aircraft operations and to provide day-to-day guidance to all operational personnel in an airline in the fulfilment of their duties. For manuals to communicate standard procedures, it is necessary that they be amended regularly, incorporating changes in operational practice, and that amendments be regularly distributed to appropriate personnel.

Generally, flight operations manuals used by Canadian air carriers operating large aircraft are of two types: manuals that deal with the air carrier's flight operations, and manuals that deal with the operation of a specific aircraft type in an air carrier's fleet.

This chapter examines operations manuals that were used by Air Ontario personnel in the operation of the F-28 aircraft.

Terminology

Throughout the Commission hearings, reference was made to a number of air carrier manuals. Witnesses demonstrated inconsistency when referring to the titles of a carrier's various flight operating manuals. To assist the reader, the following are general definitions of the relevant manuals:

1 Flight operations manual (FOM). A manual prepared by a carrier and approved by Transport Canada that sets out the organizational structure of the carrier, the duties and responsibilities of flight crews, and policies and procedures for the flight crew's guidance. The FOM is referred to as an operations manual in ANO Series VII, No. 2, Standards and Procedures for Air Carriers Using Large Aeroplanes.

2 Aircraft flight manual (AFM). A manual prepared by the manufacturer of an aircraft and approved by the airworthiness authority of Transport Canada as part of the type approval of that aircraft. It contains operating procedures, both normal and abnormal, aircraft limitations, and performance data. Certain portions of the AFM are

approved by Transport Canada. During Commission hearings the AFM most often referred to was the three-volume Fokker Aircraft F-28 Flight Handbook.

3 Aircraft operating manual (AOM). A manual prepared by a carrier that sets out detailed operating procedures for a particular aircraft type. Although approval of the manual by Transport Canada is not required, the AOM must be no less restrictive than the AFM prepared by the aircraft manufacturer. During Commission hearings, the AOMs most often referred to were the Air Ontario draft F-28 Operations Manual, the Piedmont Airlines F-28 Operations Manual, and the USAir F-28 Operations Manual (Pilot's Handbook).

4 Standard operating procedures (SOPs). This term is often used interchangeably by Transport Canada inspectors and air carrier operational personnel to describe aircraft operating manuals or condensations of procedures contained in AOMs in the form of checklists for use on the aircraft's flight deck.

5 Flight attendant manual (FAM). A reference manual prepared by a carrier that sets out procedures and practices for the guidance of flight (cabin) attendants in the conduct of their duties and responsibilities in an aircraft. The FAM is referred to by Transport Canada as a cabin attendant manual.

Manuals in Use on C-FONF on March 10, 1989

On March 10, 1989, the onboard library[1] of C-FONF contained, for use by the pilots: the three-volume aircraft flight manual (AFM) entitled, Fokker F-28 Flight Handbook; an F-28 weight and balance and performance manual; a Piedmont Airlines quick reference emergency and abnormal operations handbook; and a Piedmont Airlines normal checklist.

The pilots operating flight 1363 on March 10, 1989, carried the Air Ontario Flight Operations Manual (FOM), an Air Ontario route manual, instrument flight rules (IFR) approach charts, en route charts and related IFR information, and the F-28 Operations Manual. Captain Morwood

[1] An onboard library, located on the flight deck of an aircraft, consists of certain manuals that Transport Canada or the air carrier requires to be carried for the purpose of operation of the aircraft.

had with him a copy of Piedmont's F-28 Operations Manual, and First Officer Mills carried the USAir F-28 Operations Manual. Each flight attendant on the flight carried her own Flight Attendant Manual (FAM) issued by Air Ontario.

Included as part of each of the Piedmont Airlines and USAir F-28 operations manuals was a minimum equipment list (MEL) produced by Piedmont Airlines and USAir for their respective operations of the F-28 aircraft. Although Fokker Aircraft provided to Air Ontario two up-to-date F-28 flight handbooks in August 1988, it is not certain if one of these updated copies was on board C-FONF on March 10, 1989.[2] Since pilot evidence (Captain Monty Allan) suggests that the flight handbooks on board Air Ontario's F-28 aircraft were "a little bit dusty, a little bit dirty" (Transcript, vol. 91, p. 247), it is unclear whether a set of up-to-date flight handbooks was placed on board C-FONF. It is also not certain if a copy of the Fokker master minimum equipment list (MMEL) produced by Fokker Aircraft was on board C-FONF on the day of the crash.[3]

At the time of the crash, Air Ontario did not have its own F-28 operations manual. The Piedmont and USAir F-28 manuals were being used by Air Ontario and its F-28 pilots in the air carrier's flight operations, without the consent of Piedmont and USAir. No amendment service was requested by Air Ontario and no revisions were provided by Piedmont and USAir for their F-28 operations manuals.

Air Ontario leased from Transport Aérien Transrégional (TAT) of France the Fokker F-28 Mk1000 aircraft that crashed, which was registered to Air Ontario in June 1988 as C-FONF. It was contemplated and indeed stipulated in the lease agreement that C-FONF would be operated in accordance with the Fokker F-28 Flight Handbook and with an approved Air Ontario F-28 operations manual. At the time of the crash, Air Ontario had not completed drafting its own F-28 operations manual for approval by Transport Canada.

Flight Operations Manual

As stated elsewhere in this Report, the *Aeronautics Act* makes the minister of transport responsible for aeronautics applying to all aircraft operations within Canada. Air Regulations and Air Navigation Orders

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[2] Aircraft C-FONF bearing serial number 11060 was imported into Canada carrying a Fokker F-28 Flight Handbook without a complete set of revisions. In May 1988 Air Ontario maintenance requested a revision package for the out-of-date flight handbook set on board C-FONF, and at the same time it ordered one complete flight handbook for each of C-FONF and C-FONG.

[3] Because the entire cockpit was completely consumed by fire, none of the referenced manuals and documents was recovered, either in whole or in part.

(ANOs) are developed by Transport Canada for the regulation of aeronautics and aircraft operations. ANO Series VII, No. 2, is the Canadian legislation that must be complied with by an air carrier operating large aircraft in commercial air service.

As part of the flight operations requirements, section 31 of ANO Series VII, No. 2, states that "An air carrier shall provide an [Flight] *Operations Manual* for the use and guidance of operations personnel in the execution of their duties." As both the regulator and air carriers normally refer to an operations manual as a flight operations manual, I will also do so for the purposes of this Report. Section 33 of the ANO states that the contents of a flight operations manual shall include at least the items set forth in Schedule B of ANO Series VII, No. 2, and be "presented in sufficient detail to enable the operations personnel to perform their duties in a proper manner." Section 35 of ANO Series VII, No. 7, requires the air carrier to provide a complete copy of its flight operations manual or appropriate parts to each crew member. The FOM provided by Air Ontario to Captain Morwood and First Officer Mills that would have been carried on board C-FONF by them on March 10, 1989, was submitted by Air Ontario to Transport Canada for approval in September 1987 and was approved by Transport Canada on February 29, 1988.

Section 32 requires an air carrier to "provide" a copy of its flight operations manual to Transport Canada. The FOM is the primary operational document of all air carriers. I therefore consider it important to set out in its entirety what Canadian legislation requires as a minimum for an air carrier to include in its FOM. Schedule B of ANO Series VII, No. 2, states as follows:

OPERATIONS MANUAL [FOM]

1. The following items shall be contained in an Operations Manual.
(a) a true copy of the air carrier's operating certificates;
(b) a chart of the air carrier's management organization and general operating policies;
(c) the duties, responsibilities and succession of command of operations personnel;
(d) reference to appropriate Air Regulations, Air Navigation Orders, Information Circulars and operating certificates;
(e) the procedures for determining the usability of landing and take-off areas and for disseminating pertinent information thereon to operations personnel;
(f) the procedures for accident notification;
(g) the procedures for operating in conditions of ice, hail, thunderstorms, turbulence or any potentially hazardous meteorological conditions;

(h) emergency flight procedures and emergency duties assigned to each crew member;
(i) the procedures for familiarizing passengers with the use of emergency equipment during flight;
(j) other information or instructions relating to safety;
(k) details of the approved crew member training programs including ground, flight and emergency phases thereof;
(l) information pertaining to flight release and operational control, including procedures for the monitoring and control of each flight, as applicable;
(m) information pertaining to enroute operation, navigation and communication procedures, including procedures for the release or continuation of flight if any equipment required for a particular type of operation becomes inoperative or unserviceable enroute;
(n) information concerning the air carrier's approved routes including the types of aeroplanes authorized for each route, their crew member composition, the kind of operation, such as VFR, IFR or Night VFR, and any other pertinent information;
(o) information concerning airports into which the air carrier is authorized to operate, including
  (i) locations,
  (ii) the types of aeroplanes authorized to use the airport,
  (iii) instrument approach procedures,
  (iv) take-off and landing weather minima, and
  (v) any other pertinent information;
(p) take-off, enroute and landing weight limitations;
(q) the methods and procedures for maintaining the aeroplane weight and centre of gravity within approved limits; and
(r) information pertaining to the air carrier's flight watch system.

I note that sections 31 through 37 and Schedule B of ANO Series VII, No. 2, are generally similar to subparts 121.133 and 121.135 of Part 121 of United States Federal Aviation Regulations (FARs), which list the required contents of FOMs used by United States air carriers. I shall compare specific items in these subparts of the United States FARs with ANO Series VII, No. 2, later in this chapter of my Report.

ANO Series VII, No. 2, requires the air carrier to issue a copy of an approved FOM to each flight operations employee and further requires this manual to be kept up to date through the issuance of amendments reflecting changes in Canadian air regulations or in the air carriers' operating procedures.

The purpose of an air carrier FOM is unique. Not only does it provide important operational information for the flight crew, but it is also the "bible" which all operations personnel rely upon to ensure that safe flight operations are conducted by an air carrier. The FOM is also a

fundamental standard by which both the air carrier and the regulator measure the effectiveness and safety of the air carrier's flight operation.

Recognizing the importance of the FOM in directing air carrier operations, and given the fact that Transport Canada uses the FOM as a standard to assess and audit an air carrier's operation, I would describe at least the portions of the FOM that detail the mandatory requirements set out in Schedule B of ANO Series VII, No. 2, to be akin to subordinate legislation to the Air Regulations and to the ANO. The degree of detail and comprehensiveness with which an air carrier sets forth the requirements mandated by Schedule B in my view reveals the thoroughness and rigour with which an air carrier not only meets the regulatory requirement but also articulates its own expectation of a safe operation. In my view it also reveals the corporate philosophy and overall image of an air carrier. It is therefore important to determine if the information, advice, and direction contained in Air Ontario's FOM were sufficient to allow operations personnel to perform their duties in a proper manner.

The evidence shows that Air Ontario Inc., the merged and successor airline to Austin Airways Limited and Air Ontario Limited, operated from June 1987 until February 1988 without an updated and approved FOM reflecting the operations of the merged air carrier. Air Ontario Inc. did not produce a consolidated FOM and submit it to Transport Canada until September 1987, and Transport Canada did not approve it until February 1988. Captain Robert Nyman, the director of flight operations, testified that Air Ontario simply continued to use the old Air Ontario Limited FOM and the Austin Airways Limited FOM for the separate operations carried on within Air Ontario Inc. The FOM approved by Transport Canada in February 1988 was the result of Captain Nyman taking parts of both the old Air Ontario Limited and the Austin Airways Limited FOMs and combining the information in one document. As a result of FOM information combined from out-of-date manuals, items in the Transport Canada–approved Air Ontario Inc. FOM continued to be out of date in such matters as flight operations management, air carrier bases, various forms, and the reporting relationships among organizations internal to Air Ontario Inc. On March 10, 1989, the date of the crash, the latest amendment in the FOM was dated May 1, 1988.

Although most of the information that was out of date would not adversely affect the operational integrity of Air Ontario, matters that I view as significant were the inaccurate descriptions of the duties and responsibilities of Air Ontario's flight-watch system dispatchers, the inconsistency between the FOM and the FAM regarding hot refuelling, and the lack of an operational flight plan for use in the F-28 operation.

The FAM directs both passengers and flight attendants to leave an aircraft during hot refuelling, but, undeniably, no such direction was

provided in the aircraft fuelling subsection of the FOM. Instructions contained in both ESSO Petroleum Canada's and Transport Canada's policy documents prohibited hot refuelling of an aircraft with passengers on board. This discrepancy should have been rectified by responsible Air Ontario Inc. management, and the prohibition, accordingly, included in the FOM.

As discussed in chapter 23 of this Report, Operational Control, Air Ontario provided to its F-28 flight crew a flight release for use for the conduct of flights in Air Ontario's F-28 aircraft. ANO Series VII, No. 2, Part III, section 15(1), states as follows:

> No person shall commence a flight unless the pilot-in-command and, where applicable, the flight operations officer authorized by the air carrier to exercise operational control over the flight, has approved and signed an operational flight plan setting forth the conditions under which the flight is to be conducted.

Operational flight plan is defined in ANO Series VII, No. 2, as the "operator's plan for the safe conduct of a flight."

Mr David Rohrer, chairman of the operations group of the Commission's investigation team, in testimony referred to the operational flight plan prepared by Air Ontario for the Convair 580 aircraft as one that complied with the criteria set out in ANO Series VII, No. 2. Mr Rohrer testified that no such operational flight plan existed in Air Ontario's FOM for the F-28 aircraft. He testified that the flight release used by Air Ontario for the dispatch of the F-28 aircraft "did not fulfil what I considered to be an operational flight plan" (Transcript, vol. 87, p. 31). A copy of the flight release used by the crew of C-FONF on March 10, 1989, is set out in chapter 23. For purposes of comparison, figure 19-1 is a copy of the sample Convair 580 operational flight plan included by Air Ontario in its FOM. By comparison, the sample operational flight plan for the Convair 580 aircraft is far more complete and detailed than the flight release used by Air Ontario for F-28 flight operations. The Convair 580 operational flight plan contains information similar to that found in an aircraft flight log (referred to in testimony by Captain Claude Castonguay and discussed in chapter 20 of this Report, F-28 Program: Flight Operations Training).

The importance of an operational flight plan such as set out here is that it contains data needed by the flight crew to operate a flight. The data include magnetic tracks, distances to be flown, wind direction and velocities, outside air temperatures, true air speeds, estimated ground speeds, and estimated times to be flown on each flight leg. As well, the data contain estimated fuel flows, fuel burns, and fuel reserves for each leg of the flight. Detailed information provided for the alternate

Figure 19-1 Sample Convair 580 Operational Flight Plan

AIR ONTARIO: CONVAIR 580 OPERATIONAL FLIGHT PLAN 11/08/84
GX F918 08 NOV 84 C-GDTC

FRM	TO	AWYS	MAG HDG	DIS	W/D	W/V	TMP	TAS	EST F.F.	ACT G.S	EST G.S	ACT TIME	TIME	ETA	ATA	EST BURN	ACT BURN	EFR	REV EFR	AFR
YZR	YXU	DRCT	090	52	280	42	-29	287	1900	328	___	:14	___	___	___	618	___	9882	___	___
YXU	YYZ	DRCT	065	76	280	42	-29	287	1900	322	___	:14	___	___	___	447	___	9435	___	___
YYZ	MSS	HL594	078	224	280	42	-29	287	1900	323	___	:42	___	___	___	1317	___	8118	___	___
MSS	YJN	HL586	084	63	280	42	-29	287	1900	330	___	:22	___	___	___	612	___	7506	___	___
TOTAL												1:31				2994				
TO ALTERNATE																				
YJN	YUL	DRCT	341	35	280	10	-6	271	1900	264	___	:22	___	___	___	818	___	6688	___	___
TOTAL												1:53				3812				

ALTITUDE: 23,000 FT.
* CLIMB FACTOR INCLUDED
• APPROACH FACTOR INCLUDED

ALTITUDE: 9,000 FT.
* CLIMB & APPROACH INCLUDED

FUEL AND WEIGHT CALCULATIONS

DESTINATION FUEL:	2,994	AIRCRAFT WEIGHT:	35,110
ALTERNATE FUEL:	818	PAYLOAD	300
RESERVE FUEL:	2,100	Z.F.W.:	35,410
	------	TOTAL FUEL	10,500
MINIMUM FUEL:	5,912	G.T.O.W.:	45,910
CONTINGENCY:	500	BURN:	2,994
EXTRA FUEL:	4,088	LANDING WEIGHT:	42,916

TOTAL FUEL:	10,500		

DISPATCHER: _____

CAPTAIN: _____

end of report

Source: From Air Ontario's FOM (Exhibit 146)
Note: Any errors contained in this sample operational flight plan have not been corrected

airport includes calculations for required fuel to the alternate, reserve fuel, minimum fuel, and contingency fuel. None of the above items, including the provision of aircraft landing weights and flight altitudes, is contained in the flight release used by the flight crew of C-FONF on March 10, 1989.

Mr Randy Pitcher, a Transport Canada air carrier inspector, Mr Adrian Sandziuk, an Air Canada flight dispatcher, Captain Claude Castonguay, an experienced airline pilot, and Mr David Rohrer, this Commission's operations group chairman and an investigator with the Transportation Safety Board, all testified that the information contained in the flight release for the purposes of operational control of the flight of C-FONF was "minimal," "incomplete," or did not exist. In the view of some of these witnesses, this information did not meet the requirements of ANO Series VII, No. 2, which is to provide the flight crew with a plan for the "safe conduct of a flight."

As discussed in chapter 23, Transport Canada does not prescribe either the form that an operational flight plan should take or the minimum contents. However, the sample Air Ontario operational flight plan for the Convair 580 contains significant operational information not contained in the F-28 flight release. This information, in my opinion, is necessary for a flight crew to plan and conduct their flight in a safe and orderly manner.

The flight crew of C-FONF should have received, prior to the dispatch of flights 1362 and 1363 on March 10, 1989, in addition to the flight release, an F-28 operational flight plan similar in form and content to the sample Convair 580 operational flight plan contained in the carrier's FOM.

While I need not determine that the sample Convair 580 operational flight plan complies with ANO Series VII, No. 2, I find that the flight release used by the flight crew of C-FONF on March 10, 1989, did not meet the requirements of an operational flight plan as contemplated in ANO Series VII, No. 2. Further, the evidence is clear that no operational flight plan was used on March 10, 1989, by the flight crew of C-FONF. No sample operational flight plan was contained in Air Ontario's FOM as an example to be used by the F-28 flight crews, and there is no evidence that one had ever been created by Air Ontario.

ANO Series VII, No. 2, Schedule B, sets out the items that must be contained in an air carrier's FOM. Subsection (l) requires "information pertaining to flight release and operational control, including procedures for the monitoring and control of each flight, as applicable," and subsection (j) requires "other information or instructions relating to safety."

Since there was no operational flight plan for use by the flight crews in the F-28 operation, I am of the view that Air Ontario did not comply with the requirements of ANO Series VII, No. 2, sections 2 and 15, and Schedule B. Air Ontario did not set out in its Flight Operations Manual an example of or the information necessary for an operational flight plan for F-28 aircraft operations in order to demonstrate that procedures were in place to monitor and control the flight of C-FONF and to demonstrate that Air Ontario had a plan for the safe conduct of the flights of C-FONF on March 10, 1989.

In chapter 12 of my Report, Aircraft Performance and Flight Dynamics, I observed that there was a lack of information, advice, and direction relating to ground-accumulated wing contamination in both Air Ontario's draft F-28 Operations Manual and the approved FOM. Similarly, there is little direction in the Air Ontario draft F-28 Operations Manual and the approved FOM regarding takeoff on contaminated runways. Air Canada's FOM, by comparison, although it contains only slightly more information on the prohibition against taking off with contaminated wings, does contain far more advice and direction regarding aircraft de-icing and operation from contaminated runways. A number of amendments on environmental factors are contained in the Air Canada manual, among them an article by Captain Gary Wagner on aerodynamic and performance issues in icing conditions, written as a result of his participation with this Commission of Inquiry. The Air Canada FOM is frequently updated to include new or revised matters of operational concern to flight crews and other operational personnel. While I do not suggest that the material contained in Air Canada's FOM is exhaustive, what is obvious is that the matters of icing, wing contamination and de-icing, and operation from contaminated runways are dealt with in far more depth in the Air Canada FOM than they are in Air Ontario's FOM.

Since an air carrier's operation is inherently dynamic, it is essential that there be ongoing amendments to the FOM to ensure that it reflects changes in the air carrier's operations and provides new information which will make flight operations safer and reflect changing regulatory requirements. Given the facts that Air Ontario Inc. operated for approximately eight months with no approved FOM reflecting the merged operations and that on March 10, 1989, the last major amendment in Air Ontario's FOM was dated May 1, 1988, and taking into account just a few of the deficiencies discussed herein, it is apparent that ongoing changes in Air Ontario's operations were not being reflected on a regular basis in that air carrier's FOM.

Although I am not singling out any particular flight safety deficiency as a result of the lack of currency of the manual, it is my view that failure to maintain a comprehensive FOM, reflecting the continued and

current status of an air carrier's operation, has an overall flight safety implication. If it is understood by operations personnel that the FOM is constantly out of date or that it contains little important information on operational matters, then these operations personnel may discount its effectiveness and value.

Although ANO Series VII, No. 2, contemplates in sections 31 and 36 that there will be amendments in the operations manual, which is to be kept up to date, there are no criteria in the ANO, nor is there direction, with respect to how amendments are made, the frequency and dissemination of amendments, and the review of the contents of a carrier's FOM. In particular, there is no mandatory requirement that the required items in an operations manual, as listed in Schedule B of ANO Series VII, No. 2, be reviewed and amended on a regular basis.

Although the Air Ontario FOM was ultimately prepared, submitted, and approved – eight months after it should have been – I find it unacceptable that Air Ontario did not produce an up-to-date FOM, and that Transport Canada did not insist that it be produced within a reasonable period of time following the merger of Austin Airways Limited and Air Ontario Limited operations. Eight months is an unreasonably long time for an air carrier to be without an up-to-date FOM. A planned audit of Air Ontario Inc.'s operation was delayed in part because Air Ontario did not have a current FOM. This happened in spite of the fact that Transport Canada inspectors were concerned about inadequate operational control by Air Ontario over its widely located flight bases. I cannot see how Transport Canada can ensure that an air carrier's operations personnel are performing their duties in a "proper manner" without a current FOM.

Section 34 of ANO Series VII, No. 2, states that "[a]n air carrier shall provide not less than one complete copy of his Operations Manual to the Director." The ANO requires provision of the FOM to Transport Canada, but the legislation is silent as to whether it must be "approved" by Transport Canada. Since Schedule B of ANO Series VII, No. 2, sets out items to be contained in an FOM, one must assume that Transport Canada also reviews and approves at least the items required by Schedule B. Silence in the ANOs on the matter of the review and approval of the FOM by Transport Canada is, in my view, entirely unacceptable.

The fact that Air Ontario did not produce an up-to-date FOM in a timely manner, and the fact that Transport Canada made no effort to require such FOM to be produced and provided to Transport Canada, persuades me that ANO Series VII, No. 2, is inadequate. It fails to require the air carrier to prepare, and Transport Canada to review and approve, the FOM in a timely and effective manner.

Aircraft Flight Manual

Part of the Canadian certification process for new aircraft types is the requirement that the aircraft manufacturer produce an aircraft flight manual (AFM). This manual, given various names by individual manufacturers (in the case of Fokker Aircraft, it is called the F-28 Flight Handbook, described earlier in this chapter), is referred to in ANO Series VII, No. 2, as the "approved Aircraft Flight Manual." The AFM contains manufacturer's operating procedures that must be followed in order to conform to the aircraft limitations established during certification.

Two Fokker F-28 Mk1000 aircraft, one being C-FONF, which were leased by Air Ontario, were delivered with a three-volume set of the Fokker F-28 Flight Handbook manuals. These manuals were recognized by Transport Canada as the "approved Aircraft Flight Manual" for the purpose of the aircraft's certification.

Reference is made to specific portions of the Fokker F-28 Flight Handbook in various chapters of this Report. The AFM produced by Fokker Aircraft and approved by the Rijksluchtvaartdienst (RLD) is detailed and comprehensive in nature, and I do not propose to discuss this manual in detail in this section of my Report.

Aircraft Operating Manual

There is no legal requirement in Canada for an air carrier to produce and operate its aircraft using its own aircraft operating manual (AOM). ANO Series VII, No. 2, contemplates that the air carrier will use, in the operation of any of its aircraft, the aircraft manufacturer's aircraft flight manual (AFM).

An AFM is a highly detailed manufacturer-produced document, and its use on the aircraft flight deck on a day-to-day basis is often impractical, particularly because of its size and complexity. Most air carriers modify the presentation of the performance data and revise operating procedures set forth and contained in the AFM into handbooks and checklists, producing their own AOMs. These AOMs would be compatible with the air carrier's specific operation. An air carrier that operates a number of different aircraft types often endeavours to standardize as many procedures as is feasible to reduce the risk of error and to facilitate pilot transfers between aircraft types. AOMs, which incorporate the air carrier's standard operating procedures, must be at least as restrictive as the manufacturer's AFM.

Aircraft operating manuals, often referred to by witnesses in these hearings as aircraft standard operating procedures manuals (SOPs), were, in the case of Air Ontario, the Piedmont F-28 Operations Manual, the USAir Fokker F-28 Operations Manual (Pilot's Handbook), and the

draft Air Ontario F-28 Operations Manual. Although, as noted, neither the ANOs nor any other relevant Canadian legislation deals with such an aircraft manual, Transport Canada in its internal policy and guidance documents refers to it as an aircraft operating manual.

Either the approved AFM (referred to in ANO Series VII, No. 2) or the AOM (informally "accepted" by Transport Canada) is carried by all pilots flying a specific aircraft and is used by them in the day-to-day operation of that aircraft type. This manual is a standard against which pilots are tested in ground school, during annual recurrent training, and in the required annual pilot proficiency checks (PPCs) conducted either in the aircraft or in an approved flight simulator.

The air carrier can, and normally does, condense portions of the AFM into checklist format and make such checklists available in the aircraft as separate booklets for ease of use by the pilots and to facilitate immediate reference. Such booklets are normally called quick reference handbooks (QRHs) and aircraft checklists.

Air Ontario did not require its F-28 pilots to use the manufacturer's AFM on a day-to-day basis. Although Transport Canada was not requested by Air Ontario to approve an F-28 AOM, the evidence indicates that it was the intention of Air Ontario to create its own AOM. It was also clear from the evidence that Air Ontario intended to use Piedmont Airlines' and USAir's F-28 operations manuals on an interim basis for the initial startup of Air Ontario's F-28 revenue operations. Apparently, Piedmont Airlines and USAir understood that their F-28 operations manuals would be used only as training tools for the purposes of aircraft ground school and simulator training provided by Piedmont Airlines/USAir to Air Ontario pilots.

In January 1988 Air Ontario sought the approval of Transport Canada to add the F-28 aircraft to its operating certificate. At the same time, Air Ontario also sought approval from Transport Canada for the use, on an interim basis, of Piedmont Airlines' F-28 ground school syllabus, simulator training, and instructors to enable Air Ontario pilots to make the transition to the F-28 aircraft. Pursuant to ANO Series VII, No. 2, Air Ontario required Transport Canada's consent for the use of such an F-28 training program, which Piedmont Airlines had agreed to provide to Air Ontario. Transport Canada anticipated that Air Ontario would submit to Transport Canada in the "near future" its own F-28 training syllabus, including an Air Ontario F-28 operations manual, for its review and approval. Neither Air Ontario nor Transport Canada clarified when the "near future" would be.

Approval for Air Ontario to use Piedmont Airlines' F-28 training syllabus, simulator, and instructors was given by Transport Canada in February 1988. No formal request was made by Air Ontario, nor was permission granted by Transport Canada, to allow Air Ontario pilots to

use the Piedmont F-28 operations manuals in Air Ontario's F-28 revenue operations. The approval granted by Transport Canada was for the contract ground school and simulator training conducted by Piedmont Airlines and was considered to be "an interim measure" (Exhibits 716 and 857, Transport Canada memorandum and letters) to enable Air Ontario to make the transition to the F-28 aircraft. Transport Canada specifically advised Air Ontario that "[i]t is anticipated you [Air Ontario] will submit your own F28 syllabus of training in the near future" (Exhibit 857, letter from Transport Canada to Air Ontario, February 15, 1988). Mr Martin Brayman, at the time Transport Canada's inspector responsible for monitoring Air Ontario's operations, confirmed that he contemplated that the Piedmont F-28 Operations Manual would be part of the training package used to train Air Ontario pilots. He stressed in testimony that such use of all of the training material, including the Piedmont F-28 Operations Manual, was "on an interim basis" (Transcript, vol. 131, pp. 119-20).

The letter of authorization from Transport Canada did not mention the use of the Piedmont F-28 Operations Manual. The mere fact that Air Ontario used the Piedmont F-28 Operations Manual for the entire period it operated its F-28 aircraft appears to indicate that, in the absence of any instructions to the contrary from Transport Canada, Air Ontario assumed it could use the Piedmont manual in its F-28 revenue operations. At least one Transport Canada air carrier inspector, Mr Randy Pitcher, who was trained by Piedmont and thereafter became the designated F-28 inspector for Transport Canada, Ontario Region, felt it was acceptable for Air Ontario to use Piedmont's F-28 Operations Manual, at least for training. Mr Pitcher testified that approval by Transport Canada of the Piedmont Airlines' training program was given to Air Ontario prior to his joining Transport Canada. However, he was informed by Mr Brayman, and he understood from his review of Transport Canada correspondence, that the Piedmont F-28 manual was approved for use by Air Ontario for the purposes of training pilots on the F-28 aircraft.

Air Ontario's F-28 Project Plan contemplated that an Air Ontario F-28 operating manual would be developed under the supervision of the director of flight operations in a format similar to the Piedmont F-28 Operations Manual. The Project Plan contemplated that the development of this manual would be completed in February 1988, during the early stages of the F-28 program and at about the time it anticipated the amendment to the operating certificate to include the F-28 aircraft.

In December 1988, six months after C-FONF was imported into Canada and an operating certificate was granted by Transport Canada to operate the F-28 aircraft, a senior Air Ontario F-28 check pilot, Captain Robert Perkins, was concerned enough about the lack of an Air Ontario

F-28 operating manual to ask Captain Joseph Deluce about its status. Captain Perkins testified that when he "did not receive a favourable reply" to the question he then asked as to whether amendment information was available for the Piedmont F-28 Operations Manual (Transcript, vol. 44, pp. 93–94). Captain Perkins was advised that there would be no amendment service for the Piedmont manual. He further testified that it was his view that Air Ontario should have had either an up-to-date Piedmont manual or its own F-28 operating manual. Mr James Morrison, Air Ontario's newly appointed vice-president of operations, was aware by late December 1988 that no Air Ontario F-28 operations manual had been drafted (Transcript, vol. 115, p. 112). Captain Deluce at that time had enlisted the assistance of Captain Perkins and First Officer Steven Burton to assist him in developing the F-28 operations manual. As a result of a number of circumstances such as a pilot strike, the delay in the delivery of the F-28 aircraft, and the failure of the F-28 project manager, Captain Deluce, to attend to the production of the AOM as contemplated by the F-28 implementation plan, a draft Air Ontario F-28 Operations Manual was not submitted to Transport Canada for approval until June 7, 1989, the same month that Air Ontario discontinued its F-28 service and three months after the crash of C-FONF.

Virtually all of the operating procedures and performance data contained in the draft Air Ontario F-28 Operations Manual were extracted verbatim from Piedmont's F-28 Operations Manual. As discussed in chapter 12 of this Report, *Fokker F-28, Mk1000, Aircraft Performance and Flight Dynamics*, the authors of the Air Ontario AOM elected to leave out the charts contained in the Piedmont manual that provided weight restrictions to be applied to a takeoff on contaminated runways. In place of the chart was a statement referring the reader to the charts of the Fokker F-28 Flight Handbook. One of the drafters of the Air Ontario F-28 Operations Manual, Captain Perkins, testified that the use of the slush-correction charts from the Fokker AFM was an interim measure only, since it was operationally impractical to use these charts in the cockpit to make slush-correction calculations (Transcript, vol. 44, pp. 184–85). No explanation was given as to what correction charts Air Ontario planned to use as an alternative to the Fokker correction charts and the more restrictive Piedmont charts.

On June 20, 1989, Transport Canada acknowledged receipt of Air Ontario's draft F-28 AOM and advised Air Ontario that it was being reviewed. Because Air Ontario discontinued its F-28 service in June 1989, a review and informal approval by Transport Canada was never completed.

I do not propose to comment on the contents and form of the draft Air Ontario F-28 AOM. I do, however, note that it is unacceptable that Air Ontario did not have in place its own F-28 operations manual at an

early stage of revenue operation with the aircraft. Captain Charles Simpson, the vice-president of flight operations for Air Canada, testified that, once approved, the AOM becomes the "bible" by which the aircraft type is flown (Transcript, vol. 118, p. 76). He further testified that in his view it is the only document that should be on board the aircraft for use as a reference to operate an aircraft type. It is the policy of Air Canada that no new aircraft type be introduced into passenger-carrying line service until an AOM for the particular aircraft type is produced. While Air Canada might use a manufacturer's AFM during initial pilot training on a new aircraft type, Captain Simpson testified, by the time the aircraft type is ready for line operation Air Canada has always developed its own AOM.

After reviewing the F-28 Project Plan of Air Ontario, the manuals used, and the testimony of many Air Ontario pilots, I have a clear impression that Air Ontario F-28 pilots were often left to learn and to discover for themselves what were the best operational flight procedures for the F-28. This was occurring at the same time that the pilots were conducting revenue flights. It can be expected that some learning will take place as pilots gain experience on a new aircraft type. To require the pilots to operate without a company-generated aircraft operating manual, however, places an additional and unnecessary burden on the pilots.

It was an obvious and serious neglect for Air Ontario not to produce, in a reasonable time, an AOM for the F-28. As well, Air Ontario did not raise and Transport Canada did not address the issue of Air Ontario F-28 pilots using, at the same time, in revenue operations, other air carriers' aircraft operating manuals, specifically the Piedmont Airlines F-28 Operations Manual and the USAir F-28 Operations Manual.

The operating methods in these manuals reflected Piedmont's/USAir's standard F-28 operating procedures and, of necessity, would have been different from the operating methods previously used by Air Ontario pilots on other aircraft.

The fact that Air Ontario did not provide its pilots with F-28 operating procedures tailored to their methods of operating was considered to be a problem by the Air Ontario F-28 pilots who testified. Additionally, permitting a different F-28 aircraft operating manual to be used by each of the pilots on the flight deck is potentially hazardous.

Difficulties can arise when an air carrier uses an AOM produced by another air carrier that may operate the same aircraft in a different environment using different flight operations procedures. Aircraft standard operating procedures developed by an air carrier from the manufacturer's aircraft flight manuals incorporate operating procedures standard to all of the carrier's aircraft types. For example, although a manufacturer's AFM describes what actions and procedures are required

for a given operational situation, often it may not explain in sufficient detail how such actions and procedures are to be carried out by the flight crew. Similarly, the AFM may not designate which flight crew member should carry out which action or procedure and what, if any, verbal calls should be made in order that actions carried out can be confirmed. As was shown in the results of the pilot survey conducted by Captain Ronald Stewart, there were no pilot-not-flying (PNF) duties set out in the Air Ontario's operating procedures. This problem was in fact noted by Transport Canada during a flight inspection of the Dash-8 in its audit of Air Ontario in the fall of 1988, as discussed in chapter 33 of this Report. The following is the relevant non-conformance finding (0-15.1) from Transport Canada's 1988 audit report of Air Ontario regarding standard operating procedures (SOPs) manuals (that is, AOMs):

> Standard operating procedures between crews vary. Call outs are not standardized. There are crews doing after start check while taxiing, resulting in no lookout. There is evidence that there is no cross-checking between Captain and First Officer as to altimeter, heading, course and airspeed bug settings. Crew co-ordination and management are at times lax.

Transport Canada concluded that "These problems are due to the company not having Standard Operating Procedures Manuals" (Exhibit 1042, Transport Canada Aviation Group National Audit of Air Ontario Inc., February 1988).

The comments of the Transport Canada auditors reveal a desire by the regulator that air carriers operate their aircraft using company-produced aircraft operating manuals incorporating company standard operating procedures. Transport Canada auditors noted that the chief pilot for Air Ontario's Dash-8 aircraft fleet had not created such an aircraft operating manual. Transport Canada auditors directed Air Ontario to produce such manuals for the Convair 580 and the Dash-8 aircraft. Air Ontario's Flight Operations Manual specifies that one of the duties and responsibilities of a chief pilot is to, "[i]n cooperation with Training and Check Pilots, write and update Standard Operating Procedures Manuals for each aircraft type" (Exhibit 146, Air Ontario Flight Operations Manual, p. 3-8, para. 3.4.6.)

Captain Nyman testified that, contrary to Air Ontario's FOM, which states that aircraft operating manuals are required, and despite Transport Canada's auditors' request that Air Ontario create a Dash-8 standard operating procedures manual, Air Ontario's then Dash-8 chief pilot refused to do so. The chief pilot argued that the de Havilland Dash-8 Flight Manual was sufficient to constitute the air carrier's standard operating procedures manual. Although Captain Nyman, as director of

flight operations, disagreed with the chief pilot's position, he testified that because the chief pilot was Air Ontario's expert on the Dash-8, he did not order him to create a Dash-8 aircraft operating manual. In defence of the chief pilot's position, Captain Nyman stated that the chief pilot was able to convince Transport Canada air carrier inspectors that the de Havilland Dash-8 AFM rather than a company-produced standard operating procedures manual was a suitable document to use (Transcript, vol. 109, pp. 30–33).

The position of Air Ontario's Dash-8 aircraft chief pilot may be correct, but his view differs from both what is contemplated in Air Ontario's FOM and what was viewed by Transport Canada auditors as a deficiency by Air Ontario in not having a Dash-8 standard operating procedures manual.

Mr William Slaughter, who was director of flight standards, Transport Canada, when he appeared before me, testified that Transport Canada approves the manufacturer's aircraft flight manuals and specific parts of the air carrier's FOM. He considered a company-produced aircraft operating manual to be an optional document, internal to the air carrier, with no requirement for Transport Canada to review it. Mr Slaughter stated that although some air carrier inspectors commendably insist that company-produced aircraft operating manuals be submitted to Transport Canada for review, Transport Canada had no authority to require the air carrier to submit its aircraft operating manuals. Mr Slaughter further stated that the only method that Transport Canada has of ensuring that company-produced aircraft operating manuals are acceptable in form and content "is by exception" (Transcript, vol. 144, p. 100). In explaining what he meant by this statement, Mr Slaughter stated that if an air carrier presents its own AOM for review, Transport Canada will review it and provide its informal approval. Also, if Transport Canada suspects that an air carrier's internally produced AOM is deficient, then Transport Canada will step in and review such manual.

It was Mr Slaughter's view that, if an air carrier creates its own AOM, it should be a requirement that Transport Canada review such AOM to ensure that it conforms with the manufacturer's AFM. In any event, air carriers normally produce their own aircraft standard operating procedures manuals. More importantly, because part of these manuals includes "normal" and "abnormal" checklists and handbooks used by pilots on a day-to-day basis, Mr Slaughter acknowledged that Transport Canada should have more control over the contents and use by the air carrier of such AOMs or SOPs manuals.

Mr Ian Umbach, superintendent of air carrier operations, Transport Canada headquarters, also acknowledged during testimony that although Transport Canada reviews air carriers' training syllabi and associated data, such reviews do not necessarily include the review of

a carrier's AOMs. In the case of Air Ontario, Mr Umbach testified that while Transport Canada headquarters reviewed Air Ontario's training syllabus, no one at headquarters reviewed the Piedmont F-28 Operations Manual; nor was he aware of whether anyone at Ontario Region office had reviewed the manual. The evidence indicates that no one in Transport Canada in fact reviewed the Piedmont F-28 and USAir operations manuals used by Air Ontario. It also appears that no one at Transport Canada identified this fact and took steps to stop Air Ontario from continuing the practice of allowing F-28 pilots to use two different AOMs in the cockpit. Mr Umbach acknowledged that there should be some procedure in place to ensure that Transport Canada has reviewed an air carrier's operating manual and compared its contents with those of the aircraft manufacturer's AFM.

Both Mr Slaughter and Mr Umbach in testimony confirmed the inadequacies of the review and the approval process within Transport Canada regarding operational manuals. The stated position of Transport Canada is that although it reviews AOMs, it has no formal right to do so and has no authority to approve them. This position is untenable and creates an unworkable situation. It is my view that Transport Canada should review and approve all air carrier AOMs or SOPs manuals for each aircraft type in use by the air carrier. Both the regulator and air carriers believe that it is necessary for air carriers to develop their own aircraft-operating procedures to reflect the carrier's unique operational environment. However, there is no mechanism in place to ensure that the air carrier in fact develops an AOM that both reflects its operation and guarantees standardized procedures. While Transport Canada certainly does not ignore the reality that most air carriers use aircraft operating manuals specific to their operations, it is legally powerless to compel an air carrier to use such manuals. As well, current legislation provides no mechanism for Transport Canada to approve the manuals prior to their use by an air carrier.

ANO Series VII, No. 2, is silent on the entire issue of air carrier–produced aircraft operating manuals or aircraft standard operating procedures manuals. In contrast, the United States FARs, Part 121, clearly require the review and approval of such manuals. While there is no doubt that an air carrier has the right to use the manufacturer's AFM, most air carriers find it necessary to adapt the procedures and performance data in the AFM to their particular flight operational environment. It was the testimony of Captain Gert Andersson, an experienced F-28 captain with a Swedish air carrier, that performance charts and graphs such as the ones produced by Fokker Aircraft for takeoff on contamination-covered runways "should be used only by experienced performance people." The air carrier should make a "simpler chart for use in the cockpit" (*Transcript*, vol. 83, pp. 186–87). In reality, that is exactly what

most air carriers do when they create their own AOMs: they reproduce performance data and operating procedures in a format more readily usable by flight crews in the aircraft cockpit.

To ensure that the revised operating procedures sections and the modified presentation of performance data are no less restrictive than the AFM, the regulator must have an opportunity to review and approve such revisions and modifications.

FAR 121.141 states as follows:

> (a) Each certificate holder shall keep a current approved Airplane or Rotorcraft Flight Manual for each type of transport category aircraft that it operates.
>
> (b) In each transport-category aircraft, the certificate holder shall carry either the manual required by §121.133 [FOM], if it contains the information required for the applicable flight manual and this information is clearly identified as flight manual requirements, or an approved Airplane or Rotorcraft Flight Manual. If the certificate holder elects to carry the manual required by §121.133, *he may revise the operating procedures sections and modify the presentation of performance data from the applicable flight manual if the revised operating procedures and modified performance date presentation are –*
>
> (1) *Approved by the Administrator;* and
>
> (2) *Clearly identified as airplane or rotorcraft flight manual requirements.*
>
> (Emphasis added)

I recommend that ANO Series VII, No. 2, be amended to reflect similar provisions contained in FAR 121.141, which contemplate and allow air carriers to use internally produced AOMs and require the contents of such AOMs to be approved by the regulator. Further, as air carriers will in any event modify the presentation of performance data from the AFM in the form of "normal" and "abnormal" checklists and quick reference handbooks for use by the pilots, it is my opinion that air carriers operating large transport-category aircraft should be required to produce AOMs or SOPs manuals for each type of aircraft operated by them and to obtain approval of such manuals from Transport Canada prior to commencing commercial operation with the aircraft.

I will now deal with the second practice of Air Ontario that I view to be potentially hazardous, namely that of allowing on the flight deck the use of two different F-28 operations manuals: the Piedmont Airlines F-28 Operations Manual and the USAir F-28 Operations Manual. By way of background, during the course of training Air Ontario pilots, Piedmont

Airlines' operation was merged with the operations of USAir. USAir, which did not previously operate F-28 aircraft, rewrote the Piedmont F-28 Operations Manual to reflect the operations of USAir. The new F-28 operations manual for use by the merged operation became the USAir Operations Manual (referred to as its F-28 Pilot's Handbook). Air Ontario F-28 pilots who received training following the merger of the two airline operations received ground school and flight simulator training using the USAir F-28 Pilot's Handbook.

Captain Nyman, the flight operations director, first became aware of the change when he took his simulator training course in Tampa, Florida, in December 1988. At that time, Captain Nyman discovered that certain procedures used on the flight deck, such as standard checks and callouts, had been modified by USAir to fit its operation. Captain Nyman testified that he telephoned Captain Joseph Deluce and requested that he put a copy of the Piedmont F-28 Operations Manual in the F-28 aircraft. Captain Nyman wished to ensure that only one manual was being used by the pilots on the flight deck of the F-28; that manual, in his view, was the Piedmont F-28 Operations Manual (Transcript, vol. 109, pp. 67–68).

Despite the fact that the request to place a Piedmont F-28 Operations Manual on board Air Ontario's F-28 aircraft came from the director of flight operations, Captain Deluce never took action in relation to this request. Both manuals continued to be used by pilots on the F-28 flight deck for the duration of Air Ontario's F-28 revenue operations.

The Piedmont F-28 Operations Manual and the USAir F-28 Pilot's Handbook are comprehensive and detailed, reflecting the standard operating procedures of each of these airlines. I find no fault with the individual manuals, either in form or in content.

The fault that existed was in the use of two different aircraft operating manuals to describe flight operating procedures. Captain Simpson, in addressing this problem, explained that "you can't have two pilots in the same airplane using different procedures. It will lead to trouble sooner or later" (Transcript, vol. 118, p. 82). I entirely agree with this position.

Although the Piedmont and USAir F-28 operations manuals are comprehensive, both dealing with the same aircraft type, there are sufficient differences in the operating procedures of these two air carriers to create potential problems on the flight deck. Some of the differences were explored in testimony with Captain Perkins, who was, at the time of the crash, a check pilot on the F-28 aircraft. Briefly, some of the differences are as follows:

- The time between activating the first and the second fire extinguisher in an engine where there are indications of a fire are different. Piedmont states 45 seconds, USAir states 30 seconds.

- The USAir F-28 operations manual deals with the use of the autopilot in the procedure regarding stopping a runaway stabilizer trim; the Piedmont manual does not mention the autopilot.

- Procedures used for landing with one engine inoperative reveal several differences between the USAir and the Piedmont manuals. The Piedmont manual requires lateral fuel balance to be within 1500 pounds; USAir within 1000 pounds.

- The Piedmont manual details the actions to be taken for a go-around and requires the pilots to review them prior to landing; the USAir manual does not mention the go-around, nor is there any requirement to review go-around procedures. Piedmont provides for a level-off height of 600 feet above ground level (AGL) on a single-engine go-around; the USAir manual instructs the pilots to level off at 800 feet AGL.

- The one-engine go-around procedure is found in the Piedmont emergency chapter; the same procedure in the USAir manual is found in the training chapter.

- The Piedmont manual requires a pre-flight exterior aircraft inspection, or walkaround, prior to each flight; the USAir manual requires such inspection at originating stations and crew change points.

These and other differences caused concern among first officers who received their ground school training from USAir and were given a USAir F-28 Pilot's Handbook. Two Air Ontario pilots who were F-28 first officers testified that they were concerned that there was no formal advice given pilots as to which manual was to be used as the Air Ontario F-28 Standard Operating Procedures Manual. One of these first officers was under the impression that since no Air Ontario SOPs manual existed, the Piedmont F-28 Operations Manual was to be used. The other first officer, Captain Deborah Stoger, commented that the flight profiles are different in both manuals. "Captains were expecting Piedmont profiles, but I was trained in USAir procedures" (Transcript, vol. 93, p. 28). As a result of the differences in certain flight profiles between the Piedmont and the USAir aircraft operating manuals, this first officer recalls an instance in flight where there was confusion over the procedures to be used during the approach.

It is clear that differing procedures could cause confusion, especially in an abnormal situation where a particular procedure is not often used. One example, which I have mentioned above, is the difference between the Piedmont manual and the USAir manual regarding the altitude to

be maintained following a missed approach with one engine inoperative. This information, which deals with an abnormal F-28 flying procedure, is normally memorized by pilots and reinforced during training. The Piedmont F-28 Operations Manual describes the go-around procedure in chapter 2, "Emergency and Abnormal" Procedures, which states, "Level-off at 600 ft, AGL" (Exhibit 307, p. 2-11). The USAir Pilot's Handbook describes this procedure in chapter 18, "Training," which states "Climb straight ahead to 800 feet AGL or clear of obstructions" (Exhibit 329, p. 18-55-3). It was also revealed during testimony that the aerodrome approach charts for the Dryden Municipal Airport, produced by Jeppesen/Sanderson for use by Air Ontario F-28 pilots, provided a level-off height of 400 feet AGL for the F-28 aircraft. When, during testimony, the fact was put to Captain Nyman that there were three different obstacle-clearance level-off heights, he agreed that, for compatibility with the Piedmont F-28 Operations Manual, the single-engine level-off height should have been standardized and the Jeppesen charts should have been ordered with a level-off height of 600 feet AGL.

However, even if the Jeppesen charts showed a 600-feet AGL level-off height, there remained discrepancy between the Piedmont and the USAir manuals. Although a go-around procedure on one engine is an abnormal and emergency situation, seldom required to be performed except during training and proficiency checks, an actual go-around on one engine, possibly in bad weather conditions, would be an inappropriate time for the flight crew to disagree about, to be unsure of, or to attempt to clarify the differences in level-off heights.

Although Captain Nyman stated that at least the pilots whom he trained on the F-28 were made aware of the differences between the Piedmont and the USAir aircraft operating manuals, he agreed in testimony that it would have been preferable if Air Ontario had in place, prior to the commencement of revenue service of the F-28, its own standard operating procedures manual containing one set of operational data. Captain Nyman testified that on the F-28 flight deck all Air Ontario F-28 pilots used checklists and emergency quick reference handbooks produced by Piedmont. However, it is my view that commonality should have also extended to having one aircraft operating manual on the flight deck.

As was discussed in chapter 12 of this Report, Aircraft Performance and Flight Dynamics, another example of failure to standardize manuals and procedures was revealed in the confusion that existed among the F-28 pilots as to which slush-correction charts applied: those contained in the Piedmont and USAir AOMs, or the graphs contained in the Fokker F-28 AFM. On the one hand, Captain Perkins testified that he was not bound by the more restrictive Piedmont/USAir slush charts and could use the less restrictive slush-correction charts set forth in the

Fokker Aircraft F-28 Flight Handbook. Captain Nyman, on the other hand, was of the view that the slush chart contained in the Piedmont F-28 Operations Manual was the only slush chart to be used by Air Ontario pilots. Captain Joseph Deluce in testimony agreed that, in hindsight, it would have been best if all pilots referred to one chart only, that being the more limiting chart contained in the Piedmont manual (Transcript, vol. 150, pp. 75–76).

Had it been made clear that the more restrictive AOM was binding, and had the flight crew on C-FONF felt bound by the more restrictive manual, then, given the slush conditions on runway 11/29 at 12:09 p.m. on March 10, 1989, the flight crew would have been prohibited by Air Ontario operating policy from taking off on runway 29 with those slush conditions at a takeoff weight of more than approximately 53,400 pounds. I am fortified in this view by the testimony concerning the "Report of the Board of Inquiry into the Accident at Toronto International Airport, Malton, Ontario, to Air Canada DC8-CF-TIW aircraft on July 5, 1970" (Exhibit 1181, held before the Honourable Mr Justice Hugh F. Gibson, Commissioner).

This report dealt with the inquiry into an Air Canada DC-8 aircraft that crashed on July 5, 1970, while on final approach to Toronto International Airport, leaving no survivors. It was determined that the flight crew had agreed upon a procedure for operating the aircraft spoilers that was contrary to the procedure specified in Air Canada's DC-8 Operating Manual. While using the contrary procedure, an inadvertent, premature deployment of the spoilers occurred 60 feet above the ground prior to the aircraft flare. Evidence indicated that certain Air Canada pilots followed a procedure of arming and deploying the spoilers contrary to the Air Canada DC-8 Operating Manual and that this known procedure was allowed to continue unchecked. It was also determined that the manufacturer's DC-8 AFM contained misinformation regarding use of the spoilers that was not corrected in the Air Canada manual. Another Canadian air carrier had noted the misinformation and clarified it in its own DC-8 operating manual. Both Air Canada's and the other air carrier's AOMs were provided to and reviewed by Transport Canada.

In this report, the Honourable Mr Justice Gibson lists, among others, the following two "contributing circumstances":

> (viii) The failure of the Ministry of Transport to detect the deficiencies and misinformation in the manufacturer's aircraft flight manual as to the operation of the ground spoiler systems on this type of aircraft; and the failure to require the manufacturer in such manual to warn of the danger of inappropriate deployment of the ground spoilers on this type

of aircraft when in flight and especially when it is close to the ground.

(ix) The failure of the Ministry of Transport (1) to have noted the differences in the manuals of Air Canada and other Canadian aircraft operators in relation to the hazards of operating this ground spoiler in this aircraft, (2) to have alerted Air Canada of this, and (3) to have taken appropriate remedial action so that Air Canada's manual in respect thereto was not deficient in respect thereto.

(Exhibit 1181, pp. 107–108)

When questioned about these two "contributing circumstances," Mr Slaughter of Transport Canada agreed in testimony that Mr Justice Gibson attached importance to the need for Transport Canada to review air carriers' AOMs. Mr Slaughter also agreed that in 1989, 19 years after the crash of Air Canada's DC8-CF-TIW aircraft, Transport Canada, which was under no legal requirement to do so, was, owing to workloads and other priorities, still conducting only a cursory examination of air carriers' AOMs.

In my view, the reason this situation continues is that there is no regulatory requirement that air carriers produce AOMs specific to each aircraft type operated by the carrier. Partly because there is no requirement for Transport Canada to do so, these AOMs are neither thoroughly reviewed nor approved by Transport Canada prior to an aircraft type being operated by an air carrier in revenue service.

This situation must change. Legislative requirements should exist for, and inspectors should be specifically dedicated to, the process of the review and the approval of the contents of all air carriers' AOMs.

Flight Attendant Manual

Although a cabin attendant manual (designated the Flight Attendant Manual (FAM) by Air Ontario) is referred to extensively in Transport Canada's procedures document, Manual of Regulatory Audits, and elsewhere, there is no requirement in the Air Navigation Orders for the issuance of a cabin attendant manual. However, Transport Canada policy documents expect air carriers to produce manuals for the flight attendants. Most air carriers, including Air Ontario, do so. On the day of the crash, flight attendants Katherine Say and Sonia Hartwick each carried on board C-FONF an Air Ontario FAM with a last revision date of September 10, 1988.

Section 42 of ANO Series VII, No. 2, requires that an air carrier establish and maintain a ground- and flight-training program approved by Transport Canada to ensure that each crew member is adequately

trained to perform his or her assigned duties. In addition, the air carrier must provide adequate ground- and flight-training facilities and qualified instructors to ensure that proper training of all crew members is carried out. By definition in ANO Series VII, No. 2, "a cabin [flight] attendant means a crew member, other than a flight crew member, assigned to duty in a passenger-carrying aeroplane during flight time."

Under the apparent aegis of section 42 of ANO Series VII, No. 2, Transport Canada reviews the cabin attendant training programs of an air carrier and compels the carrier to ensure that all flight attendants are adequately trained to perform their duties; specifically, abnormal and emergency procedures. Transport Canada is therefore mandated to approve an air carrier's cabin attendant training program. Section 34 of ANO Series VII, No. 2, requires an air carrier to provide a copy of its FOM to Transport Canada. Section 35 requires the air carrier to provide as well a copy of its FOM or "appropriate parts thereof" to each crew member.

Since crew members include flight attendants, I conclude that "appropriate parts" of an FOM will include matters that deal specifically with the duties, responsibilities and requirements of flight attendants. Inspection checklists contained in the Manual of Regulatory Audits remind audit personnel to determine if the contents of the FAMs comply with sections 31 through 37 of ANO Series VII, No. 2. I therefore conclude that, by inference, ANO Series VII, No. 2, allows, and Transport Canada, through policy documents, contemplates, that the part of an FOM dedicated to cabin attendants' duties, responsibilities, and training can be a separate document. Such a document may be a cabin attendant manual, as referred to by Transport Canada, or the Flight Attendant Manual produced by Air Ontario.

In terms of legislative requirements for cabin attendant manuals, I perceive the same problem to exist as exists at present with AOMs. Although Transport Canada reviews cabin attendant manuals such as Air Ontario's FAM if they are submitted to Transport Canada by the air carriers, there is no legislative requirement to produce cabin attendant manuals, nor is there a commensurate requirement that Transport Canada review and approve such manuals.

On the one hand, ANO Series VII, No. 2, requires that cabin attendant training programs, including training relating to abnormal and emergency procedures, be approved by Transport Canada. On the other, there is no commensurate requirement for the review and approval of cabin attendant manuals to ensure, for example, that abnormal and emergency procedures for each aircraft type operated by the carrier are delineated. Although certain abnormal and emergency procedures may be general to all aircraft types operated by an air carrier, other procedures may be specific to an aircraft type. For example, the Air Ontario FAM includes,

in addition to an emergency procedures section, dedicated sections regarding four aircraft: the Hawker Siddeley HS-748, the Convair 580, the de Havilland Dash-8, and the Fokker F-28 Mk1000. The FAM, therefore, may contain procedures relevant to both the FOM and a particular AOM, such as for the F-28 Mk1000.

Since Transport Canada must approve an air carrier's cabin attendant training program and ensure that each crew member is adequately trained to perform his or her duties, and since Transport Canada reviews an air carrier's cabin attendant manual to ensure that it includes all abnormal and emergency procedures, I see no reason why Transport Canada should not also approve, either as a separate document or as part of the FOM, an air carrier's cabin attendant manual.

In directing my attention to portions of Air Ontario's cabin attendant manual relevant to its F-28 operation, I have reviewed the entire contents of the document. The following is stated in the introduction to the FAM:

> 1.1 FOREWORD
>
> This manual has been written for use by, Flight Attendants, Pursers, and In-Flight Supervisors in their perspective roles. This manual is a valid piece of emergency equipment and must be regarded as such.
>
> This manual must be in the possession of each person while he/she operates a flight. An individual will not be considered 'Emergency Qualified' in the event that he/she does not have this manual in his/her possession when reporting for flight assignments. (See Section 2, Item 2.4, Page 6)
>
> 1.2 MANDATE OF THE MANUAL
>
> The mandate of this manual is to establish definite policies and procedures for rendering a uniformly superior service to passengers. Whenever possible, the standard procedures outlined herein will be followed without deviation. However, nothing can replace good judgement in providing passengers with the finest in service and hospitality. Unusual conditions will arise that can only be met by the use of your initiative and ingenuity. Having said this, you must always be alert **never to compromise safety.**
>
> Remember the impression you create in the minds of our passengers are the impressions they will carry with them – because to them, YOU ARE THE COMPANY, you are Air Ontario..
>
> The requirements of Air Transport are such that Company Procedures must be established and maintained to ensure safe and efficient operations.

> This publication is the property of the company and is on loan to company employees. This manual must be returned to the Company upon termination of employment within the 'In-Flight' department.
>
> Trainees, Flight Attendants, and In-Flight Supervisors are required to bring this manual to all recurrent training, type training, and refresher programs that the Company conducts, and to have, on their person, this Manual at all times while completing flight assignments.

I am impressed by the position presented in this introduction by Air Ontario regarding the role and responsibilities of flight attendants. Indeed, I find the Air Ontario FAM, like the introduction, to be thorough and comprehensive in its content.

Legislative Requirements

Imprecision in the language of the Air Navigation Orders is a significant problem, which is referred to in other chapters of this Report. Imprecise language necessitates the exercise of discretion by the individual regulator, which, in the extreme case, can render an air carrier vulnerable to the caprice of an air carrier inspector who is the sole arbiter of what is "satisfactory" or "proper." Alternatively, an inspector, without any further guidance, may be vulnerable to arguments from a persuasive air carrier.

All legislative instruments, including the Air Regulations of the ANOs, must serve to give effect to some government objective. In this case, the basic objective of government in its operational regulation of air carriers is, in my view, to ensure an acceptable level of safety in Canadian commercial aviation. To achieve this objective, the ANOs should provide a minimum acceptable standard in a clear and comprehensive manner. If this were the case, then the air carrier would have unambiguous notice of what is expected from it in its operation; and air carrier inspectors would have a tool that would permit them to insist upon a definite standard of operational practice. Instead, ANOs appear to be a collection of ad hoc, unconsolidated, and in some cases discretionary standards that do not provide readily available assistance to either the regulator or the air carrier. Stated simply, ANOs at times fall short of their purpose, which is to give effect to the government's objective of ensuring an acceptable standard of safety in air carriage.

Having reviewed Air Ontario's Flight Operations Manual and Flight Attendant Manual, the Fokker F-28 Flight Handbook, and the F-28 Aircraft operating manuals used by Air Ontario, I feel compelled to review particular portions of United States air carrier legislation dealing with manual requirements. I find that FAR Part 121 provides more

clearly than does ANO Series VII, No. 2, a statement of the requirement to be met by the air carrier and expected by the regulator.

For example, with respect to the issuance of an operating certificate, FAR subpart 121.59, subsection (a) states as follows:

> **121.59 Management personnel required.**
>
> (a) Each applicant for a certificate under this subpart must show that it has enough qualified management personnel to provide the *highest degree of safety* in its operations and that those personnel are employed on a full-time basis in the following or equivalent positions:
>
> (1) General manager.
> (2) Director of operations (who may be the general manager if qualified).
> (3) Director of maintenance.
> (4) Chief pilot.
> (5) Chief inspector.
>
> (b) Upon application by the supplemental air carrier or commercial operator the Administrator may approve different positions or numbers of positions than those listed in paragraph (a) of this section for a particular operation if the air carrier or commercial operator shows that it can perform the operation with the *highest degree of safety* under the direction of fewer or different categories of management personnel ...
>
> (Emphasis added)

The equivalent Canadian legislation, which is Part I ("Certification Requirements"), section 5, of ANO Series VII, No. 2, states as follows:

> 5. (1) An applicant for an operating certificate shall show that he has the qualified managerial personnel necessary to operate the proposed commercial air service and that such personnel are employed on a full time basis in the following or equivalent positions:
>
> (a) Managing Director;
> (b) Director of Flight Operations (or Operations Manager);
> (c) Director of Maintenance and Engineering (or Maintenance Manager);
> (d) Chief Pilot; and
> (e) Chief Inspector.
>
> (2) Where because of the nature of a commercial air service, positions other than those specified in subsection (1) would, *in the opinion of the Director*, be more appropriate, the Director may

> (a) approve different positions or a different number of positions; and
> (b) authorize the allocation of more than one position to one person.
>
> 6. (1) No person shall serve as a Director of Flight Operations (or Operations Manager) or as a Director of Maintenance and Engineering (or Maintenance Manager), unless his qualifications, background and experience are *satisfactory to the Director.*
>
> (Emphasis added)

Although the provisions in sections 5 and 6 of Canadian ANO Series VII, No. 2, and the United States FAR subparts 121.59 (a) and (b) are similar in intent, what is noticeably different between the two is the test specified by the respective provisions for the determination of the qualifications and standards that must be met by each country's air carriers.

In determining the degree of information, guidance, and instruction in the FOM, section 33 of ANO Series VII, No. 2, stipulates that the requirements of the items set forth in Schedule B be presented "in sufficient detail to enable the operations personnel to perform their duties in a *proper manner*" (emphasis added).

The equivalent United States legislation, FAR subpart 121.135, states as follows:

> (a) Each manual required by §121.133 [Preparation] must –
> (1) Include instructions and information necessary to allow the personnel concerned to perform their duties and responsibilities with a *high degree of safety;*
>
> (Emphasis added)

The use in the United States FARs of the words "highest degree of safety" and "high degree of safety" in my opinion is significant. These statements of the requirements expected of United States air carriers provide a benchmark for the regulator to review and audit an air carrier. These tests are, in my view, both understandable and meaningful to an air carrier industry. The requirements to meet the test "high or highest degree" of safety can be reasonably established by a regulator and met by air carriers, and are determinable in jurisprudence.

Although the equivalent Canadian legislation, section 33 of ANO Series VII, No. 2, employs the wording "in a proper manner" to determine the sufficiency of the contents of the FOM, it is my opinion that these words form an elusive test, leaving insufficient guidance to the regulator on how "proper manner" is to be interpreted. The use of this test, as does the term "satisfactory to the Director," also gives to those

who apply the law a discretion akin to a mandate to interpret government policy.

The existing tests ("satisfactory," and "in a proper manner") contained in the ANO Series VII, No. 2, are, in my opinion, inadequate. These tests leave the door open to allow the air carrier to negotiate or debate with Transport Canada what the carrier views to be satisfactory and what it considers to be in a proper manner. As well, these tests do not provide Transport Canada air carrier inspectors with certainty in standards that they can rely upon in reviewing documents such as the FOMs. Applying the test "high" or "highest degree of safety" is more meaningful and determinable and should provide greater benefit and certainty to both the air carrier and the regulator.

Findings

- On March 10, 1989, on board C-FONF, Captain Morwood carried a Piedmont F-28 Operations Manual and First Officer Mills carried a USAir Fokker F-28 Pilot's Handbook.

- At the time of the crash, Air Ontario did not have its own F-28 operations manual. The Piedmont and USAir F-28 manuals were being used by Air Ontario and its F-28 pilots in the air carrier's flight operations without the consent of Piedmont and USAir.

- There were some material differences between the two manuals.

- It was the understanding of Piedmont Airlines and USAir that their F-28 operations manuals were to be used only as training tools for the purposes of aircraft ground school and simulator training provided by Piedmont Airlines/USAir to Air Ontario pilots.

- No amendment service was requested by Air Ontario, and no revisions were provided by Piedmont and USAir for the respective F-28 operations manuals.

- The flight release used by the flight crew of C-FONF on March 10, 1989, did not meet the requirements of an operational flight plan as contemplated in Air Navigation Order (ANO) Series VII, No. 2.

- Air Ontario did not set out in its Flight Operations Manual (FOM) an example of, or the information necessary for, an operational flight plan for F-28 aircraft operations so as to demonstrate that procedures were in place to monitor and control the flight of C-FONF and that the

carrier had a plan for the safe conduct of the flights of C-FONF on March 10, 1989.

- No operational flight plan was made available to or used by the flight crew of C-FONF on March 10, 1989.

- Since Air Ontario did not provide the information necessary to flight operational personnel, including the flight crew, to monitor and control the flight of C-FONF, and since the FOM did not contain sufficient information to demonstrate that Air Ontario had a plan for the safe conduct of the flights of C-FONF of March 10, 1989, I find that Air Ontario failed to comply with the requirements of ANO Series VII, No. 2, sections 2 and 15, and Schedule B.

- It was contemplated and stipulated in the lease between Transport Aérien Transrégional and Air Ontario Inc. that C-FONF would be operated in accordance with the Fokker F-28 Flight Handbook and with an approved Air Ontario F-28 operations manual. At the time of the crash, Air Ontario had not completed drafting its own F-28 operations manual (AOM) for submission to Transport Canada.

- The Air Ontario F-28 Operations Manual (AOM) was not submitted to Transport Canada for approval until June 7, 1989.

- Air Ontario Inc. operated for approximately eight months, from June 1987 until February 1988, without an approved and updated FOM reflecting the operations of the merged air carrier Air Ontario Inc. During this period of time, Air Ontario did not have in place a comprehensive FOM reflecting the continued and current status of Air Ontario's operation.

- There was lack of sufficient information, advice, and direction in Air Ontario's FOM regarding aircraft ground de-icing and for operations from contaminated runways.

- Existing ANOs do not contain a requirement for the updating and amendment of FOMs or for approval of updates and amendments by Transport Canada.

- Although a copy of the FOM must be submitted to Transport Canada, ANO Series VII, No. 2, does not specify that the FOM must be approved by Transport Canada.

- Both the Piedmont F-28 Operations Manual and the USAir Fokker F-28 Pilot's Handbook are comprehensive and detailed. No fault is found with these individual manuals, either in form or in content. However, because of the differences between them, only one manual should have been designated for use.

- Air Ontario did not designate one specific F-28 operating manual to be used by the F-28 pilots. This situation created uncertainty in the application of aircraft operating limitations and procedures used by Air Ontario F-28 pilots operating the aircraft.

- Transport Canada failed to review properly and adequately either the Piedmont F-28 Operations Manual or the USAir F-28 Pilot's Handbook, failed to identify the fact that the two different manuals were being used by the pilots, and failed to take steps to stop this practice.

- ANO Series VII, No. 2, is silent on the issue of air carrier company–produced AOMs or aircraft standard operating procedures manuals (SOPs). There is no regulatory requirement that air carriers produce AOMs specific to each aircraft type, and, further, there is no legislative provision that allows Transport Canada to review and approve AOMs prior to an aircraft type being operated by an air carrier in revenue service.

- There is no legislative requirement for an air carrier to produce a cabin attendant manual, and, further, there is no commensurate legislative requirement that Transport Canada review and approve such a manual.

- The existing tests contained and used in ANO Series VII, No. 2, sections 5, 6, and 33, to determine the qualifications of operational management personnel and to determine the sufficiency of the contents of an air carrier's FOM are discretionary and open to interpretation. They do not provide to Transport Canada certainty with which to apply a standard and an adequate standard to be achieved by an air carrier.

RECOMMENDATIONS

It is recommended:

MCR 61 That Transport Canada approve a complete copy of the air carrier's operations manual prior to the granting of an operating certificate or an amendment to an operating certificate, and that it approve all amendments and insertions made to that manual.

MCR 62 That Transport Canada proffer for enactment an amendment to Air Navigation Order Series VII, No. 2, requiring Transport Canada to approve one aircraft operating manual for each type of aircraft operated by the air carrier. It is further recommended that such approval be required prior to the granting of an operating certificate or an amendment to an operating certificate by Transport Canada to the air carrier to allow the commercial use of that aircraft type by the air carrier.

MCR 63 That Transport Canada proffer for enactment an amendment to Air Navigation Order Series VII, No. 2, requiring each air carrier to provide to Transport Canada an air carrier cabin attendant manual for review and approval, either as part of the flight operations manual or as a separate manual.

MCR 64 That Transport Canada proffer for enactment an amendment to Air Navigation Order Series VII, No. 2, deleting the existing tests contained in sections 5, 6, and 33 and replacing them with tests containing the wording "high degree of safety" and "highest degree of safety." Such wording is similar to wording contained in equivalent United States Federal Aviation Regulation legislation dealing with standards and procedures for air carriers using large aircraft.

MCR 65 That Transport Canada proffer for enactment legislation requiring an air carrier to submit its operations manual as defined in Air Navigation Order Series VII, No. 2, to Transport Canada and have it approved prior to the issuance by Transport Canada of an operating certificate or any amendment thereto.

MCR 66 That Transport Canada ensure that air carriers follow and comply with those sections of the operations manuals required by Air Navigation Order Series VII, No. 2.

20 THE F-28 PROGRAM: FLIGHT OPERATIONS TRAINING

Proper operations training is as important as flight operations manuals (chapter 19) in the standardization of flight operations procedures. This chapter examines the Air Ontario flight operations training programs as they applied to F-28 operations. Three areas of training are looked at in particular: flight crew training, flight (cabin) attendant training, and ground handler training. Air Ontario dispatch training is discussed in chapter 23, Operational Control.

Terminology and Regulatory Requirements

Part IV of Air Navigation Order (ANO) Series VII, No. 2, is entitled "Crew Member Requirements." Section 2 thereof defines "crew member" as "a person assigned to duty in an aeroplane during flight time." A cabin attendant is defined as "a crew member, other than a flight crew member, assigned to duty in a passenger-carrying aeroplane during flight time." The term flight crew is defined to mean "a pilot, flight engineer or flight navigator assigned to duty in an aeroplane during flight time."

ANO Series VII, No. 2, Parts IV and V, detail crew member requirements and crew member training and qualifications that must be met by an air carrier. ANO Series VII, No. 2, Part V, details the training requirements for flight crew members and cabin attendants for each aircraft type. The general requirements set out in sections 42, 43, and 44 under the heading "Crew Member Training and Qualifications" are as follows:

> *General*
>
> 42. (1) An air carrier shall establish and maintain a ground and flight training program approved by the Director to ensure that each crew member is adequately trained to perform his assigned duties, including those relating to abnormal and emergency procedures, and knows the relationship of those duties with respect to those of other crew members.

(2) An air carrier shall provide adequate ground and flight training facilities and qualified instructors for the training required by this Part.

(3) An air carrier shall provide ground and flight training for a flight crew member with respect to each type of aeroplane on which that member serves including proper crew member co-ordination and training in all types of situations resulting from powerplant, airframe, or system malfunction or from abnormality or fire.

(4) An air carrier shall maintain a record of the initial and recurrent training and checks provided for each crew member and that record shall be certified as to the proficiency of the crew member at the completion of each training phase or check by the instructor responsible for that particular phase of training or check.

(5) An air carrier shall submit to the Director for approval, a detailed training syllabus for each crew member classification, which syllabus shall consist of

(a) programmed ground and flight training to meet the requirements of section 45 to 52 and Schedule C, as applicable, for each type of aeroplane to be operated; and

(b) a sample of the record required to be maintained pursuant to subsection (4).

43. Notwithstanding section 42, an air carrier may be granted approval to have all or a portion of the required training provided by a training organization other than his own but shall, notwithstanding any arrangement, be responsible for the proficiency of his crew members.

44. (1) No air carrier shall use a person as a crew member unless that person has satisfactorily completed

(a) the initial training phase of the air carrier's approved training program; and

(b) the appropriate recurrent training phase and any required checks at least once every 12 months following the initial training phase.

(2) Where any recurrent training phase is completed or any required check is taken either during the calendar month preceding or following the month in which it became due, it shall be deemed to have been completed or taken in the month in which it became due.

ANO Series VII, No. 2, section 42(5), requires an air carrier to submit a detailed training syllabus for each crew member classification to Transport Canada for its approval. Section 44(1) prohibits an air carrier from using a person as a crew member unless that person has satisfactorily completed the initial training phase of the air carrier's approved training program.

Sections 45 through 52 of ANO Series VII, No. 2, detail the various training requirements under the following subheadings: Emergency

Procedures Training, Pilot Ground Training, Pilot Flight Training, Flight Engineer Training, Flight Navigator Training, Cabin Attendant Training, Line Indoctrination, and Recurrent Training. The training requirements for both the flight crew and the cabin crew are set out in considerable detail. While the qualification requirements for pilots, flight navigators, flight engineers, chief pilots, and chief inspectors are also outlined, there is no provision in the ANOs dealing with qualifications for cabin attendants.

Schedule C of ANO Series VII, No. 2, details the requirements to be met by flight crew members in pilot proficiency check rides. ANO Series VII, No. 2, Schedule D, requires air carriers to obtain Transport Canada approval to use a flight simulator for pilot flight training. Schedule D also stipulates simulator features necessary for Transport Canada approval.

ANO Series VII, No. 2, requires air carriers to carry out aircraft type-specific ground school training for flight crew, followed by written examinations and flight training. It also requires flight crew members to demonstrate knowledge and proficiency in all areas of flight handling. Thereafter, pilots must receive pilot proficiency checks from Transport Canada examiners or company check pilots (CCP) who have authority delegated from Transport Canada to carry out such checks. During pilot proficiency checks, the pilots must demonstrate proficiency in preflight preparedness, takeoffs, landings, normal flight, abnormal procedures, emergency procedures, and instrument procedures. Detailed pilot proficiency check requirements are contained in ANO Series VII, No. 2, Schedule C. Air carriers are required to keep accurate records of all ground school and flight training, including pilot proficiency checks and instrument rating renewals of flight crew members.

Once a pilot has successfully completed an initial pilot proficiency check on an aircraft type, a Transport Canada inspector will endorse his or her licence for the aircraft type. This endorsement authorizes the pilot to fly the aircraft type in revenue operations under the supervision of a pilot-in-command designated by Transport Canada to carry out line indoctrination flight training. Flight crew members must perform their duties in accordance with an air carrier's line indoctrination program and in conformance with ANO Series VII, No. 2, section 51, Line Indoctrination. Normally, a flight crew member must carry out line indoctrination training until the air carrier is satisfied that the trainee is competent to operate in the designated capacity; for example, a pilot-in-command or second in command of an aircraft. On completion of line indoctrination training, a flight crew member receives a line check from an air carrier check pilot, and, if successful, training is considered to be complete and the flight crew member is assigned normal flight crew duties.

Similarly, cabin or flight attendants must receive ground and flight training sufficient to satisfy the requirements of ANO Series VII, No. 2, sections 42, 43, and 44, General, and section 50, Cabin Attendant Training. This training, provided by the air carrier, must be sufficient to ensure that cabin attendants are competent to perform the duties and functions assigned to them "in the interest of the safety of passengers." Cabin attendants are required to attend a ground school course, followed by a written examination, and to receive line indoctrination until the air carrier is satisfied they are competent to perform the duties and functions contemplated in ANO Series VII, No. 2, and as required by Transport Canada.

Finally, an air carrier is required by ANO Series VII, No. 2, section 51, Recurrent Training, to have all crew members carry out recurrent training and required checks at least once every twelve months.

Flight Crew Training

On January 12, 1988, Air Ontario made application to Transport Canada to have the Piedmont Airlines F-28 ground, simulator, and flight training program approved for use by Air Ontario until Air Ontario could submit to Transport Canada its own Fokker F-28 training syllabus. At that time, Captain Robert Nyman, director of flight operations, advised Transport Canada that two pilot candidates were attending Piedmont's ground school course and that Air Ontario expected to acquire two F-28 aircraft in the near future and to train a total of 16 pilots for its F-28 program.

On January 28, 1988, Transport Canada's Large Air Carrier Inspection Branch in Ottawa approved Piedmont Airlines' F-28 syllabus, simulator, and instructors as an interim measure to allow Air Ontario pilots to train for the F-28 aircraft. The Ontario Region branch of Transport Canada advised Air Ontario of such approval on February 15, 1988.

F-28 Ground School Training

All of the pilots who testified before this Commission about their Piedmont/USAir training considered the ground school training to have been excellent. Mr Randy Pitcher, Ontario Region's civil aviation inspector who took the Piedmont F-28 ground school course in July 1988, testified that the course was a total of 80 hours and was "very comprehensive." Operational procedures, flight characteristics, performance capabilities, slush, ice, and rain protection, and many other areas of the F-28 aircraft operation were covered "in detail" (Transcript, vol. 127, p. 22).

The testimony of Air Ontario pilots regarding certain aspects of the F-28 ground school course was of significance to this Inquiry. Of particular relevance was the handling of an F-28 aircraft in weather conditions conducive to the formation of ice on the aircraft or where there is contamination on runway surfaces.

Aircraft Contamination

Captain William Wilcox received the Piedmont Airlines ground school course in March 1988 with five other Air Ontario F-28 pilots including Captain Bradley Somers and Captain Robert Perkins, who also testified before me. Captain Wilcox testified that the pilots being instructed were told a number of times that the F-28 aircraft could not be flown with any contamination on its wings. He testified that one of the ground school instructors, who was previously an F-28 pilot with Empire Airlines, a predecessor airline of Piedmont, reinforced the proscription by way of stories of other pilots who had experiences with contamination: "I recall him telling us of two situations where their airplanes had taken off with some snow on the wings and both of them resulted in near crashes but both of them survived, so to speak. In other words, went airborne, but very scary. You know, one wing stalling, the other remaining flying" (Transcript, vol. 93, p. 112). Captain Wilcox stated that Piedmont Airlines clearly emphasized the need for a "clean wing."

According to Captain Keith Fox, the Piedmont instructors described the characteristics and sensitivity of the F-28 aircraft wing to contamination as follows: "Yes, we were advised that it was very important, critical, that you ... [depart] with a clean wing if you are in icy conditions" (Transcript, vol. 51, p. 19). As part of his introductory notes to the course on December 5, 1988, Captain Fox wrote the following statement:

> * Wing and horizontal stab leading edges – "clean" wing critical
> – refer to ice and rain protection 1-311 Piedmont Manual.[1]

Captain Fox testified that ice and any contamination on the F-28, with its swept wing, was "more critical than any other straight wing aircraft" he had flown (Transcript, vol. 51, p. 21).

First Officer Monty Allan testified that he was told during his course that the F-28 wing had "zero tolerance" to contamination:

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[1] Exhibit 382, three-ring binder containing Captain Fox's handwritten notes and printed handout material supplied by Piedmont Airlines Contract Training Services Department

A. ... I couldn't remember whether it was specifically mentioned at the classroom ground school in Greensboro or whether it was by my simulator instructor, but I do recall the mention being, as Piedmont had operational experience, they flew up in the northeast, that you did not take off with any ice on the wings, zero.

Like, it wasn't a matter of measuring what was an acceptable amount and what wasn't.

Q. No contamination?

A. It was imparted to me that it was zero, yes.

(Transcript, vol. 91, pp. 42–43)

First Officer Allan also testified that it was generally agreed by Air Ontario F-28 pilots that there was a common understanding of "zero tolerance" in relation to wing contamination.

Captain Erik Hansen, who completed both his ground school and the simulator flight training with Captain George Morwood, commented that the ground school instructors emphasized that the wings of the F-28 aircraft should not be contaminated either for takeoff or during flight. Captain Hansen recalled Captain Morwood's participation in discussions with Piedmont instructors regarding aircraft wing contamination.

I view Captain Hansen's testimony to be significant because it demonstrates the emphasis placed by Piedmont Airlines on the need to operate the F-28 with clean lifting surfaces, and because it provides clear evidence of the advice and instruction provided by Piedmont Airlines to Captain Morwood. Captain Hansen gave the following testimony relating to Captain Morwood's participation in ground school discussions:

A. Well, it was stressed in ground school. See, I also had a recurring ground school down in, I believe it was Syracuse, same four guys. I'm talking about George Morwood, Reichenbacher, Maybury and myself went to Syracuse for recurring ground school, and that would have been November, October, November of '88.

And now we're getting into the winter operations as such, and again they were stressed with de-icing that this had a clean wing, wouldn't tolerate any contaminants of any kind, so preheat and when you are flying, if you are anticipating that you are going to be encountering icing conditions, turn on your heater or ... heat up the aircraft before entering the ice. Don't use it as a de-icing system, more as an anti-ice system.

Q. Let's digress for one moment ...

George Morwood was with you in Tampa and he was also with you on the recurrent in October or November of '88?

A. That's correct.

Q. Now, in Tampa, could you tell the Commissioner initially if he was in the classroom with you throughout the entire period of time?
A. Yeah, every, every day. Every day, he never missed a class.
Q. So whatever you heard, he heard?
A. Absolutely.
Q. ... Now, could you tell the Commissioner what you heard related to you in relation to the sensitivity of the wing and contamination of the F-28?
A. Well, just that it was ... a clean wing and it didn't tolerate any contaminants as such. And it was of the utmost importance that the aircraft was kept clean and you ensure that it was clean prior to departure.
Q. Was that stressed?
A. It was stressed so that because we, meaning the four of us, like there was 20 some odd other people in the classroom with all kinds of jet experience and also people who flew in the southern States who don't really get into the weather that we did.

But the four of us coming out of Convairs and the Convair will take ... some ice and some contaminants prior to departure before ... you're really starting to get upset about it.

We were very interested in finding out ... when he said clean, what do you mean clean. When he just said super clean, it won't take anything.
Q. Would you ask questions during these sessions, sir?
A. Oh, yes, we did.
Q. And you have indicated to us that George certainly had a propensity to ask questions?
A. To a point where it became annoying, yes, really.
Q. Would both of you or maybe all four of you have directed questions specifically in this area which was peculiar to you; namely, the winter flying?
A. Well ... George would be bringing these things up because this was George's way of getting the floor.

He would say, well, we are flying up and down the Lakes and the weather gets really bad up there, and he would relate a couple of stories in his past experience, whatever they were, flying in bad weather, and he was trying to relate that and put that into the F-28 operation and that kind of stories ... he had a couple of those.

And the instructor just said, look, the aircraft has to be clean and that's it and he won't take any nonsense. You are not flying a Convair now. This is a jet, it's got a clean wing and swept back and all these other good things, so don't.

And George also had a couple of stories of his own to relate because he flew the G-2[2] as well for Steve Roman.

Q. And what stories would he have related in that particular –

A. Well, for the G-2, he said it was so nice to fly because could go in and out of it so fast so he never really had any bad experience with icing in the G-2 and – but then he was also reminded that he wasn't flying a G-2, this was an F-28, and then to keep the aircraft clean.

Q. Was it your impression, sir, and I know that it's hard to put yourself in the position of someone else, was it your impression that you and the other three gentlemen with you including George Morwood understood what was being conveyed by the Piedmont instructors?

A. Yes, there's no doubt.

Q. No doubt in your mind on that?

A. None.

(Transcript, vol. 94, pp. 70–74)

Captain Hansen testified that because his fellow Air Ontario classmates had been flying Convair 580 turboprop aircraft prior to converting to the F-28 aircraft, and because this turboprop aircraft was able, in their view, to operate safely with a certain amount of contamination on its wings, Captain Morwood in particular was interested in discussing with the Piedmont ground school instructors the F-28's capabilities to carry contamination on its wings. Captain Hansen described the dialogue with the Piedmont ground school instructors:

A. ... At no time did they minimize the seriousness of ice or of any kind of contamination. They did not.

But when the four of us sitting in the classroom there and kept hammering on these questions about, well, how little is little ice, will it take a thin layer of frost, perhaps, how about a wet wing, and these questions, they kept on and on and on from the four of us, like I say, primarily from George, if memory serves me right.

The rest of the classmates that we had were getting perhaps a little annoyed, because to them, you know, why do you keep

[2] Captain Morwood accumulated approximately 500 flight hours on the Grumman Gulfstream G-2 executive turbojet. This aircraft has a profile similar to that of an F-28, and some models are also equipped with the same engine type. The Grumman Gulfstream G-2 is somewhat lighter and faster than the F-28, but has operational and handling characteristics generally similar to the F-28 aircraft. Like the F-28 aircraft, the G-2 has a "hard wing" with no leading-edge high-lift devices, a "T"-type configured horizontal and vertical stabilizer, and its two engines are similarly mounted at the rear of the aircraft fuselage.

hammering on this, you know. The book says keep it clean, no contaminants, and that's the end of it.

And maybe it was because that flying the Convairs, which we all did prior to this, we have been able to get away with a certain amount of contaminant on these wings and the aircraft performs well. But this was a different airplane, different wing. This was a jet, not a propeller-driven airplane, and on and on it goes.

Q. And at the end of this whole process, are you confident with George Morwood came away with that feeling, that no matter what, this wing had to be absolutely clean?

A. He had to.

(Transcript, vol. 94, pp. 148–49)

The view expressed by Captain Hansen that turboprop aircraft can handle a certain amount of contaminant on their wings is not unique. Mr Pitcher described a similar opinion, as did expert witnesses from both Fokker Aircraft and from the National Research Council Canada. The aerodynamic reasons why a turboprop aircraft might be able, in some circumstances, to carry a certain amount of contaminant are fully discussed and described in chapter 12, Aircraft Performance and Flight Dynamics.

Based on the testimony of these pilots and of others who appeared before me, and from a review of Captain Fox's handwritten notes and Piedmont's handouts provided to him, I conclude that the operation of the F-28 aircraft with contaminated wings was dealt with thoroughly at the ground school training provided by Piedmont Airlines, at least for Air Ontario pilots who took the course. Testimony of many Air Ontario pilots, including Captains Wilcox, Hansen, and Fox, was candid and revealed a cautious professional view regarding the prohibition of operating an aircraft, especially at takeoff, with contaminated lifting surfaces. The evidence leads me to conclude that all Air Ontario pilots who took the Piedmont ground school course received thorough instruction and caution that it was of utmost importance that the F-28 be operated at all times with a clean, uncontaminated wing. The evidence also leads me to conclude that Captain Morwood considered, as did other pilots, that propeller-driven aircraft, such as the Convair 580, would perform adequately with some contaminant on the aircraft wings. However, it is clear from the testimony of Captain Hansen that Captain Morwood, as one of the pilots who took the Piedmont ground school course, must also have been aware of the prohibition of operating the F-28 aircraft with any amount of contamination on the wings.

Cold-Soaking Phenomenon

Cold soaking is a term used to describe a phenomenon that sometimes occurs as a result of an aircraft operating at high altitudes. An aircraft, while flying at altitude, where the temperature is usually much colder than on the ground, will gradually be cooled to near ambient temperature. Fuel in wing tanks next to the outer skin will also be cooled to ambient temperature, although at a different rate, along with the outer aircraft wing skin surfaces. When an aircraft has landed with cold-soaked wings and fuel, frost or ice may form on the upper and/or the lower wing surfaces next to the fuel tanks, depending on the ambient temperature and the relative humidity. As discussed in detail in chapter 12, one of the relevant aspects of cold soaking concerns the way the cold-soaked wing conducts heat away from precipitation, such as wet snow and rain resting on the wing, and causes the precipitation to freeze. This freezing process was described by Dr Myron Oleskiw of the National Research Council Canada as follows:

> A. As the freezing occurs from the bottom working its way upwards because of the conduction into the fuel tank, the bottom portion would become entirely solid, still with air trapped in it, but there - the water part, of course, would be frozen. Further up, there would be this ice structure but with the water still there.
>
> (Transcript, vol. 68, p. 218)

The fact that precipitation on the upper surface of the wing freezes from the wing surface upwards is particularly insidious. It is possible for slush, which is solidly frozen to the wing, to appear to be largely wet and unfrozen. The potential for human misperception in this scenario is obvious.

In the course of this Inquiry, pilots were asked about their knowledge of cold soaking. Captain Fox testified that he was aware of the term "cold soaking," and that wing cooling at high altitude was brought up during the course. He said that the cold-soaking phenomenon occurred quite often with the HS-748 aircraft, and explained it as follows:

> A. Hawker Siddeley 748, would be high, it would be cold up north, warmer summertime in Pickle [Pickle Lake]. I would come down quickly and land and it would be warm on ground but you get out and there is a frost on the bottom and top of the wings, particularly it stays quite a bit longer on the bottom of the wing and it is from the fuel in the wings is still very cold, got cold soaked up high altitude and it hasn't warmed up yet.
> Q. When you say high altitude, what sort of altitudes would you be flying at with the 748?
> A. Twenty-four, 25,000 feet.

Q. So you were familiar with this concept of cooling of the wing by – and the fuel cooling the wing and then coming down to a lower altitude and having frost or some sort of precipitation show on the wings?
A. Yes.

(Transcript, vol. 51, p. 24)

He testified that this matter was also touched on briefly during the Piedmont ground school course and that a warning on cold soaking was in the Piedmont Airlines/USAir F-28 operations manuals.

A number of other pilots who testified indicated that they were aware of the concept of cold soaking. Captain Wilcox, one of the most experienced F-28 pilots with Air Ontario, provided general observations and his understanding of cold soaking:

A. Other ... than being aware of cold soaking affecting any airplane, this airplane in particular, although not much different than a Convair, we are basically operating at below 25,000 feet, descending into, you know, your warmer, warm, moist atmosphere, and you are always cognizant or looking for it to be occurring underneath the wing.
Q. That's the point, sir. You were aware of the concept of cold soaking?
A. Yes.
Q. And when you used your anti-icing system, you paid particular attention to the wing after that?
A. Correct. You always want to walk around, check that, you know, there's not a heavy frost layer, whatever.

(Transcript, vol. 93, pp. 121–22)

The pilots who testified before me demonstrated various levels of knowledge of cold soaking as it applied to wing contamination. One Air Ontario pilot had never heard of it prior to the crash. However, most Air Ontario pilots and other pilots who testified had a general understanding of the phenomenon. A number of them related personal experiences with cold-soaked wings causing contamination to freeze and adhere to the wing surfaces.

It should be noted that the cold-soaking phenomenon depends on the juxtaposition of various factors, including the time at altitude, the temperature at altitude, the temperature and dew point on the surface, and the amount of fuel in the wing tanks.

Captain Joseph Deluce, F-28 chief pilot, had a general understanding of the cold-soaking phenomenon. He also stated he was aware of the references and cautions contained in the manuals. He agreed that "cold soaking is critical with all aircraft" (Transcript, vol. 112, p. 28). Captain Deluce testified that he did not communicate his views on cold soaking

to his F-28 pilots because, in his opinion, the issues were properly addressed in the aircraft flight and operating manuals and during ground school training. Captain Deluce further stated that cold soaking is something that pilots learn about through operational experience.

Captain Deluce's statement that cold soaking is something that pilots learn through operational experience appears to represent the current state of affairs in the aviation industry. Except for Captain Fox, no one testified that the cold-soaking phenomenon as it affects wing contamination was dealt with either in ground school or in flight training. While manufacturers and air carriers may produce circulars and publications dealing with this matter for dissemination within their own pilot groups, neither the Fokker F-28 Flight Handbook nor the Piedmont/USAir operations manuals cover, in a systematic manner, the issue of cold soaking and the potential for moisture to freeze on upper-wing surfaces. Similarly, the Air Ontario and the Air Canada flight operations manuals do not address this phenomenon either specifically or in detail. The A.I.P. Canada: Aeronautical Information Publication, which is circulated to all Canadian licensed pilots and which, at the time of the crash, contained a caution regarding takeoff with contamination on the lifting surfaces, also fails to cover the matter of cold soaking and its potential to cause contamination to adhere to wings.

It is possible that Captain Morwood and First Officer Mills, despite their collective flying experience of more than 30,000 hours, were not sufficiently aware of the insidious nature of cold soaking. Captain Morwood reported an incident to Air Ontario Flight Operations that occurred in January 1983 in Cleveland, Ohio, when he was flying Convair 580s. He stated as follows:

> Flight was 40 min late leaving the gate due to a combination of events. There was moderate snow in Cleveland temp –5° C, however, the aircraft had 7500 lbs of tanker fuel remaining that must have been relatively warm. I went out to check the wings at 10.30 and I was surprised to find the snow was melting and sticking on the wings in the area of the fuel tanks. I immediately requested a spray, then the fun began. Wright had just taken their spare over to be fuelled, then a problem occurred with fuel truck. They finally arrived at the aircraft around 1130.
>
> (Air Ontario Pilot Incident Report, January 19, 1983)

Captain Morwood in his incident report identified a heat transfer phenomenon that caused moisture to adhere to the upper-wing surface adjacent to the fuel tanks. This report shows that Captain Morwood had some exposure to a form of heat transfer, similar to cold soaking, that caused contamination to adhere to the upper surface of an aircraft wing. I can reasonably assume that First Officer Mills, who like Captain Fox

had previously flown HS-748s and other aircraft in northern Canada, must also have had a fundamental understanding of the cold-soaking phenomenon.

Based upon the evidence of the pilots who testified before this Commission, I find it likely that both Captain George Morwood and First Officer Keith Mills would have had some knowledge, based on their operational flying experience, of the cold-soaking phenomenon. As discussed in chapter 12, *Aircraft Performance and Flight Dynamics*, ample warnings and cautions were present in the Fokker F-28 Flight Handbook and in aircraft operations manuals used by Air Ontario regarding the danger of taking off with an aircraft with contaminants on the lifting surfaces. However, a systematic and comprehensive discussion of the cold-soaking phenomenon does not appear in these manuals. Comprehensive research such as that conducted by Dr Oleskiw should be used to prepare specific information on the subject. Such information should be inserted in the air carriers' flight manuals and in government publications such as the A.I.P., in order to make all pilots and aviation operational personnel fully aware of the various factors that may cause contamination to adhere to lifting surfaces. A clear warning should be made by air carriers and by Transport Canada that the only way pilots can be certain that lifting surfaces will be clear of contamination prior to takeoff is through strict adherence to a "clean wing" policy.

Runway Contamination

As C-FONF made its last takeoff in Dryden on March 10, 1989, the runway was contaminated with slush on at least the east half of its length and was wet on the remainder. It was therefore of interest to this Commission to know what instruction had been given by Piedmont Airlines/USAir, and what direction was provided by Air Ontario to its pilots, regarding aircraft performance limitations with respect to contaminated runways.

Captain Fox testified that the Piedmont instructors took the students through the performance charts in the Piedmont/USAir F-28 operations manuals, as well as those in the Fokker F-28 Flight Handbook pertaining to contaminated runways. However, the testimony indicates that instruction regarding the Fokker F-28 Flight Handbook was brief. Although the instructors may have demonstrated to students how to use the Fokker F-28 Flight Handbook slush-correction charts, Piedmont Airlines/USAir did not use the Fokker charts for their own operational use.

Captain Fox testified that during the time he was flying Air Ontario's F-28 aircraft, he did not encounter a runway contamination situation where he would have been required to use performance and weight-reduction calculations (Transcript, vol. 51, pp. 28–29). Similarly, although

Captain Hansen did not have an occasion to take off from a contamination-covered runway with the F-28, he testified that he was familiar with both the slush-correction chart contained in the Piedmont Airlines F-28 Operations Manual and the correction chart and graph contained in the Fokker F-28 Flight Handbook.

The runway-correction chart contained in both the Piedmont and USAir F-28 operations manuals entitled "Take-off in Standing Water, Slush or Snow," and dealt with in chapter 12, provides guidance to F-28 flight crews who find themselves required to take the aircraft off from a runway covered with specified amounts of contamination.[3] These charts are considerably more restrictive than the correction chart contained in the Fokker F-28 Flight Handbook. However, the Piedmont/USAir charts are simple to use, and the reduced aircraft weight can be determined quickly.

A number of pilots were asked which slush-correction chart should, in their opinion, have been used by Air Ontario pilots in the operation of the F-28 aircraft: the chart contained in the Piedmont/USAir F-28 operations manuals or the chart and graph contained in the Fokker F-28 Flight Handbook. Captain Hansen testified that he felt bound to use the Piedmont F-28 manual because, in his words, "we were told by Transport Canada in our training that that was our Bible until we had one [an Air Ontario F-28 operating manual] approved of our own." He said that if the more restrictive Piedmont aircraft weight-penalty parameters were used, he would be "on safe ground" and would feel comfortable that he had adequate aircraft performance capability during takeoff in runway contamination (Transcript, vol. 94, p. 150). He further stated that a pilot who was looking for "a few extra pounds in order to get the aircraft off the ground" might choose to use the graph contained in the Fokker F-28 Flight Handbook.

As discussed in chapter 12, Captain Hansen's view was indicative of the position taken by most of the pilots who testified before me. This view was not, however, the view of Captain Perkins, a senior Air Ontario F-28 check pilot authorized for line indoctrination training. Captain Perkins, who was also responsible for assisting Captain Joseph Deluce in drafting Air Ontario's F-28 operations manual, was of the view that the Piedmont/USAir slush-correction chart was "fairly restrictive" and, since it was not FAA approved, he considered it to be for guidance only.

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[3] Exhibit 307, Piedmont F-28 Operations Manual, Normal Operation Mark 1000 Takeoff in Standing Water, Slush or Snow, p. 4-1-42; Exhibit 329, USAir F-28 Pilot's Handbook, Planning & Performance, Take-off Information, Take-off in Standing Water, Slush or Snow, p. 4-1-42.

During Captain Perkins's testimony it became evident that he was under the mistaken impression that the complicated Fokker charts for takeoff from slush-covered runways guaranteed a balanced field.[4] In practical terms, Captain Perkins felt that by using these charts he could be assured that, in the event of engine failure during takeoff roll, he would be able to stop on the runway-clearway, or, alternatively, would be able to continue to a successful takeoff with one engine inoperable (Transcript, vol. 44, pp. 14–17). Mr Pitcher, among others, testified that on this important point Captain Perkins was misinformed:

> Q. ... The problem is, if you have got a slush covered runway, there's no way, from these charts, to guarantee that you have got a balanced field; correct?
> A. Absolutely.
> ...
> Q. ... So it's very clear to you as an inspector, a Transport Canada inspector, that Captain Perkins was wrong when he said that the Fokker charts concerning takeoff from contaminated runways guaranteed a balanced field?
> A. Yes, it's surprising.
> Q. ... And – well, let's take it one step at a time. Is it clear to you that he was wrong?
> A. May I say misinformed?
> Q. All right. That's fine. It's clear to you that he was misinformed; is that right?
> A. Yes.
> Q. And does it surprise you that someone who had been granted check pilot authority could be that misinformed?
> A. It does, yes.
>
> (Transcript, vol. 128, pp. 122–23)

It is also evident from Captain Perkins's evidence that assuring a balanced field requirement where the runway is covered in slush was, to his mind, a paramount consideration. On this point he testified as follows:

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[4] Balanced field length: In general terms, a balanced field length takeoff occurs when the distance required to accelerate an aircraft to decision speed (V_1), lose the critical engine, and continue the takeoff using normal pilot techniques, climbing the aircraft to a screen height of 35 feet, is equal to the distance required to accelerate the aircraft to decision speed (V1), lose the critical engine, and stop the aircraft on the runway. The first distance deals with accelerate-go and the second distance deals with accelerate-stop. These two criteria are discussed in detail in chapter 12, Performance and Flight Dynamics.

Q. ... And even though the runway is slushy, you still as a pilot, a safety-conscious pilot, want – are you still thinking about accelerate stop and accelerate go even though the runway is slushy?
A. Certainly.
Q. ... You want those options available even though the runway is slushy, is that correct?
A. Yes.
...
Q. ... but Dryden, there was only 6000 feet of runway, and ... you'd be looking more closely at whether or not the runway length was a limiting factor in takeoff with slushy conditions, would you not?
A. I can't really say you would look more closely. Obviously it would be a paramount consideration. It would also be a consideration at Toronto, though.
Q. ... out of an abundance of caution in Toronto, you would assure that you could accelerate stop even though it's fairly obvious that you could, is that what you're saying?
A. Yes.
Q. ... but in Dryden, it becomes more of a paramount consideration, to use your word, is that right?
A. That's correct.

(Transcript, vol. 44, pp. 8–10)

It should be pointed out that the observations expressed above do not reflect the complexity of the balanced field length issue.

Since it is evident that Captain Perkins felt it important to be assured of a balanced field, and since he mistakenly believed that the Fokker chart for takeoff from slush-covered runways assured a pilot of a balanced field, the foundation for his reasoning that it was acceptable for Air Ontario pilots to refer to the Fokker slush-correction charts is seriously undermined. Further, Captain Perkins's view that pilots were not bound to follow the easy reference charts contained in the Piedmont/USAir manuals is weakened by the impracticality of the only other alternative, namely, the use of the complicated Fokker charts.

Captain Gert Andersson, a senior captain with the Swedish air carrier Linjeflyg who had more than 5000 flight hours on Fokker F-28s, testified as follows concerning slush-correction charts:

Q. ... And so it's your evidence that that [Fokker] chart, really, is only properly used by the performance people in their well-lit office when they're trying to come up with an easy reference chart for the pilots to use; is that right?

A. That is my opinion that it should be used only by experienced performance people, and they should make a simpler chart for use in the cockpit.

(Transcript, vol. 83, p. 187)

Captain Perkins conceded that in the operational environment, the use of the Fokker chart for takeoff from slush-covered runways was not desirable:

Q. ... How long would it take to use one of these complicated graphs in the Fokker manual to come up with a precise answer to a very specific scenario?
A. It depends on the scenario that you're looking for. The one in –
Q. Well, let's deal with takeoff in slush, then.
A. Okay, the one scenario we had presented yesterday, yeah, I would estimate 30 to 45 minutes.
Q. That's not the kind of procedure you would want to do in Dryden while you're faced with misconnections in Winnipeg and leaving an engine running burning up fuel on the ground?
A. Obviously not.
Q. Thank you. For that kind of scenario, what would clearly be more preferable would be a quick reference chart; is that right?
A. Yes, it would.
Q. Such as the one in the Piedmont manual?
A. Such as, yes.

(Transcript, vol. 44, pp. 89–90)

From the evidence before me, I am unable to give much weight to Captain Perkins's assertion that Air Ontario pilots were not expected to be bound by the more restrictive charts in the Piedmont/USAir operations manuals.

The draft Air Ontario F-28 Operations Manual forwarded to Transport Canada did not include a quick reference chart similar to the Piedmont and USAir slush-correction chart. Instead, it contained a statement referring Air Ontario pilots to the Fokker F-28 Flight Handbook chart and graph.

None of the Air Ontario pilots who testified had had an occasion to effect a takeoff of the F-28 aircraft with contamination on the runway. Accordingly, none of them could provide evidence as to what graph he or she had used. Most of the pilots, on the assumption that the Piedmont F-28 Operations Manual was the one to use until they were presented with an Air Ontario operating manual, testified that they would use the more restrictive and conservative weight limitations provided in their Piedmont or USAir operations manuals.

Based on their training, Captain George Morwood and First Officer Keith Mills should have been aware of the restrictive weight limitations

imposed on the aircraft by the Piedmont and USAir chart. Had they felt bound to use this chart, however, C-FONF would have been weight-restricted and the takeoff by flight 1363 at Dryden on March 10, 1989, could not have been made until the runway had been cleared of slush.

F-28 Aircraft Flight Training

Captain George Morwood

Captain George Morwood received his F-28 flight training in February 1988 on Piedmont's F-28 aircraft flight simulator at Tampa, Florida. At the completion of this training, he received a pilot proficiency check from a Transport Canada air carrier inspector, and his pilot's licence was endorsed for the F-28 aircraft on February 26, 1988. Captain Morwood did not immediately fly the F-28 in revenue service, but rather went back to flying the Convair 580 aircraft for the remainder of 1988. He attended a Piedmont F-28 pilot recurrent ground school in November 1988, which consisted of 16 hours of classroom instruction. As well, he completed a further eight hours of F-28 flight training in Piedmont's F-28 flight simulator and passed his pilot proficiency check ride on January 9, 1989.

Captain Claude Castonguay, who acted as an observer during the flight simulator training of Captain Morwood and Captain Erik Hansen, testified that Captain Morwood had no difficulty with the aircraft systems or in flying the aircraft. He stated that Captain Morwood flew the aircraft within all of the parameters, was knowledgeable with all of the systems, and was "a fairly smooth pilot while flying the aircraft." Captain Castonguay provided similar observations regarding Captain Hansen's knowledge and flying capabilities (Transcript, vol. 105, p. 107). The Piedmont training record sheets indicate that all of Captain Morwood's flying was done to the satisfaction of the Piedmont flight instructor, who trained him initially; Captain Nyman, who provided his recurrent training in January 1989; and Transport Canada inspectors. Captain Nyman's comments were as follows: "Captain Morwood has not flown the aircraft for several months yet has obviously been studying the aircraft systems and flight procedures. Good training session" (Exhibit 684).

The F-28 aircraft simulator training course conducted by Piedmont consisted of five sessions, each of four hours. During each session, the pilot flew the simulator for two hours and carried out pilot-not-flying duties for the other two hours. Captain Hansen testified that he and Captain Morwood received a part of their pilot proficiency check ride on the F-28 aircraft flight simulator, and completed the remainder in a Piedmont F-28 aircraft in Tampa, Florida.

First Officer Keith Mills

The agreement for pilot training between Piedmont Airlines and Air Ontario was terminated as a result of the merged Piedmont/USAir carrier's requirement to use the flight simulator to train its own pilots. First officer trainees, such as Keith Mills and Deborah Stoger, did not receive the benefit of flight training on an aircraft flight simulator.

After he completed his ground school course, First Officer Mills received his F-28 aircraft flight training on Air Ontario's own F-28 aircraft. His instructor was Captain Joseph Deluce, and the flight training was carried out on four consecutive nights from Winnipeg International Airport in early February 1989 and totalled 8.3 hours. First Officer Mills completed a 1.2-hour pilot proficiency check ride with Transport Canada inspector Randy Pitcher, and had his pilot's licence endorsed for the F-28 aircraft on February 10, 1989, in his designated capacity as first officer.

The pilot-training reports completed by Captain Joseph Deluce indicate that First Officer Mills satisfied his instructor, with two exceptions. Captain Deluce observed during one session that First Officer Mills tended to "get overloaded when pushed a bit" and that he briefed First Officer Mills on "chasing altitude in steep turns and approaching stalls." First Officer Mills also flew the aircraft to the satisfaction of Mr Pitcher, except for minor errors in instrument flying and loss of some altitude when recovering from a demonstrated stall.

In contrast with Captain Morwood, who received 20 hours of flight simulator training during his initial F-28 course with Piedmont Airlines and who occupied the co-pilot's seat and acted as the pilot-not-flying while Captain Hansen received his training, First Officer Mills did not serve as the pilot-not-flying while he was training with Captain Joseph Deluce. Because he did not occupy this position, he did not receive the benefit of additional F-28 flight hours observing and participating in the training of another pilot.

Aircraft Flight Simulators

Pilots who testified at the Inquiry before me all agreed that the type of training received in an aircraft flight simulator is superior to that in an aircraft. For most of the Air Ontario F-28 pilots who testified before me, the F-28 simulator flight training was their first experience using a flight simulator.

The Piedmont F-28 flight simulator was capable of simulating all modes of aircraft flight, including abnormal situations, that might reasonably be expected to occur in actual aircraft operations. The simulator was programmable to allow such factors as low ceiling and visibility, the effects of slush on the runway, and wind shear to be simulated.

When describing his flight simulator training, Captain Fox testified that it was difficult to tell "the difference between flying a simulator and the actual aircraft." The aircraft cockpits are identical, and the flight simulator could even simulate "bumps on the tarmac as the aircraft was taxiing over them." By way of example, Captain Fox described the difference between a simulated engine loss in an aircraft and an engine loss in a simulator:

> A. ... In the real aircraft, for instance, in a shutdown, they say, okay, just put your hand on this lever, do not pull it ... because that will really shut the engine down, whereas, in a simulator, you actually do pull the fuel-off handles and ... actually go through actual shutdowns.
>
> (Transcript, vol. 51, p. 43)

Captain Nyman agreed that the use of a flight simulator is desirable because:

> A. ... inherently it's safer. You can't crash a simulator. Well, you can, but the results aren't quite the same.
>
> And ... you can show the emergency procedures without endangering the aircraft and more realistically than you can in the actual aircraft. For that reason, I say that it's more suitable.
>
> (Transcript, vol. 108, p. 134)

Captain Deborah Stoger, who received her first officer flight training from Captain Joseph Deluce in one of Air Ontario's F-28 aircraft during the night hours, testified that she would have preferred to have been trained during daylight hours and on the F-28 flight simulator. She testified that after discussing with other pilots what she had learned during her training, and the "variances in the training" between what she received and what was conducted in the flight simulator, she concluded that "obviously, simulator training is better" (Transcript, vol. 93, p. 13).

From a training perspective, malfunctions can be introduced in a flight simulator that would be impossible in an aircraft during flight. All emergency procedures, many of which are too hazardous to be carried out in flight, can be duplicated and practised in the simulator. A flight simulator, as a teaching tool, can be stopped at any time during a flight sequence to review and reinforce procedures, and procedures can be repeated quickly by repositioning the simulation.

More importantly, because of the high level of risk involved in conducting some of the procedures and manoeuvres during aircraft flight, not all can be demonstrated and practised in an aircraft. For example, Captain Stoger testified that she did not actually shut an

engine down, but only simulated an engine failure. When asked what sort of manoeuvres she was required to do during her pilot proficiency check, Captain Stoger testified that she did "exactly the same as in training." Captain Fox and other witnesses on the other hand provided examples of emergencies such as fuselage rapid depressurization, total engine failure, and smoke in the cabin and cockpit, which can be demonstrated in a flight simulator but not in the actual aircraft.

Mr Pitcher testified that he was concerned when he found out that Air Ontario no longer had the use of the Piedmont flight simulator to conduct pilot training and pilot proficiency check rides. He said he was not in favour of Air Ontario conducting pilot training in the aircraft rather than in flight simulators. Mr Pitcher testified that, during the time Air Ontario conducted flight training on the aircraft, he called Piedmont and USAir on several occasions to determine if the flight simulator would be available for Air Ontario pilots. He stated that flight simulators are preferable to aircraft for training:

> A. Because in a simulator, you can cover the full range of emergency possibilities. You can really allow a pilot to fly. You can create scenarios that you couldn't even imagine doing on board an airplane.
>
> So from a purely practical point of view, you could get a far better picture, a far more comprehensive picture of a pilot's abilities, in relation to the airplane and to operating as a crew member, as a team, in the simulator under extenuating circumstances that you, in fact, created than you could in an airplane where you had to be very careful.
>
> (Transcript, vol. 127, p. 162)

Mr Ian Umbach, Transport Canada's superintendent of air carrier operations, testified:

> Q. Is it your view that simulators are a necessary part of training?
> A. Oh, absolutely.
> Q. Is it a – in your view, a mandatory requirement?
> A. In my opinion, it's mandatory, and I think it should be mandatory.
> Q. And why are you saying that?
> A. Because right now, it's not. You can train on the airplane if you want to. And I think that's unwise and unsafe.
>
> (Transcript, vol. 138, p. 141)

Mr Umbach was of the opinion that flight training in an aircraft, rather than in a flight simulator, should not be permitted. He agreed there is no legislation that prevents air carriers, operating large aircraft, from carrying out initial training in the actual aircraft. It was his view that

legislation should prevent initial flight training from being conducted in large aircraft.

I agree with both Mr Umbach and Mr Pitcher. With the advent of modern flight simulators capable of simulating virtually all flight modes, system failures, and procedures, I believe that, to the maximum extent possible, initial flight training and recurrent training required to maintain pilot proficiency should be conducted in aircraft flight simulators.

F-28 Line Indoctrination Training

ANO Series VII, No. 2, requires that, in addition to ground and flight training, a pilot crew member must complete line indoctrination on the aircraft in the air carrier's normal commercial route structure. In this training, the trainee pilot flies regular flights under the supervision of an air carrier check pilot who provides instruction in the operation of the aircraft in normal line flying, usually on scheduled routes.

Captain Morwood conducted his line indoctrination flying between January 18, 1989, and January 25, 1989, with Captain Joseph Deluce, and received his line check from Captain Robert Nyman on the last day. He had accumulated a total of 27.5 hours of line indoctrination flying. Thereafter, Captain Morwood began flying as a line captain on the F-28 aircraft, with a total of 29 hours of F-28 aircraft and 30 hours of simulator time.

First Officer Mills conducted approximately 20 hours of line indoctrination flying between February 13 and February 17, 1989, and received his pilot line check on February 17, 1989, all with Captain Perkins. He commenced revenue flying as a qualified first officer on the F-28 aircraft on February 21, 1989, having accumulated 29.5 flight hours.

There is no evidence that either Captain Morwood or First Officer Mills had any difficulty during line indoctrination flying. Both Captain Deluce, who conducted line indoctrination flying with Captain Morwood, and Captain Perkins, who conducted the line indoctrination flying with First Officer Mills, were satisfied that Captain Morwood and First Officer Mills were competent to carry out their respective flight duties. Unlike most of the other Air Ontario pilots who converted to the F-28 aircraft, both Captain Morwood and First Officer Mills had previous experience on turbojet-powered aircraft, Captain Morwood on the Grumman Gulfstream G-2 executive aircraft and First Officer Mills on the Cessna Citation executive aircraft.

Company Check Pilot

Because of the many required training and checking demands that are part of the commercial air carrier operation, Transport Canada delegates

to "approved Carrier Check Pilots" or company check pilots (CCPs), who are employed by air carriers, the authority to perform certain training and checking functions on behalf of Transport Canada. Further details regarding CCPs are dealt with in chapter 35, Company Check Pilot.

Air Ontario's Need for Company Check Pilots

In January 1988, immediately prior to Air Ontario's applying to have its operating certificate amended to allow it to operate the F-28 aircraft, there was no Air Ontario employee who could meet CCP qualifications. The first four Air Ontario pilots who were to be trained on the F-28 were Captains Joseph Deluce, Robert Murray, Erik Hansen, and George Morwood. This group attended their initial F-28 ground school course in North Carolina in early January 1988. It was not until well after that date that Captain Deluce and Captain Murray, who received line indoctrination and route flying experience on the F-28 with Norcan Air and TimeAir, were qualified to act as CCPs.

In the earliest stages of planning for the F-28 program, Air Ontario management recognized that they should bring in an individual with F-28 expertise to give line indoctrination, conduct check rides, and generally assist in the commencement of F-28 operations. As early as October 1987, in the first F-28 Project Plan, the following was noted:

> FLIGHT OPERATIONS
>
> ...
>
> 2. Director of Flight Operations will immediately recruit a F28 Specialist on a contract basis to assist and advise Air Ontario on operations of the F28. This specialist would also be available for aircraft acceptance, any airborne training and line indoctrination during our initial start-up.
>
> 3. Director of Operations would select the Check Pilot for the F28.
>
> 4. Check Pilot and Coordinator would visit and observe a number of other F28 operations and determine how Air Ontario's F28 operation should be handled. Familiarization of these operations would be useful in minimizing start-up operational problems.
>
> 5. After discussions with the Director of Operations, the Chief Pilot and the F28 Specialist, the F28 Check Pilot, Manager of Training and Coordinator will negotiate initial training package with selected training facility.
>
> ...
>
> 9&10. F28 Check Pilot will organize ground school and simulator training for management F28 pilots. 4 management pilots will be trained initially.

...

16&17. Chief Pilot and F28 Check Pilot will arrange ground school, simulator and rides for F28 pilots.

18. Line indoctrination of F28 pilots will be done by the F28 Operations Specialist and some contract line indoctrination pilots. The indoctrination will take place in the month prior to start-up, on ferry flights, promotional flights and in the first month of operation right on the line.

19. Some amendments to the flight manual will be done by the Chief Pilot and the F28 Check Pilot in order to bring it into line with an Air Ontario operation. DOT approval will be obtained.

...

21. The Director of Flight Operations will contract some experienced F28 pilots to assist in line indoctrination of pilots during initial start-up.

...

23. The F28 Check Pilot and the F28 Specialist will do the flight testing of both aircraft prior to acceptance.

(Exhibit 799, Air Ontario Inc. F28 Project Plan, 1987)

In order to meet the requirements of Transport Canada's Air Carrier Check Pilot Manual for its F-28 program, Air Ontario needed an experienced pilot qualified on the Fokker F-28 aircraft to conduct line indoctrination training and line checks. Neither of the Air Ontario pilots designated as F-28 captains by Air Ontario in the early stages of planning for the F-28 program, Joseph Deluce or Robert Murray, had any large turbojet aircraft experience and, in particular, previous F-28 experience.

Captain Nyman and Captain Joseph Deluce both testified that, in early December 1987, they were considering at least two individuals to fill the role of F-28 specialist and, in the early stages of operation, to act as the CCP. Although they intended that Captain Murray and Captain Deluce would eventually become the CCPs, neither pilot would have sufficient time on the F-28 to qualify as a CCP before the planned commencement of the F-28 operations. There was a need, then, to contract from outside the air carrier for F-28 expertise.

It is important to note that the F-28 Project Plan was considered at the Air Ontario executive committee, which included Air Canada's shareholder representative, Mr William Rowe, and that the plan was later forwarded to the senior technical officer at Air Canada, Mr Bruce Aubin, for his review. Mr Rowe testified that, from Air Canada's perspective, the planned reliance on outside expertise in the Air Ontario F-28 program was a positive development.

In the fall of 1987 Air Ontario contacted Captain Claude Castonguay, a retired senior pilot from Quebec Air and previously a captain on the

Fokker F-28 aircraft. He was asked to provide his flying expertise and experience on a contract basis, and to act as the carrier check pilot during the initial startup of Air Ontario's F-28 aircraft operations.

Captain Castonguay's résumé indicated a total flight time of 27,461 hours. His flying hours as a captain were in excess of 26,000, and his experience on large turbojet-type aircraft exceeded 11,000 flight hours. Captain Castonguay had approximately 3000 hours on the Boeing 737 aircraft, 1300 hours on the Douglas DC-8 series aircraft, 3000 hours on the Boeing 707 aircraft, 3700 hours on the BAC 1-11 aircraft, and, at the time of his nomination for carrier check pilot, 222 hours on the F-28 Mk1000 aircraft. As well, Captain Castonguay had extensive experience flying a number of piston and turbine propeller-powered aircraft such as the Fokker F-27 and Douglas DC-3. He had held an airline transport pilot licence since 1953, and most of his flying had been with Quebec Air, operating its various aircraft types in Canada, elsewhere in North America, and worldwide. Captain Castonguay had experience in line indoctrination training and had received a course in crew resource management from United Airlines. Without question, he satisfied the regulatory qualification requirements of ANO Series VII, No. 2, for a company check pilot.

Captain Castonguay entered into an employment contract with Air Ontario on January 23, 1988 (Exhibit 836). In the contract, his duties were described as follows: "Duties will include F28 simulator instructor and F28 line indoctrination of Air Ontario pilots. Assistance with preparation of manuals, W [weight] and B [balance] forms and other items connected with the introduction of the F28 will also be considered normal duties." The next day, January 24, 1988, Captain Nyman, as the Air Ontario director of flight operations, forwarded to Transport Canada Air Ontario's formal application for the inclusion of the F-28 on its operating certificate. In that application, Captain Castonguay is nominated as a company check pilot and is described as part of the F-28 implementation team (Exhibit 855).

As part of the application to amend its operating certificate to include the F-28 aircraft, Air Ontario was required to nominate a "carrier check pilot" pursuant to ANO Series VII, No. 2. Having contracted the services of Captain Castonguay, Air Ontario was able to fulfil the Transport Canada nomination requirement, and it submitted to Transport Canada, as part of its aircraft and air carrier operating certificate application, the nomination form signed by Captain Castonguay and Captain Nyman requesting that Captain Castonguay be approved as Air Ontario's check pilot. Included with the nomination form was Captain Castonguay's impressive résumé, a letter of reference from Quebec Air's vice-president of flight operations, a copy of Captain Castonguay's airline transport pilot licence containing an F-28 endorsement, together with a number of

appendices relating to the F-28 aircraft and its operation within the Air Ontario system. The application advised Transport Canada that the first two F-28 aircraft captains would be Captain Joseph Deluce and Captain Murray, pending completion of their F-28 aircraft training.

As at the date of the Air Ontario application to amend its operating certificate to include the F-28, namely January 24, 1988, Captain Castonguay was the only Air Ontario pilot who was qualified on the F-28. There is no doubt that Captain Castonguay was hired by Air Ontario to fulfil its particular requirement for a company check pilot.

Transport Canada reviewed this application and granted Air Ontario a temporary amendment to its operating certificate in May 1988 and a permanent amendment in July 1988. Included as part of the granting of an amendment to the operating certificate, Transport Canada granted approval for Captain Castonguay to act as a carrier check pilot. On March 28, 1988, Transport Canada, Ontario Region, forwarded to Air Ontario written notice of Captain Castonguay's appointment.

The Role of Captain Castonguay

Captain Claude Castonguay was in the employ of Air Ontario only from January 24, 1988, until February 29, 1988, when he tendered his resignation. Immediately after being hired, Captain Castonguay proceeded to Charlotte, North Carolina, and completed a brief recurrent ground training course with Piedmont Airlines. Thereafter, he went to Florida to commence aircraft reconversion training on the F-28 flight simulator. Captain Castonguay was given four hours of training and received a pilot proficiency check ride from Transport Canada inspector William McIntyre on February 10, 1988. Captain Castonguay's check report stated "the simulator was well flown. Thorough application and procedures only minor points for debrief" (Exhibit 841). Captain Castonguay spent the next two weeks in Tampa, Florida, learning to operate the flight simulator and observing Captains Deluce, Murray, Hansen, and Morwood conduct their flight simulator training. After observing the simulator training of these pilots, Captain Castonguay was recalled to Toronto by Captain Nyman, Air Ontario's director of flight operations. Captain Castonguay met with Captain Nyman on February 29, 1988, at which time Captain Castonguay resigned from his employment. Captain Castonguay's letter of resignation reads:

> So much as I would like to keep working to establish your FK-28 program, I have concluded that I cannot function in my duties as a check pilot when I do not get the support I need.
>
> I wish everyone good luck in the new venture.
>
> Yours truly,
> Claude Castonguay
>
> (Exhibit 805)

On March 13, 1988, Captain Nyman forwarded a CCP nomination form to Transport Canada nominating Captain Robert Murray as the new CCP. The nomination form disclosed that as of March 11, 1988, although Captain Murray had approximately 15,000 hours of large propeller-driven aircraft flight time, he had acquired only 85 hours on the Fokker F-28 aircraft and 1.2 hours on the Boeing 737 aircraft. The nomination form did not disclose that Air Ontario intended to replace Captain Castonguay with Captain Murray as the F-28 specialist. It should be noted that only a few months earlier, Air Ontario had represented to Transport Canada that it would use a seasoned large turbojet aircraft captain to assist with the implementation of the F-28 program. Captain Nyman testified that he did not advise Transport Canada of Captain Castonguay's departure. He explained as follows:

> A. I did not personally. They would have certainly – we could not introduce the aircraft without a check pilot. We would have had to have a company check pilot of some sort to introduce the aircraft, part again of the regulatory process.
>
> I can't recall exactly how it went. It was very shortly thereafter that the strike occurred. The program, the F-28 program was put, to my knowledge, on hold. It ... wasn't an item of immediate concern.
>
> Whether Transport Canada were advised that day or not, I don't know. I certainly knew that they would have to be advised before the program was implemented.
>
> (Transcript, vol. 107, p. 234)

There is no evidence to indicate that anyone from Air Ontario in fact advised Transport Canada of Captain Castonguay's departure or the reasons for his resignation.

Given the widely recognized necessity of having an experienced large turbojet aircraft specialist to assist with the implementation of the F-28 program, I find it strange that Air Ontario did not replace Captain Castonguay with another individual with similar turbojet aircraft flying experience. Instead, Air Ontario relied on Captain Murray, who had very limited turbojet experience.

At the request of Captain Joseph Deluce, Captain Castonguay rejoined Air Ontario for approximately two weeks in July and August 1988 to assist with line indoctrination and route checks on the F-28. He provided line indoctrination training and route checks for Captain Hansen, Captain Nyman, and First Officer Allan during five separate flights over the course of the two weeks, but had no further involvement with Air Ontario.

Captain Castonguay testified before this Commission about his involvement with Air Ontario, and provided his perceptions and

observations relating to flight simulator training conducted by the first four pilots he observed. He also provided his views on the air carrier's flight operating procedures generally. He was a thoughtful and credible witness whose observations regarding the operation of large turbojet-type aircraft in an air carrier environment were most instructive.

Deficiencies Identified by Captain Castonguay

During the course of monitoring the flight simulator training of Captains Deluce, Murray, Hansen, and Morwood, and from conducting line indoctrination flights on Air Ontario pilots in July 1988, Captain Castonguay identified certain deficiencies in Air Ontario's cockpit procedures and flight operations philosophies. These deficiencies were not related to these pilots' flying capabilities, but rather reflected operational procedures which, in his view, are not recommended in jet aircraft operations.

Captain Castonguay was initially requested to assist Air Ontario in preparing manuals and weight and balance forms for the F-28. However, Air Ontario did not use Captain Castonguay's expertise in preparing its own F-28 operating manual and weight and balance forms, and other documents for use in F-28 operations.

Captain Castonguay spent approximately one week observing Captain Joseph Deluce and Captain Murray conduct their initial F-28 flight training in Piedmont's flight simulator. He observed that when these captains occupied the co-pilot's seat and took the role of the pilot-not-flying, they did not assist the pilot flying the aircraft in a meaningful way. It was his perception that these pilots did not practise integrated cockpit procedures. For example, Captains Deluce and Murray used the Piedmont briefing forms, but did not follow the proper procedures for "take-off briefing and approach briefing." In Captain Castonguay's opinion, both of these pilots were using procedures which, although perhaps adequate in flying turboprop-powered aircraft, were not suited to large jet-powered transport-type aircraft. He described the lack of crew concept which he observed as "the old concept: One guy flies and the other one doesn't do anything" (Transcript, vol. 105, p. 95). Captain Castonguay stated that in modern air carrier flying, one pilot carries out flying duties while the other, non-flying pilot does other duties such as reading checklists, handling radios and communications with air traffic control, and assisting the pilot flying wherever possible. Captain Castonguay's observations of lack of crew coordination were, in his words, "too numerous" to comment upon. He testified that neither Captain Deluce nor Captain Murray was receptive to Captain Castonguay's observations, advising him instead that Air Ontario had its own "ways of doing things" (Transcript, vol. 105, p. 99).

While Captain Castonguay observed that Captain Morwood and Captain Hansen both exhibited excellent flying skills, he also observed that, during their simulator training, both men, when acting as pilot-not-flying, did not always assist the pilot flying the aircraft in areas such as cross checks and checklists.

It was Captain Castonguay's opinion that these four pilots, as senior captains with Air Ontario, were not receptive to his observations of lack of proper flight crew coordination. He said he did not have the support of critical members of the F-28 implementation plan, Captains Murray, Deluce, and Nyman, without which he did not feel he could act properly in his capacity as company check pilot. Captain Castonguay also stated that it became clear that Air Ontario did not intend to allow him to continue conducting line indoctrination training, as represented to Transport Canada, but rather relegated him to the role of conducting simulator training.

For approximately two weeks in the months of July and August 1988, Captain Castonguay carried out line indoctrination flights with Captain Hansen, Captain Nyman, and First Officer Allan. Captain Deluce asked him to assist in line indoctrination because Captain Deluce felt himself to be overworked. Captain Castonguay recounted that he advised Captain Nyman during a line indoctrination flight that, in his view, Air Ontario had to change its philosophy and procedures in operating the F-28 aircraft; in his words, "you cannot operate this [F-28] like a turboprop" (Transcript, vol. 105, p. 132). Captain Nyman advised Captain Castonguay that procedures and philosophies could not change, and that "it may take six months, a year before we do any changes" (Transcript, vol. 105, p. 132).

Captain Castonguay testified that Quebec Air used fully qualified dispatchers in their flight watch system and that he was not experienced with a pilot self-dispatch system. He observed that while he saw an Air Ontario flight release used by Air Ontario F-28 crews, he at no time saw an operational flight plan issued to the flight crews. In his opinion, based on his experience and his understanding of the provisions of ANO Series VII, No. 2, he did not consider that the flight release used by Air Ontario for the F-28 met the requirements of an operational flight plan.

Captain Castonguay observed that Air Ontario F-28 pilots did not use an aircraft flight log to record flight leg times and fuel burn, but simply made entries into the aircraft journey logbook at the end of the flight. In his view, it was insufficient simply to use a flight release and an aircraft journey logbook for jet operations. A flight crew should have in their possession an operational flight plan that meets regulatory requirements, and should have an aircraft flight log in which to record during a flight critical items such as flight times, distances, fuel burns, and aircraft weights.

Captain Castonguay recommended that Air Ontario not allow a circling approach procedure to be conducted in the F-28 aircraft for several months, at least until the pilots had more experience flying the aircraft. Neither Quebec Air nor Piedmont Airlines, he said, conducted this low-altitude manoeuvre with jet aircraft. It was Captain Castonguay's opinion that Air Ontario did not have the expertise or the experience with jet aircraft to allow immediate use by its pilots of a circling approach as an approved IFR manoeuvre (Transcript, vol. 105, pp. 176–77). This advice was not accepted by Air Ontario.

Captain Castonguay's Recommendations

Captain Castonguay, at the conclusion of his testimony, provided the following observation:

> Q. ... From your experience of the two stints that you did at Air Ontario ...
>
> Do you think that when Air Ontario put the F-28 into public service, into service as a public carrier, that Air Ontario was ready?
>
> A. They weren't ready.
>
> (Transcript, vol. 105, p. 258)

Because of his extensive aviation experience, Captain Castonguay was asked, when he appeared before this Commission, to offer for the record any recommendations he might have to improve air carrier operations in Canada. He made three recommendations.

First, he testified that individuals with experience on an aircraft type should be hired as necessary on a short-term basis to fly with an air carrier that does not have qualified people. He gave examples of Quebec Air hiring experienced Douglas DC-8 and Boeing 707 pilots to fly as co-pilots with Quebec Air pilots on its DC-8 and 707 aircraft until the Quebec Air captains had adequate experience on the aircraft type.

The testimony of Captain Gert Andersson, a veteran F-28 pilot of the Swedish airline Linjeflyg, supports this view. He testified that when Linjeflyg recently commenced flight operations with new Boeing 737 aircraft, its most experienced flight instructors, all of whom had significant F-28 experience, were sent to Boeing Aircraft for the first conversion course. Route training conducted by Linjeflyg with their Boeing 737s was done using Boeing Aircraft flight instructors as first officers. When it was determined that the Linjeflyg pilots had sufficient flight hours and experience on the new aircraft, they were released to conduct line flying. Captain Andersson testified that as the conversion program matured, there was a "slow rollover program" in order that the Linjeflyg flight instructors could eventually take over the training of Linjeflyg's own pilots (Transcript, vol. 83, p. 179).

Second, with respect to flight crew pairing, Captain Castonguay recommended that one of the flight crew members, either the captain or the first officer, should, when a transition is being made to a new or different aircraft type, have substantial experience on that aircraft type.

Captain Andersson's testimony also supports this recommendation. He stated that it was a "bad combination" to have captains and first officers paired as flight crew on a new aircraft type when they had approximately 100 hours flight time each on that type and where the training pilot responsible for line indoctrination and check rides was almost as inexperienced, with perhaps 200 hours on the aircraft type. Captain Andersson testified that pairing two pilots who are equally inexperienced on an aircraft type could not happen in Linjeflyg. Through the use of computer programming, Linjeflyg ensures that neither an inexperienced captain nor a first officer who has recently completed aircraft type training and route flying will be paired with other inexperienced pilots (Transcript, vol. 83, pp. 158–60).

Third, Captain Castonguay recommended that all air carriers embrace cockpit resource management (CRM) programs. He expressed the view that the benefits of providing CRM courses and training to pilots would, in the long run, pay dividends by promoting harmonious work habits among flight crew members.

Cockpit and Crew Resource Management Training

Experience in the United States and other countries has demonstrated the importance of CRM training in improving the effectiveness of flight crew performance. America West Airlines has extended CRM training in a program called Aircrew Team Dynamics (ATD) to include both flight crew and cabin attendants in total crew coordination concepts. In this section, while I touch briefly on the total crew resource management training concept, I focus primarily on cockpit resource management, which deals with training of the aircraft flight crews.

CRM training originally focused on flight crews, as a result of recommendations made by the United States National Transportation Safety Board (NTSB) following the United Airlines accident in Portland, Oregan, in 1978 where a captain did not listen to "rather mild protestations by a crew member" that the aircraft was running out of fuel (Transcript, vol. 157, p. 158). The aircraft subsequently ran out of fuel and crashed. The recommendations from the NTSB were that interpersonal communication training should be carried out to improve flight crew coordination. Shortly thereafter, organizations such as the United States National Aeronautics and Space Administration (NASA) began research, and major United States air carriers, such as United Airlines, started training flight crews in CRM (Transcript, vol. 157, pp. 158–59).

The United States Federal Aviation Administration (FAA) has encouraged CRM training within the United States air carrier industry and, in December 1989, published an advisory circular, AC 120-51, entitled Cockpit Resource Management Training, to provide guidelines for developing, implementing, and evaluating air carrier CRM training programs. The guidelines for CRM training programs designed by the FAA were intended for use by all air carriers in training their flight crew. Efforts are now under way in the United States to make CRM training mandatory for all air carriers operating under Parts 121 and 135 of the Federal Aviation Regulations. I have attached United States FAA Advisory Circular AC 120-51, Cockpit Resource Management Training, as appendix J to this Report.

The premise of Advisory Circular 120-51, supported by empirical research such as that conducted by Dr Robert Helmreich, who testified before this Commission, is that a single CRM training course in CRM concepts is insufficient to provide long-term changes in crew coordination, attitudes, and operating methods, and that such training must be accompanied by opportunities to practise and reinforce the concepts. The circular suggests that check pilots and pilot instructors are a critical element in the reinforcement of CRM concepts, and should be given special training in the evaluation and reinforcement of resource management issues. This is an extension of their traditional role of teaching and examining individual flight crew member's technical skills and systems knowledge. CRM evaluation and reinforcement should, according to the FAA and experts such as Dr Helmreich, occur during ground school courses, flight simulator training, and line checks.

To its credit, Air Ontario assessed CRM training and, in late 1987, had its chief pilot and chief Dash-8 training pilot attend a CRM course conducted by a major United States air carrier. Captain Nyman, the director of flight operations, testified that in his view CRM is a new concept "certainly to Canada and Canadian carriers" (Transcript, vol. 109, p. 60). After assessing the CRM course attended by two of its supervisory pilots, Air Ontario decided that this type of course "did not fit" Air Ontario's operation, and that it was of limited value and was expensive. Air Ontario pilots also attended and reviewed other CRM courses, including those conducted by Air Canada and a "pilot decision-making course" recommended by Transport Canada. Captain Nyman testified that Air Ontario has adopted and is using the pilot decision-making course and that some Air Ontario pilots have attended the CRM course conducted by Air Canada.

The view expressed by Air Ontario's pilots that some CRM training courses were of limited value to certain air carrier operations is not uncommon. Captain Castonguay testified that the United Airlines course was more suited to three-person than two-person flight crews. Dr

Helmreich agreed in testimony that some CRM training courses might not have been applicable to Air Ontario's flight operations environment. When asked to comment on the position of Captain Nyman and his pilots regarding their experience with CRM training, Dr Helmreich testified as follows:

> A. ... I think it shows a very keen evaluation of the situation by Mr Nyman and his pilots, because what we saw developing in the last few years was airlines moving to recoup some of the substantial expense involved in putting in CRM by selling their courseware to other airlines.
>
> And the first attempts of that were usually off the shelf; in other words, there was kind of an assumption that one size will fit all, buy our course and we will do it. And some of the attempts were fairly depressing. Attempts to take an U.S. course and fit it into Korean culture did not come across very well.
>
> And I think these gentlemen attended at one of the major airline courses which was offered as a turnkey operation and said, gee, this doesn't quite fit the culture we have and it was expensive. I'm familiar with the course. So I think that was a very valid perception.
>
> Q. So you view this as a positive move by Air Ontario?
>
> A. I think looking into it was an extremely positive move and one ... of course, has to feel sorry for them that there wasn't the resources available to customize a course or develop their own or used their parent's course to fit their own culture.
>
> (Transcript, vol. 157, pp. 195–96)

In Dr Helmreich's opinion, CRM or equivalent training cannot alleviate operational problems associated with lack of management stability and consistent direction.[5] CRM training will also only be effective so long as the flight crew have adequate education and have the knowledge available to them to make a reasoned assessment of operational problems.

According to Dr Helmreich, statistical and research data still suggest that certain accidents and incidents involved the failure of flight crews to operate effectively as teams. Many airlines have responded to these findings by increasing the emphasis in flight crew training and checking on the overall flight crew performance, rather than on the individual flight crew member's aircraft handling skills.

In addition to encouraging CRM training through Advisory Circular 120-51, the FAA has made CRM training a requirement for air carriers who elect to operate under the new Special Federal Aviation Regulation

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[5] Exhibit 1270, "Human Factors Aspects of the Air Ontario's Crash at Dryden," p. 10

(SFAR) 58, the Advanced Qualification Program (AQP). This new program has been developed in the United States by the FAA as an alternative means of qualifying, certifying, and training flight crew members and other flight operations air carrier personnel. A voluntary program, the AQP is intended to enhance flight crew qualifications by the development and use of innovative training and qualification techniques for flight crew and check pilots. Instead of defining specific manoeuvres that must be accomplished by individual flight crew members, the AQP contemplates, in certain instances, training and evaluating a flight crew as a unit, rather than the traditional method of emphasizing individual performance focusing on flying and technical skills. The AQP shifts the emphasis to crew coordination and to management of crew resources, communication, coordination, and decision-making skills.

One of the training approaches to be used for United States air carriers operating under the AQP is Line Oriented Flight Training (LOFT). LOFT involves all of the flight crew operating in a simulator under realistic operating conditions, using flight releases, conducting air traffic communications, and facing a variety of operational problems, including inflight emergencies. In LOFT, flight crews are allowed to experiment with a variety of behaviours and approaches without intervention by the flight instructor and without placing their licences at risk.

The Air Transport Association in the United States, in endorsing the FAA's Advisory Circular 120-51, has suggested that CRM training be extended beyond the aircraft cockpit to include flight attendants, maintenance personnel, and dispatchers. The experience of airlines such as America West Airlines has shown that efforts are being made to extend CRM training to cabin attendant crews. None of the crew on board C-FONF on March 10, 1989, had received cockpit or crew resource management training courses. According to Dr Helmreich, had both the flight attendants and the flight crew completed cockpit and crew resource management training and accepted its concepts, there might have been an exchange of information that would have precluded the last takeoff of C-FONF.

As discussed in chapter 39, Crew Coordination and Passengers' Safety Concerns, the evidence of flight attendants Sonia Hartwick and Labelle-Hellmann suggests, in the view of Dr Helmreich, an environment in Air Ontario that discouraged them from questioning a flight crew or bringing operational issues to their attention. Air Ontario flight attendant training stressed the competence of pilots and fostered a position of total reliance on the flight crew with regard to operational decisions. An example of this discouragement of crew communication was the failure of the flight crew of an Air Ontario HS-748 aircraft to respond to Mrs Labelle-Hellmann's concerns regarding contamination on the aircraft's

wings prior to takeoff from Pearson International Airport. There was also a failure of the flight attendants to relay passenger concerns to the flight crew regarding contamination on the wings of C-FONF prior to its last takeoff. Dr Helmreich explained that the concepts taught in crew resource management training courses stress the importance of unfettered information exchange between the flight crew and the cabin attendant crew (Exhibit 1270, p. 14). However, cockpit and crew resource management training can be effective only when it is based on accurate technical information and knowledge.

In light of the possible benefits of CRM training, it is my opinion that concepts described in the United States FAA Advisory Circular 120-51, which have already been incorporated into training programs by many United States air carriers and by some Canadian air carriers, should be promoted by Transport Canada and adopted by all Canadian air carriers.

New programs such as the Advanced Qualification Program should be monitored and evaluated by Transport Canada and, if found suitable, should be adopted as an alternate method of training and evaluating pilots of air carriers operating large aircraft pursuant to ANO Series VII, No. 2. Specific crew resource management training courses expanded to include both flight crew and flight attendants should also be considered. Because Transport Canada air carrier inspectors and delegated company check pilots are critical in evaluating and reinforcing CRM concepts, they should receive special instruction in resource management training issues.

Cabin Attendant Training

ANO Series VII, No. 1, subsection 45(1)(b), requires an air carrier to provide for each crew member individual instruction in the location and operation of all emergency equipment carried on board an aircraft. Parts of section 45 that require the participation of cabin (flight) attendants during emergency procedures read as follows:

> 45. (1) Emergency procedure training provided by an air carrier in respect of an aeroplane shall include, for each crew member, individual instruction in the location of and operation of all emergency equipment carried and instruction, including co-ordination among crew members, in the emergency procedures for
>
> ...
>
> (b) handling of
>
> (i) emergency decompression,
>
> (ii) fire in the air or on the ground,
>
> (iii) ditching, and
>
> (iv) evacuation; and ...

Having regard to the evidence, it is indisputable that the primary role of a flight attendant is to ensure cabin and passenger safety. This concept, which was rigorously advanced by flight attendant Sonia Hartwick and the representatives of the flight attendants' union, was endorsed by senior Transport Canada management-witnesses and was fully supported by counsel on behalf of the Canadian Air Line Pilots Association (CALPA), who stated: "I would first like to say that CALPA fully supports the concept that Mrs Hartwick has expressed that a flight attendant's primary role is safety" (Transcript, vol. 12, p. 99).

Air Ontario's Flight Attendant Manual sets out in section 2 the requirements for the initial training of flight attendants. Subsection 2.2(c) states as follows:

> During training, ALL participants will be required to have practical use of:
>
> a. Oxygen bottles & systems as carried in the fleet
> b. Fire Extinguishers as carried in the fleet
> c. Exit operations - each aircraft type
> d. Evacuation drills
> e. Shouted commands
> f. Observation/operation of an evacuation slide & participate in evacuation drill down a slide on the F28 or the CV580
> g. Operation of an evacuation slide & participate in at least one evacuation drill on the HS-748 aircraft
> h. Pilot incapacitation drill
>
> Following completion of successful training, each candidate will then be assigned to line indoctrination flights.

Initial Training: Flight Attendant Hartwick

Flight attendant Sonia Hartwick testified that her initial flight attendant training with Air Ontario Limited spanned a six- or seven-day period. Following an employment screening interview, conducted on September 14, 1986, in Sudbury, Ontario, she reported to London, Ontario, on the next day for training. Ten days later she took her indoctrination flight on the Convair 580 as a flight attendant and completed approximately seven more flights on the Convair 580 as one of the working flight attendants.

The evidence indicates that the theoretical portion of Mrs Hartwick's initial flight attendant ground school training was thorough, and examinations written by her on safety procedures, dangerous goods, and flight attendant responsibilities, as well as the aircraft pre-flight examination, show that these matters were well covered. However, when asked what stood out in her mind about her initial training, Mrs Hartwick testified that "there was indeed some emergency procedures"

training conducted during the course, but, in her opinion, "it was lacking."

Recurrent Training: Flight Attendant Hartwick

Examination records of Mrs Hartwick for 1987 and 1988 also indicate that the theoretical and written portion of the recurrent flight attendant ground school training was thorough. However, in sharp contrast to her initial flight attendant training, Mrs Hartwick was laudatory of the recurrent training she received from Air Ontario in October 1988 under the direction of Mr Roger Whittle with respect to the Convair 580 and the Dash-8 aircraft. This recurrent training involved hands-on training in simulated emergency situations. Mrs Hartwick stated that this recurrent training was very different from her initial training in 1986 and she described it as "exceptional training." She stated that having gone through the recurrent training in October 1988, she "felt like she was qualified" (Transcript, vol. 10, pp. 53–55).

Practical Training: Flight Attendant Hartwick

The term "practical use" as it appears in subsection 2.2(c) of the Air Ontario Flight Attendant Manual appears to be interchangeable with the term "hands-on." Air Ontario's flight attendant recurrent training program in October 1988, however, did not include any hands-on training on the F-28 aircraft, which had been in service since June 1988.

In February 1988 Mrs Hartwick took ground school training on equipment and procedures on the HS-748 and received hands-on training on the aircraft in March 1988 in Toronto. In June 1988 she expressed to Mr Bryan Pettman, who was at the time in charge of the in-flight service department at Air Ontario, her concern that she did not feel she was qualified and competent to work on the HS-748. It was her view that the actual hands-on training, which she took with a group of four or five other flight attendants, was not thorough, lasting only several minutes. In her memorandum of June 19, 1988, to Mr Pettman, Mrs Hartwick indicated that she was not alone in her concerns: "recently there have been several occasions where fellow YXU [London, Ontario] F/As [flight attendants] have flown the Hawker [HS-748], and who also feel as unqualified as I do."[6]

Mr Pettman, in a memorandum dated July 8, 1988, addressed the flight attendants' concerns outlined by Mrs Hartwick. He expressed the opinion that "they had received sufficient training to fully qualify them" on both the Convair 580 and the Dash-8 and that it should "not be

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[6] Exhibit 121, Memorandum from Sonia Hartwick to Bryan Pettman, dated June 29, 1988

difficult to grasp a third aircraft after a few days' training." He indicated that the manuals contained all the resources needed to refresh them on equipment and that he was available to answer questions. He offered to fly with them until they felt comfortable on the equipment.

When questioned during hearings about specific problems she had regarding the practical hands-on training provided by her employer, Mrs Hartwick testified that, among other things, her major concern was the lack of hands-on training in assembling the emergency slide:

> A. With the practical hands-on training, I felt ... that not enough things were done ... we were only able to watch a girl take a light off - an emergency light because they didn't want to have to replace too many seals.
>
> I did open the cargo door in the washroom area and the main entry door a couple of times, but I was not able to actually assemble the emergency slide which is located in the rear of the aircraft ...
>
> I think ... that is more or less your most important thing on the aircraft would be an emergency slide and how to actually assemble it and this was not done with myself and, therefore, I did not feel that I was properly qualified unless I actually did this a couple of times and got the feel for actually assembling the slide, an emergency slide that is.
>
> (Transcript, vol. 10, pp. 86–87)

Flight attendant training should recognize the need for practical hands-on training in the operation of aircraft doors, emergency exits, evacuation chutes, and other emergency equipment in the course of a simulation of the various adverse conditions that might be encountered in an actual emergency. Such training should also include practical examinations in which flight attendant candidates, after initial training, and qualified flight attendants, after recurrent training, are required to demonstrate their capability of consistently carrying out their emergency-related tasks properly and within the time allotted for the evacuation of an aircraft.

While the evidence reveals that the theoretical training and examinations given by Air Ontario to the flight attendants were thorough, and while the flight attendant training did include some hands-on training, it was Mrs Hartwick's view that during her initial training on the Convair 580 and her conversion training on the HS-748, such hands-on training was not sufficiently extensive and, in her mind, was therefore not acceptable.

Mrs Hartwick testified that the only hands-on training she received from Air Ontario on the F-28 aircraft was in the opening of the main entry door. This was obviously a function that would have to be learned apart from cabin safety. She received no hands-on training with respect

to the operation of the over-wing emergency exit windows and the galley service exit door on the F-28, nor on the location of the over-wing emergency window exit rope.

Flight attendant Hartwick described her training on the F-28 aircraft as simply a line indoctrination on a return flight, Toronto–Sault Ste Marie–Toronto, in October 1988, with passengers on board. When questioned as to the particulars of her Air Ontario training for the purpose of qualifying on the F-28, she stated:

> A. I did a line indoctrination sometime in October of '88, and my line indoctrination flights consisted of two flights, Toronto–Sault Ste Marie and return to Toronto.
>
> And, at that time, the purser who was in charge, I was just boarding passengers, I opened up the door, I closed the main entry door, and I just continued to serve passengers as I normally would on any other revenue flight.
>
> (Transcript, vol. 11, p. 178)

On her own initiative, Mrs Hartwick posed a "quiz question" to several Air Ontario F-28 flight attendants regarding their hands-on training on the F-28 and their knowledge of the location of the evacuation rope for the over-wing exit windows:

> A. ... So, it is good to actually try these things. Because I spoke to flight attendants and said to them, you know, did you have hands-on on the F-28 and many of them have said, No. And then I just gave them a quiz question on my own. Do you know where the rope is by the windows on the F-28? And a few of them went to say, yeah, it is in the frame.
>
> And I said, No, it is not. It is actually in the overhead rack or the overhead where your lights are and things ...
>
> So practical use and hands-on, in my opinion, is very important.
>
> (Transcript, vol. 11, pp. 131–32)

During her testimony, Mrs Hartwick commented on her perception as to why she did not receive hands-on training:

> A. Again, the only observation I could think of is that the F-28 was too busy with revenue flights and, therefore, there was no actual ground school time for it to actually be on the ground for us to have practical training on it.
>
> (Transcript, vol. 11, p. 132)

When questioned about the term "practical use" as found in subsection 2.2 of the Air Ontario Flight Attendant Manual, Mrs Hartwick stated:

> A. Well, practical use, again, in my view, is hands-on training on the aircraft itself, and, again, I [did] not have hands-on training on the F-28.
>
> (Transcript, vol. 11, p. 145)

I agree with Mrs Hartwick's view that adequate hands-on training on specific aircraft types is an essential element of cabin crew training.

Flight Attendant Licensing: CUPE Proposal

In its formal submission to this Inquiry, the Airline Division of the Canadian Union of Public Employees (CUPE), representing flight attendants, proposed that this Commission recommend that flight attendants be licensed by Transport Canada. Although I was presented with a written brief and oral argument by counsel on behalf of the flight attendants' union in support of the union's position, its representatives declined the opportunity offered to them to call witnesses before the Inquiry. Since I have not heard any witness testimony regarding this proposal, I am not in a position to make a recommendation with respect to this issue.

Ground-Handling Personnel Training

It is essential that ground handlers and fuellers be properly trained to carry out their duties and responsibilities in support of the flight crew.

Regulatory Requirements and Guidelines

There are no Canadian regulatory requirements pertaining to training of personnel involved in the ground-handling, fuelling, or de-icing of aircraft. With respect to fuelling operations, however, Transport Canada has policy documents, which the Dryden Flight Centre was required to follow. As well, ESSO issues guidelines for the handling of its equipment and products (see chapter 9, Crash, Fire-fighting, and Rescue Services).

While there are no Transport Canada policies respecting training of ground handlers, it is, nevertheless, an area subject to inspection. Transport Canada's Air Carrier Inspector (large and small aeroplanes) manuals include under the heading "Aircraft Servicing and Ramp Safety" the following procedure to be followed by inspectors as part of in-flight inspection:

> Observe refuelling procedures and the method of determining fuel quantities. Check loading methods and security, the use of ground handling equipment and safety precautions exercised in its use,

> aircraft parking and the control of passenger traffic on the ramp. Evaluate the fire precautions and the use of the aircraft electrical and heating systems during refuelling, use of cabin "no smoking" signs, if there is a cabin attendant on board and if there are ramps at the doors of the aircraft.
>
> (Exhibits 960 and 961)

In his testimony before the Commission, Mr Martin Brayman, superintendent of air carrier inspection (large aeroplanes), Ontario Region, reiterated that inspectors were to monitor ground handlers as part of their in-flight inspections, while the airworthiness group were responsible for monitoring fuelling operations.

With respect to the Dryden Flight Centre, however, it appears that neither ground-handling nor fuelling operations of Air Ontario's F-28 aircraft were monitored by Transport Canada. Mr Randy Pitcher testified that in his capacity as lead inspector of Air Ontario's F-28 operation, he was in Dryden only on one brief occasion and did not inspect the facilities in place for servicing the F-28. Contrary to Mr Brayman's understanding, airworthiness inspector Ole Nielsen indicated that he knew nothing whatsoever about an airworthiness responsibility to monitor fuellers.

As discussed in chapter 15, F-28 Program: Planning, Air Ontario was required to amend its operating certificate prior to commencement of its F-28 operation. While there is no precondition to amendment of the operating certificate that ground handlers or fuellers meet a particular standard, Air Ontario included the following representation respecting refuelling facilities in its application to Transport Canada to amend its operating certificate:

> N) The company has determined that existing terminal facilities, buildings, lighting, ground support, power units, refuelling facilities, communications and navigation aids, dispatch, weather service and ATC are adequate for the proposed operations. However, the company may require certain improvements as F-28 operations develop.
>
> (Exhibit 855)

Dryden Flight Centre Training

Mr Lawrence Beeler was the president of Dryden Flight Centre, and Mr Vaughan Cochrane was responsible for day-to-day management. Both Mr Beeler and Mr Cochrane, along with Dryden Flight Centre employee Mr Jerry Fillier, were involved in fuel and baggage handling.

In the December 7, 1987, agreement between Dryden Flight Centre and Air Ontario, Air Ontario assumed the responsibility of training Dryden Flight Centre's ramp and ticket agents. The agreement contained

the following clause with respect to training: "Air Ontario will provide instructors and all material for the initial ramp and ticket agent training. The parties will agree to the manner of any subsequent or recurrent training" (Exhibit 177, para. 5).

In November 1987, in preparation for Air Ontario's Dash-8 service through Dryden and in expectation of concluding the December 1987 agreement, Air Ontario provided Mr Beeler and Mr Cochrane with a day-and-a-half of hands-on training on the Dash-8 series 100 aircraft at Sault Ste Marie. Despite intentions to the contrary, Dryden Flight Centre personnel never received ground-handling or fuelling training on the F-28 aircraft. In a letter dated March 8, 1988, to Mr Cochrane regarding arrangements for Air Ontario's new F-28 service, Mr Scott Tapson, Air Ontario's manager of airport services, stated that "Ground handling training for the F-28 will be arranged in the near future. Rod Coates will be contacting you with these arrangements" (Exhibit 392). On March 16, 1988, Mr Tapson again wrote to Mr Cochrane and, in addition to providing copies of the Fokker F-28 Ground Handling and Service Data Manual and the ESSO Aviation Fuelling Guide, he stated: "Formal training on the aircraft will be planned in the future. Bruce Maxim, at our London head office, will be coordinating this training" (Exhibit 398).

The evidence of Mr Cochrane and from Air Ontario's Mr Rodney Coates is in conflict as to why this planned training session never came to pass. Mr Cochrane testified that he could not recall being contacted by a representative of Air Ontario to schedule the training sessions referred to in the correspondence of March 8 and March 16, 1988. Mr Rodney Coates, in contrast, testified that he did arrange training for ground handlers from all stations through which the F-28 was to operate, including Dryden. He stated that he spoke to Mr Cochrane about the training:

> A. I explained to him when the course was, where the course was and which stations would be attending, and he declined to send any people to the course.
> Q. Did he give a reason why he was not going to send someone to the course?
> A. Yes, that being that, for a number of years, another airline had been operating an F-28 into and out of Dryden and that he felt he had sufficient experience and didn't need to attend the course.
> Q. So was it your understanding that Mr Cochrane had been handling the F-28 over an extended period of time?
> A. Well, I wouldn't say that. I would say that I felt that he had the experience. I don't know if in fact he was handling the F-28, but ... I felt that, from the conversation, that he had enough experience, and that satisfied me.
>
> (Transcript, vol. 57, pp. 19–20)

Dryden Flight Centre was the only ground-handling agent not represented at Air Ontario's F-28 training session, and Messrs Cochrane, Beeler, and Fillier received no formal training on the F-28.

There can be little doubt that the training course would have been worthwhile. Mr Cochrane agreed in his testimony before the Commission that, although the Dryden Flight Centre had received from Air Ontario copies of the Fokker ground-handling training manual and the ESSO refuelling publications, they were technical documents that would be understood best in the context of a training session. Furthermore, the testimony of Dryden Flight Centre personnel revealed gaps in their knowledge of certain refuelling safety procedures. Mr Cochrane testified as follows:

> Q. ... I questioned Mr Fillier about his knowledge concerning the proper technique and what instructions he had been given, and, under oath, he told me, for instance, that no one had suggested to him that, before doing a fuelling, the tank vent openings should be unobstructed, nobody pointed the tank vents out to him and so on.
>
> Does that testimony accord with your own recollection of his training?
>
> A. I would probably agree with that, yes.
>
> Q. ... And, also, he didn't know where the landing gear static ground wires were, so he couldn't check them for proper contact; is that the kind of thing that you even knew?
>
> A. No, I didn't – that's one I didn't know either.
>
> Q. Did you know, for instance, that the Fokker manual, at least, recommends that, before fueling is begun, one of the things that should be done is to check that the main gear inboard doors are closed; did you know –
>
> A. Yes, I knew about that one.
>
> Q. Now, Mr Fillier, however, testified that no one had instructed him in that regard. Does that testimony accord with your own recollection?
>
> A. That would be –
>
> Q. ... So these are all instances of – or these are all examples of how a proper training session on fueling that plane would have been of assistance to you and your employees; is that right?
>
> A. Agreed.
>
> (Transcript, vol. 54, p. 8)

It is unfortunate that Air Ontario did not insist that the Dryden Flight Centre personnel attend the training session. Although Mr Coates had no operational background in aviation, he accepted Mr Cochrane's position that, on the basis of the Dryden Flight Centre's track record and Mr Cochrane's own F-28 experience, training was not required. In fact, contrary to Mr Coates's understanding, Mr Cochrane's F-28 experience

was extremely limited. Mr Cochrane's own testimony revealed that he had observed only one short turnaround of an F-28 in 1987.

Mr Coates testified that, as Air Ontario's regional manager for customer service, his concern was with on-time performance and passenger service. He was not responsible for ground-handler training or the operational and safety aspects of ground handling, such as marshalling, fuelling, de-icing, and cleaning of aircraft, and he was not certain who, within his company, was responsible. In fact, according to Mr Coates, in the absence of an internal inspection system, the only means by which Air Ontario could ensure the competence of its ground handlers would be reports from flight crews to system operations Control. As the following testimony of Air Ontario pilot, Captain Keith Fox, reveals, flight crews are themselves not trained to understand or monitor all aspects of a ground handler's or fueller's duties:

> Q. ... Given the fact that you used Jet B and that Jet B has a flash point something below zero, I believe, were you familiar with all of the grounding and bonding techniques that Fokker recommended for refueling the F-28 or is that something that you relied upon the ground crew to be familiar with?
>
> A. I was not familiar with it. I would rely upon the ground crew.
>
> (Transcript, vol. 51, p. 259)

When an air carrier contracts for ground-handling and fuelling services, it should satisfy itself that the contractor is competent. This can be achieved only by thorough training and purposeful monitoring by individuals with relevant operational knowledge and experience. As I have outlined in chapters 21 and 9 on hot refuelling and crash, fire-fighting, and rescue, many ground-handling activities, particularly aircraft refuelling, are potentially dangerous. The travelling public requires the assurance that ramp activities are conducted by well-trained, competent individuals operating properly maintained equipment.

I also find it difficult to comprehend why Mr Cochrane declined the training course. Mr Paul Lefebvre, an Air Canada station attendant who appeared before me in the de-icing phase of the hearings of this Commission, testified that Air Canada's station attendants receive a five-week training course, including separate instruction on the different aircraft types, followed by a six-month period of supervision and probation. Dryden Flight Centre was an agent for Air Ontario, whose training expenses would have been covered by Air Ontario. I can therefore see no acceptable reason why Dryden Flight Centre personnel did not take the ground-handling training course for Air Ontario's F-28 aircraft.

Aircraft Fuelling: Training

Pursuant to an ESSO aviation dealer agreement dated August 1, 1985, which the Dryden Flight Centre entered into with Imperial Oil, the Dryden Flight Centre undertook to "properly train all personnel involved in loading, handling and delivery of aviation petroleum products" (Exhibit 170, para. 11).

Mr Beeler testified that although he had no training or prior experience fuelling an F-28, he reviewed the Fokker F-28 Fuelling Procedures Manual, and fuelled the F-28 aircraft with his employee, Mr Fillier, on a couple of occasions, until he was satisfied that Mr Fillier understood the fuelling system. Also, as previously noted, Mr Cochrane's only previous experience on F-28 fuelling procedures occurred when he observed the fuelling of an F-28 in 1987.

The two manuals supplied by Air Ontario do not refer to the issue of hot refuelling. The Fokker F-28 Fuelling Procedures Manual and the Fokker F-28 Ground Handling and Service Data Manual, which for the most part are identical, state that pressure fuelling while an engine or APU is running is acceptable if certain precautions are followed. There is no mention of passenger protection in the list of precautions (Exhibits 180 and 181, section 4.1.9). The ESSO Aviation Operations Standards Manual provides detailed instruction on fuelling with one engine running.

I heard no evidence that Air Ontario was involved in any way in training fuelling personnel at Dryden Municipal Airport, nor did the Dryden Flight Centre request any such assistance. As discussed in chapter 21, F-28 Program: Hot Refuelling and Ground De-icing, there is also no evidence that Air Ontario trained its flight crews in fuelling procedures to assist them in monitoring off-line fuelling effectively.

Similarly, notwithstanding the cited excerpt from Transport Canada's Air Carrier Inspector (large and small aeroplanes) manuals, Mr Beeler testified that the Dryden Flight Centre's refuelling operation had never been subject to a Transport Canada inspection. It is my strongly held view that Transport Canada must take seriously the guidelines set out in its own publication and routinely inspect the training and activities of aircraft fuellers and ground handlers.

Findings

- The Piedmont Airlines and USAir ground school course and instruction provided to Air Ontario F-28 pilot trainees were generally thorough and comprehensive in form and content.

- Training and instruction given and received on an aircraft flight simulator is more comprehensive and thorough than training and instruction given and received on an aircraft, because an aircraft flight simulator is capable of simulating abnormal situations and dangerous flight manoeuvres that are not possible to perform in an aircraft without exposing the aircraft and occupants to unacceptably high risk.

- Captain Morwood received his F-28 aircraft flight training primarily on an F-28 flight simulator, accumulating 20 hours prior to taking a pilot proficiency check ride.

- First Officer Mills received all of his aircraft flight training on an F-28 aircraft, accumulating approximately 8.5 hours prior to receiving his pilot proficiency check ride.

- Captain Morwood received 27.5 hours of line indoctrination before commencing his duties as a line captain.

- First Officer Mills received approximately 20 hours of line indoctrination before he began flying as a line first officer on the F-28.

- As a result of receiving his F-28 training in an aircraft flight simulator, Captain Morwood probably received better and more thorough training and instruction than First Officer Mills.

- Captain Morwood commenced line flying as a captain on the F-28 aircraft with 29 hours in the F-28 aircraft and 30 hours simulator time.

- First Officer Mills commenced line flying as a first officer on the F-28 aircraft with approximately 30 hours of flight time, 9.5 hours of which were acquired during aircraft flight training.

- Both Captain Morwood and First Officer Mills completed the pilot ground training, pilot flight training, and line indoctrination training requirements for the F-28 aircraft in accordance with Canadian regulations and Air Navigation Orders.

- Although both Captain Morwood and First Officer Mills were qualified to operate and carry out flight crew duties in the F-28 aircraft in accordance with Canadian regulations and Air Navigation Orders, Air Ontario did not have a policy in place to prevent the pairing of both a low time-on-type captain and first officer.

- Air Ontario's F-28 Project Plan approved by the executive committee of Air Ontario and by Air Canada contemplated that Air Ontario would have an F-28 specialist hired on a contract basis to assist and advise Air Ontario on the operations of the F-28.

- The F-28 specialist was to be available for aircraft acceptance and for airborne training and line indoctrination during initial startup of the project.

- Captain Claude Castonguay was hired by Air Ontario's director of operations to fill the F-28 specialist function and to conduct F-28 simulator and line indoctrination of Air Ontario pilots.

- Captain Castonguay has over 27,000 flight hours, 11,000 of which are on large turbojet-type aircraft. He is experienced in operating large turbojet-type aircraft in an air carrier operational environment, and was fully qualified to act as Air Ontario's company check pilot.

- Captain Castonguay was also hired by Air Ontario to fulfil its requirement to have, during the initial implementation of the F-28 aircraft into Air Ontario service, a qualified company check pilot for the F-28 aircraft acceptable to Transport Canada.

- Based on the submissions made to it by Air Ontario and on the flying experience and qualifications of Captain Castonguay, Transport Canada granted approval for Captain Castonguay to act as Air Ontario's company check pilot for the F-28 aircraft.

- Captain Castonguay was employed by Air Ontario for approximately one month, from January 24, 1988, until February 29, 1988, at which time he tendered his resignation. He was later rehired by Air Ontario for a two-week period, in July 1988, to conduct F-28 line indoctrination.

- Air Ontario failed to advise Transport Canada of the resignation of Captain Castonguay and its resultant lack of a qualified F-28 company check pilot during a critical phase of its F-28 implementation program.

- Air Ontario should have replaced Captain Castonguay as its F-28 company check pilot with an experienced and qualified F-28 pilot during a critical phase of its F-28 implementation program.

- Transport Canada, because of its failure to monitor Air Ontario's F-28 implementation program, was unaware of the fact that, after Captain

Castonguay's resignation, Air Ontario did not have an experienced and qualified F-28 company check pilot between February 24, 1988, and March 13, 1988.

- During the time that Captain Castonguay was employed by Air Ontario as a company check pilot, certain deficiencies existed in F-28 flight crew cockpit and flight operations procedures, including:
  - there was no proper crew coordination concept;
  - no operational flight plan was issued to or used by the flight crews on the F-28 aircraft;
  - no aircraft flight log was used by F-28 flight crews to keep track of flight times, distances, fuel burns, and aircraft weights;
  - Air Ontario allowed circling-approach procedures to be conducted in the operation of the F-28 aircraft before the pilots had sufficient flight experience on the aircraft.

- The operation of F-28 aircraft with contaminated wings was dealt with thoroughly in the ground school instruction and training provided by Piedmont Airlines and USAir. The instructors cautioned the pilot-trainees against operating an F-28 aircraft with contaminated lifting surfaces in all flight modes including takeoff.

- All Air Ontario pilots who took the Piedmont/USAir ground school training course, including Captain George Morwood, received thorough instruction, warning, and caution that it was of utmost importance that the F-28 be operated at all times with a clean, uncontaminated wing.

- Most of the Air Ontario pilots who testified had a general understanding of some form of the cold-soaking phenomenon, but appear to have learned about its effect largely through operational experience.

- At the time of the crash, the A.I.P. Canada: Aeronautical Information Publication, which is circulated to all Canadian licensed pilots, contained a caution regarding taking off with contamination on the lifting surfaces, but failed to deal with the phenomenon of cold-soaked wings, cold-soaked fuel, and its potential to cause contamination to adhere to wings.

- While both Captain Morwood and First Officer Mills may have had some knowledge and experience regarding wing cold soaking, they may not have been sufficiently aware of or knowledgeable about the insidious nature of the cold-soaking phenomenon and, in particular,

the effect of cold fuel in the wing tanks in contributing to or causing moisture to adhere to wing surfaces adjacent to wing tanks.

- A systematic and comprehensive discussion of the cold-soaking phenomenon does not exist in the manuals reviewed by this Commission, such as manufacturers' aircraft flight manuals, air carriers' aircraft operating manuals, and air carriers' flight operations manuals, which are normally referred to and used by flight crews on a day-to-day basis.

- Air Ontario pilots who took the Piedmont/USAir F-28 ground school training course, including Captain Morwood and First Officer Mills, received instruction in the use of the slush-correction chart for takeoff in runway contamination contained in the Piedmont and USAir F-28 operations manuals.

- Some Air Ontario pilots also received some instruction in the use of the runway slush-correction graph and chart contained in the Fokker F-28 Flight Handbook.

- Although Piedmont ground school instructors may have demonstrated to Air Ontario student pilots how to use the Fokker F-28 Flight Handbook slush-correction charts, neither Piedmont Airlines nor USAir used the Fokker chart for operational use.

- Although there was no advice or instruction by Air Ontario management to its F-28 pilots that they should use only the slush-correction chart contained in the Piedmont and USAir operations manuals, there was a general consensus among Air Ontario F-28 pilots that, because they were to use the Piedmont Airlines F-28 Operations Manual for purposes of operating the aircraft, they must also comply with the slush-correction charts contained therein.

- Both Captain Morwood and First Officer Mills should have been aware of the restrictive weight limitations imposed on the aircraft by the slush-correction chart contained in the Piedmont and USAir operations manuals.

- There are no Canadian regulatory requirements pertaining to the training of personnel involved in the ground handling, fuelling, or de-icing of aircraft, and Transport Canada has no stated policy with respect to the training of ground handlers and de-icing personnel.

- Although Air Ontario and Dryden Flight Centre contemplated the provision of instructors and materials to train ground-handling personnel, no such training was provided by Air Ontario to Dryden Flight Centre regarding such ground-handling training.

- Transport Canada air carrier inspectors, as part of an inflight inspection, are required to inspect aircraft servicing and ramp safety, including fuelling procedures, baggage and passenger loading methods, and safety and fire precautions.

- Transport Canada policy documents state that aviation regulation inspectors are to inspect and monitor ground handlers, and that airworthiness inspectors are responsible for monitoring fuelling operations.

- With respect to the Dryden Flight Centre, neither its ground-handling procedures nor fuelling operations with respect to Air Ontario's F-28 aircraft were monitored by Transport Canada at the Dryden Municipal Airport.

- The initial training provided to flight attendant Sonia Hartwick by Air Ontario in 1986, while reasonably thorough, did not include adequate practical (hands-on) emergency procedures training.

- The recurrent flight attendant training provided by Air Ontario to Mrs Hartwick in October 1988 did involve hands-on training in simulated emergency situations and was far superior to the initial training previously provided. This recurrent training, however, did not involve the F-28 aircraft.

- Air Ontario failed to provide practical (hands-on) emergency procedure training to flight attendant Sonia Hartwick, and probably to other F-28 flight attendants, with respect to the F-28 aircraft.

RECOMMENDATIONS

It is recommended:

MCR 67 That Transport Canada ensure that a systematic and comprehensive discussion of cold soaking be inserted in air carriers' flight operations manuals and/or aircraft operating manuals and in Transport Canada publications such as the Aeronautical Information Publication, to make all pilots and aviation operational personnel aware of the insidious nature of the cold-soaking phenomenon and the various factors that may cause contamination to adhere to aircraft lifting surfaces.

MCR 68 That Transport Canada ensure that all air carrier pilot flight training be conducted in aircraft flight simulators to the maximum extent possible.

MCR 69 That Transport Canada ensure that an air carrier, if it does not have pilots with the requisite and necessary flight experience on the aircraft when it introduces a new aircraft type, provide sufficient non-revenue flying time for its pilots to enable them to gain the requisite experience.

MCR 70 That Transport Canada encourage air carriers lacking pilots with sufficient experience on a new aircraft type to provide highly experienced pilots from outside the air carrier to assist in training the air carrier's pilots and to fly with them until they have gained an adequate level of flight experience on the new aircraft type.

MCR 71 That Transport Canada proffer for enactment legislation with respect to flight crew pairing, requiring that one of the flight crew members, either the pilot-in-command or the first officer, have substantial flight experience on the aircraft type.

MCR 72 That Transport Canada routinely inspect the activities of aircraft fuellers and ground-handling personnel, to ensure that they are properly performing their duties and to ensure that these personnel have received adequate training.

MCR 73 That Transport Canada ensure that all ground-handling personnel, whether employed by the air carrier or by a contract agent, receive ground-handling training on all aircraft types that they will be required to handle. If personnel are required to refuel aircraft, they should also have knowledge of proper fuelling procedures.

MCR 74 That Transport Canada proffer for enactment regulations setting the training and competency requirements for cabin attendants.

MCR 75 That Transport Canada monitor and periodically audit the cabin attendant training program of all air carriers to ensure that such training meets the standards set.

21 THE F-28 PROGRAM: OPERATIONAL PRACTICES – HOT REFUELLING AND AIRCRAFT GROUND DE-ICING

Hot Refuelling

Aircraft refuelling is always potentially dangerous, and it is essential that there be coordination of the activities of all personnel involved – the flight crew, the flight (cabin) attendants, and ground-handling personnel.

In the early phases of this Inquiry, I heard evidence regarding the refuelling of the F-28 aircraft C-FONF in Dryden, on March 10, 1989, with its right main engine running while passengers were on board.

In my *Interim Report* of November 30, 1989, I examined this issue and recommended that:

> The Department of Transport prohibit the refuelling of an aircraft with an engine operating when passengers are on board, boarding, or deplaning.[1]
>
> (p. 23)

In response to this recommendation, the minister of transport took immediate action and took steps to give effect to the recommendation by way of regulation. On August 28, 1990, section 540 of the Air Regulations was amended to read:

> 540.1 No operator of an aircraft shall permit the fuelling of an aircraft while an engine used for the propulsion of the aircraft is operating if passengers are on board or are entering or leaving the aircraft.[2]

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[1] The recommendations from my *Interim Report*, 1989, and my *Second Interim Report*, 1990, are reprinted in Part Nine of this Report, Consolidated Recommendations. This recommendation is numbered MCR 1.

[2] It is to be noted that the minister of transport gave immediate notice to air carriers of the intended regulatory change and requested that carriers voluntarily comply with the intent of the recommendation until the regulation was ultimately amended.

Subsequent to my first *Interim Report*, I heard additional evidence regarding the hot refuelling of aircraft C-FONF on March 10, 1989, and I think it appropriate to address further this issue in the context of the Commission's system investigation of the crash of C-FONF on March 10, 1989.

Air Ontario Policy

Transport Canada had no policy on hot refuelling as of March 10, 1989. Similarly, Air Ontario did not have a policy set out in its Flight Operations Manual (FOM) that would have precluded a hot refuelling with passengers on board; nor was there an established flight operations policy regarding procedures or guidelines to be followed in the event of a hot refuelling.[1]

The Air Ontario FOM, carried by all pilots of the carrier, contained a section entitled "Aircraft Fuelling Procedures." That section, however, makes no mention of refuelling with an aircraft engine running, while clearly endorsing refuelling with no engines running and with passengers on board.

> 7.19 AIRCRAFT FUELLING PROCEDURES
>
> (a) On-Line Fuelling – It is the responsibility of Air Ontario to be satisfied that refueling contractors are properly qualified and trained in refueling procedures and kept advised of any changes thereto. The Captain will not accept any aircraft which has not been fueled to the required minimum for flight dispatch. Actual departure fuel quantity will be shown in the weight and balance form displayed in the chapter "Flight Dispatch."
>
> (b) Off-Line Fueling – All procedures remain the same as at on-line stations with the exception that the flight crew must supervise the re-fueling and ensure all procedures are complied with.
>
> (c) Re-fueling with Passengers on Board – The Purser [in-charge flight attendant] must be notified that fueling is in progress. The Purser will ensure that there is absolutely no smoking; the main entrance door is open; the

[1] It should be noted that, on March 10, 1989, C-FONF was refuelled at Dryden with Jet B fuel, which, at +1°C, the ambient temperature at Dryden at that time, is within the flammability range of the fuel. That is, at that temperature Jet B fuel gives off fumes in sufficient concentration to burn if ignited. In contrast, the more common Jet A fuel would not have been within its flammability range at that temperature.

evacuation slide armed; flight attendants are in position for a rapid evacuation in case of a fire.

(d) Fuel Spill – If a fuel spill occurs the Captain will notify A.T.C. immediately and request the Airport Fire Department to immediately proceed with flushing procedures to minimize the risk of fire.

(Exhibit 146, pp. 7-15–7-16)

In contrast to the scant mention of the subject in the Air Ontario FOM, the Air Ontario Flight Attendant Manual (FAM) contained a section entitled "Refuelling Restrictions," which sets out, in greater detail, the procedures to be followed during aircraft fuelling. Although the FAM provisions specifically permitted the fuelling of an aircraft with passengers on board, with no engines running, subject to certain conditions set out therein, it clearly required the off-loading of passengers during the refuelling with one engine running:

2.31 Refuelling Restrictions

Fueling with passengers onboard or embarking/disembarking is permitted in accordance with the airport local regulations and provided the additional safety precautions as listed below are strictly complied with. The Captain or designated flight deck crew member will coordinate the requirements with the Purser and Ramp Control.

1. A flight deck crew member is on the flight deck.

2. Interphone contact between the flight deck/cabin and ground is available.

3. The flight Attendants have been advised that fueling will take place.

4. The NO SMOKING sign is on. The no smoking rule will be enforced. No striking of matches or use of flame producing devices is permitted.

5. Flash bulb photography is not permitted.

6. No oxygen is to be administered.

7. The exit doors are unobstructed at all times.

8. The Flight Deck and Cabin must be informed of any situation endangering the safety of the aircraft and its occupants.

9. The main entry door remains open with stairs in position, and on the CV580 [aircraft] the aft service door will be armed and minimum Cabin Crew limitations are met, with crew being stationed close to their assigned floor level exit(s).

10. Promptly notifying refuelling personnel if fuel vapours or any other hazard are detected in the cabin. If such conditions occur, the fueling will be discontinued.

11. When additional fuel is required after passenger boarding has been completed, the requirement for the main door to be opened with the stair in place may be disregarded under the following conditions:

    a) all loading and catering equipment is removed from the aircraft allowing room for slide deployment
    b) CV-580 aft door is armed and crew is on standby for immediate evacuation via slide
    c) interphone contact between ground and flight deck is established

12. *When refuelling is required with one engine running, all passengers are to be off loaded and cleared from the area during the refuelling period. Flight Attendants should also leave the aircraft.*

(Exhibit 137, section 2.31; emphasis added)

In the case of a refuelling with no aircraft engines running, both the Air Ontario FOM and FAM direct that the purser be informed by the flight crew when refuelling is to take place with passengers on board the aircraft. The presumption is that once the purser is informed of the intended procedure by the pilots, he or she will ensure that the precautions listed in the FAM are carried out. The FAM provisions contemplate close cooperation among the pilots, the flight attendants, and the refuelling personnel, directing that there must be interphone capability between the flight deck/cabin and the ground. It is rather odd that these directives are included in the FAM and not the FOM, since the arrangements relating to fuelling could be made only by the pilots.

It is quite incomprehensible as to why the Air Ontario FAM addressed the required refuelling safety precautions in greater detail than the Air Ontario FOM. I am also concerned that there appears to have been no cross-referencing between the FOM and the FAM, even though, as of March 10, 1989, Air Ontario flight attendants and pilots were all part of the flight operations department, with the manager of in-flight services and the director of flight operations both reporting to the Air Ontario vice-president of flight operations.

Further to my earlier comments in chapter 19 of this Report, F-28 Program: Flight Operations Manuals, it would appear that the persons responsible for the production and amendment of the FOM and the FAM did so without reference to the other manual. This is particularly problematic in areas like refuelling, where close cooperation was required between pilots and flight attendants.

Personnel of the Dryden Flight Centre who conducted the hot refuelling of aircraft C-FONF on March 10, 1989, were given guidance on fuelling procedures from a number of sources. As discussed earlier (chapter 5, Events and Circumstances Preceding Takeoff, and chapter 9, Crash, Fire-fighting, and Rescue Services), at least four manuals related to fuelling were supplied to Dryden Flight Centre. Two were supplied by Air Ontario (Air Ontario Inc. Fokker F-28 Fuelling Procedures Manual, and Fokker F-28 Ground Handling and Service Data Manual), and two were ESSO manuals (ESSO Aviation Fuelling Guide, and ESSO Aviation Operations Standards Manual). The two manuals supplied by Air Ontario did not refer to hot refuelling.

The Air Ontario Inc. Fokker F-28 Fuelling Procedures Manual and the Fokker F-28 Ground Handling and Service Data Manual, which were substantially the same, stated that pressure fuelling while an engine or auxiliary power unit (APU) was running was acceptable if certain precautions were followed. These precautions were general in nature and were to be used when refuelling with an engine or an APU running. No mention was made of deplaning passengers or positioning the aircraft away from the terminal.

The ESSO Aviation Operations Standards Manual provided detailed instruction on fuelling with one engine running, including the following prohibition:

> Fueling must not be started until all passengers:
> - have vacated the aircraft
> - are kept at a distance of at least 46 metres (150 feet)
>
> (Exhibit 173, section AOSM 020-007, p. 2)

The evidence suggested that Air Ontario policy and procedures regarding the fuelling of its aircraft were characterized by a lack of coordination. Pilots, flight attendants, and ground-handling personnel, all of whom should have had well-defined responsibilities regarding the fuelling of Air Ontario aircraft, were instead guided by a number of uncoordinated operational manuals that were, in some respects, inconsistent.

With regard to the specific practice of hot refuelling, the evidence suggested that there was no policy communicated and understood by key operational personnel. In the absence of clear company policy, it would appear that some personnel derived their own hot-refuelling

procedures based on practical experience. By way of example, I refer to the evidence of Air Ontario Dash-8 captain, David Berezuk. Captain Berezuk was asked about his experience regarding refuelling with one engine running. He stated that such a practice was often used by pilots in the north as a means of expediting station stops. He also indicated that the pilots followed what Captain Berezuk considered to be safe procedures. He testified as follows:

> Q. ... So basically what you do is to expedite a through-trip, you stop, one engine is shut down; you leave another engine running and you refuel with one engine running, is that correct?
> A. That is correct.
> Q. And the times that you have done this type of refuelling with an engine running, have there been passengers on board?
> A. Yes.
> ...
> Q. Now, in what areas have you done this; where have you done this?
> A. Most of our operation up north in the arctic and in northern remote areas.
> Q. And when you did these refuellings with an engine on, what precautions did you take?
> A. The precautions I stated before were the main cabin door with stairs extended were left in the open position, the door was not locked as far as passenger egression or deplaning, the ... quickest means, in case there [were] any problems.
>
> There was a credited flight crew member in the cockpit in order to secure the engine to shut down the aircraft and assist in evacuation in the event of some problem.
>
> (Transcript, vol. 14, pp. 170–71)

It appears that in the absence of a company policy which placed restrictions on hot refuelling, Air Ontario pilots relied on their own experience and continued to refuel with passengers on board.

There is evidence that Air Ontario management made an attempt to provide guidance on policy and procedures regarding the hot refuelling of its F-28 aircraft. This evidence is in the form of a June 2, 1988, memorandum authored by Mr Bruce Maxim of Air Ontario and given to Captains Robert Murray, Robert Nyman, and Walter Wolfe. Air Ontario director of flight operations Robert Nyman gave evidence on the subject of the memorandum:

> Q. ... the title of this is F28 Station Operation with an Engine Running. Under the heading Important, it reads: "This is a special procedure and must only be used at those stations where ground support equipment is not provided or where the neces-

sary equipment is unserviceable." Would that apply to the Dryden Airport?

A. Yes, it would.

Q. And if you can turn the page over to Additional Procedures for Refuelling, and just reading quickly the terms:

9 The fuelling vehicle must be located at the front of the wing tip.

10 Fuelling hoses and their (connectors) must be leak-free.

11 The fuelling hose should be routed below the wing so that in case of a hose burst, the emergency fuel-spray cannot enter the engine or APU intake.

12 Fuelling operations must be monitored continuously.

13 During pressure refuelling, either (left-hand) or (right-hand) engine may be running at idle RPM.

14 During gravity refuelling, the running engine must be opposite to the overwing fuelling point.

The above assumes that these procedures occur without passengers on board. In the event that fuelling takes place with passengers on board, it is mandatory that the station fire trucks are standing by the aircraft. Otherwise, passengers must be deplaned.

Do you recall discussing so-called hot-refuelling procedures as detailed in this particular memo?

A. Do I recall discussing them? No.

Q. Did you recall reviewing the procedure as set out in the memo at the time?

A. No.

Q. Again, you were the Director of Flight Operations at that time, I believe; is that right?

A. Yes, I was.

Q. Did you adopt the recommended practices set out in this memo with respect to hot refuelling?

A. We did not.

Q. And why did you not?

A. Well, I shouldn't say we didn't adopt it. We did not advise anybody of the procedures.

(Transcript, vol. 108, pp. 56–58)

It should be noted that this proposed policy does not preclude hot refuelling with passengers on board; but if passengers are on board, then the station fire trucks must be standing by the aircraft.

I think it is instructive to review the hot-refuelling policy of Air Ontario's parent company, Air Canada.

Air Canada Policy

Air Canada's policy is that aircraft fuelling with a main engine running is not to be carried out as a planned procedure in normal operations.[4] This policy ensures that, except in rare circumstances, refuelling with an engine running is not required in normal operations. However, recognizing the possibility of being forced by peculiar circumstances to hot refuel, Air Canada has specific instructions set out in the aircraft operating manual for each aircraft type to address that contingency. Although these instructions are specific to each aircraft type, some parts of the instructions, such as the requirement to deplane all passengers and flight attendants prior to commencing the refuelling, are common to all types of aircraft. Captain Charles Simpson, Air Canada's senior vice-president of flight operations, gave the following testimony regarding his company's refuelling procedures for the Boeing 767:

> A. ... I brought an excerpt from the 767 operating manual again, the procedure that has to be used if you refuel with an engine running.
>
> And I guess the key to it is that you will take certain precautions because it's abnormal. We give the crew specific instructions of how it's to be done, even to the extent to ensure that the aircraft is positioned away from the terminal or other facility, and of course, all passengers are deplaned during the process.
>
> Q. And that was reiterated on the second page [of exhibit 911] where it says passengers and cabin crew may not be boarded until refuelling is completed?
>
> A. That's correct.
>
> (Transcript, vol. 118, p. 128)

For present purposes, three noteworthy aspects of Air Canada's policy regarding hot refuelling are:

1 It is not a normal operation, and hot fuellings are not to be planned.
2 The aircraft is to be moved some distance from the airport terminal building.
3 Passengers are to be deplaned.

On March 10, 1989, Air Ontario system operations control planned the hot refuelling that occurred at Dryden during the flight 1363 station stop; the aircraft was not positioned a safe distance from the airport terminal; and the passengers remained on board.

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[4] This policy is compatible with Air Canada's policy, discussed in chapter 16, F-28 Program: APU, MEL, and Dilemma Facing the Crew, of not dispatching an aircraft with an unserviceable APU to a station without ground-support equipment.

Findings

- Hot refuelling is not a normal procedure.

- Air Ontario, as of March 10, 1989, did not have a consistent company policy that would have precluded the hot refuelling of an aircraft with passengers on board and a main engine running (hot refuelling). The Air Ontario Flight Attendant Manual (FAM) specifically prohibited such a practice, while the Flight Operations Manual (FOM) was silent on the subject.

- The Air Ontario policy and procedures regarding the fuelling of its aircraft were contained in a number of uncoordinated operational manuals.

- Both the Air Ontario FOM and FAM permitted the refuelling of an aircraft with passengers on board with no engines running. The FAM contained more specific restrictions and much more detail on the procedures to be followed in such a situation than did the FOM.

- There were no consistent and comprehensive procedures provided by Air Ontario to its pilots and operational personnel regarding the fuelling of F-28 aircraft with a main engine running.

- The Air Ontario FOM, its FAM, and the manuals used by ground-handling personnel at Dryden were significantly inconsistent in their treatment of the hot-refuelling procedure.

- Air Ontario lacked a clear policy with respect to hot refuelling of aircraft, and such policy as existed was not properly communicated to and understood by pilots and by operational personnel.

- There was no information available in manuals or documents normally available to and used by Air Ontario F-28 pilots regarding the hot refuelling of an aircraft either with or without passengers on board.

- Because of the lack of a clear company policy and specific procedures for hot refuelling of an aircraft, Air Ontario pilots resorted to improvising individual hot-refuelling procedures based on their own practical experience, when the occasion required.

- Given that there was no F-28 ground-start facility at Dryden, one of Air Ontario's scheduled F-28 station stops, there was a reasonable

likelihood that, at some time in normal commercial operations, it might be necessary to fuel an F-28 aircraft at that station with a main engine running.

- Air Ontario senior operations management should have established, but did not establish, a procedure to accommodate such a contingency. By failing to do so, Air Ontario allowed a potentially unsafe situation to manifest itself on March 10, 1989.

- On March 10, 1989, Air Ontario F-28 C-FONF was refuelled at Dryden, Ontario, while one main engine was running.

- Although this hot refuelling was planned by Air Ontario system operations control (SOC), no instructions were given by Air Ontario SOC for the deplaning of passengers at Dryden while flight 1363 was being hot refuelled at that station.

- The surviving flight attendant was not notified of the hot-refuelling procedure and was unaware of it.

- The passengers on board the aircraft were not deplaned prior to the hot refuelling of the aircraft, contrary to the provisions of the Air Ontario FAM.

- The hot refuelling of C-FONF involved the more volatile Jet B fuel, and a small fuel spill occurred.

- The aircraft was not parked a safe distance from the Dryden terminal during the hot-refuelling procedure, contrary to the provisions of the Air Ontario FAM.

- The ground-handling personnel conducting the hot refuelling were not familiar with proper hot-fuelling procedures, including the use of the deadman switch and proper bonding and grounding.

- The hot refuelling of flight 1363 at Dryden on March 10, 1989, was carried out in a manner that exposed to unnecessary risk not only those persons on board the aircraft but also the nearby terminal and its occupants.

Aircraft Ground De-icing

The Clean Aircraft Concept: Interim Recommendation No. 2

In the first *Interim Report* of this Commission, I concluded:

> On the basis of the evidence I have heard, I am satisfied beyond any doubt whatsoever, and I find, that the critical upper-wing surfaces of the aircraft were, at all material times, severely contaminated with heavy wet snow and that such contamination was at least a contributing factor to the crash that occurred.
>
> (*Interim Report*, p. 25)

At the time of the Dryden accident, the Canadian regulation pertaining to commencement of a flight by a large aircraft with wing contamination was found in Air Navigation Order (ANO) Series VII, No. 2, section 25(3), which stated:

> No person shall commence a flight when the amount of frost, snow or ice adhering to the wings, control surfaces or propeller of the aeroplane may adversely affect the safety of the flight.

Implicit within this section of the ANO is the permissibility to commence a flight with frost, snow, or ice adhering to the aircraft's lifting surface, provided that, in the pilot's discretion, this contamination will not adversely affect the safety of flight.

Given the known hazards posed by contamination of aircraft lifting surfaces; the difficulties in accurately predicting performance decrements due to any given amount of wing contamination; and the permissive nature of the ANOs respecting takeoff with wing contamination, I recommended that:

> The Department of Transport immediately develop and promulgate an Air Navigation Order applicable to all aircraft that would prohibit takeoffs when any frost, snow, or ice is adhering to the lifting surfaces of the aircraft, and the Department of Transport provide guidelines to assist aviation personnel in conforming to the amended orders.[5]
>
> (Interim Recommendation No. 2, p. 28)

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[5] MCR 2 in Part Nine, Consolidated Recommendations

I am pleased to note that this interim recommendation met with a favourable response from Transport Canada. Immediate steps were taken in the form of a letter from the minister of transport advising all Canadian carriers of Transport Canada's acceptance of my interim recommendation, along with a request for compliance with the intent of the recommendation during the period that the air regulations were being amended.[6] On November 1, 1990, section 540.1 of the *Aeronautics Act* was amended to give effect to Interim Recommendation No. 2 of this Commission.

Air Ontario's Policy on Flights in Icing Conditions

This section should be read in conjunction with chapter 12 of this Report, Aircraft Performance and Flight Dynamics, where, in the context of the performance and flight dynamics of the F-28, I discuss information and procedures available for safe operation in cold-weather operations. Specific attention is drawn to the provisions in the Fokker F-28 Flight Handbook, the Piedmont F-28 Operations Manual, and the USAir F-28 Pilot's Handbook addressing cold-weather operations. In the following pages, I address the company-specific cold-weather operations policy adopted by Air Ontario, as set out in its Flight Operations Manual (FOM).

Air Ontario's FOM states that "Take-off shall not be attempted when frost or freezing precipitation is adhering to the surfaces of the aircraft" (Exhibit 146, p. 7-3).[7] Rather than prominently displaying this critical prohibition in its FOM, Air Ontario included it in the broader operational directive dealing with in-flight operating procedures in icing conditions. Moreover, the directive is applicable to all aircraft types, including the F-28, and is not accompanied by a caution similar to those found in the Fokker F-28 Flight Handbook and the Piedmont and USAir F-28 operations manuals.

Unlike section 25(3) of ANO Series VII, No. 2, which included discretionary words permitting pilots to take off with frost, snow, or ice adhering to the aircraft, provided it does not "adversely affect the safety of the flight," Air Ontario's FOM prohibits pilots from attempting to

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[6] Under letter dated March 15, 1990, from then Minister of Transport Doug Lewis to Commissioner Moshansky, Transport Canada provided the following response to Interim Recommendation No. 2: "The Department of Transport will take action to amend the Air Regulations to state that no person shall commence a flight if frost, ice or snow is adhering to the lifting surfaces or propellers of the aircraft and will provide guidelines for the interpretation of these regulations."

[7] The Air Ontario Flight Operations Manual, Part 10.1.1, provides the following meaning of the words "may," "should" and "shall": may - permissive; should - informative; shall - imperative, compliance is mandatory.

take off with frost or freezing precipitation adhering to aircraft surfaces, but is silent in relation to snow adhering to aircraft surfaces. In this sense, Air Ontario's FOM is more restrictive than the ANO Series VII, No. 2, section 25(3), and more closely resembles the "clean wing concept" that I recommended in my first *Interim Report*.

In that the FOM represents Air Ontario's company policy, it follows that Air Ontario flight crews, including Captain Morwood and First Officer Mills, would have been bound not to attempt a takeoff when frost or freezing precipitation adhered to the surfaces of their aircraft. Because Air Ontario's FOM is more restrictive than the ANO in this regard, it would be possible for an Air Ontario pilot to contravene company policy while still being within the bounds of the Air Navigation Order. Theoretically, this situation could occur where an Air Ontario pilot attempted a takeoff with frost or freezing precipitation adhering to the surface of the aircraft, but where, in the pilot's discretion, it would not adversely affect the safety of the flight. Compliance with a company manual should guarantee compliance with the Air Regulations since the company manual can be no less restrictive than the Air Regulations.

Although the FOM is more restrictive than the air regulation in the context described above, in another respect it may be less restrictive. Where the ANO speaks of "frost, snow or ice adhering to the wings," the directive to Air Ontario pilots in the FOM mentions only "frost or freezing precipitation." The omission of any reference in the FOM to snow adhering to the wings creates the potential for uncertainty as to the intention of the directive that the company provided to its pilots. The fact that snow is not mentioned could leave the impression that takeoff may be attempted with snow on the aircraft, and even adhering to it. It is unclear whether the company is deliberately, and unscientifically, distinguishing the adhering properties of frost and freezing precipitation from those of snow on the basis that snow may be more likely to blow off on takeoff. If this is a deliberate distinction on the part of Air Ontario, it fails to take into account the phenomenon of cold soaking, which is discussed in chapter 12 of this Report, Aircraft Performance and Flight Dynamics.[8] Further, if company policy countenances the dangerous practice of attempting takeoff with snow on the wings, there is no guidance given to pilots as to how to make a judgement on whether or not snow would blow off on takeoff.

During the course of the hearings of this Commission, I heard evidence from Air Ontario pilots and flight attendants that some Air

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[8] In chapter 12 of this Report, Aircraft Performance and Flight Dynamics, I found that the cold-soaking phenomenon contributed to the freezing of falling snow to the surface of the wings of aircraft C-FONF in Dryden on March 10, 1989.

Ontario pilots had, in specific circumstances, attempted takeoffs with snow on aircraft wings. There is also evidence to suggest that some Air Ontario pilots may have carried out takeoffs even when they were not certain that the snow would blow off during the takeoff run. In the context of a discussion about the Piedmont F-28 ground school training, and the absolute necessity of a clean wing on the F-28 jet aircraft, Captain Erik Hansen testified that, by way of contrast, some amount of contamination was considered acceptable prior to takeoff in propeller-driven Convair 580 aircraft. He testified as follows:

> A. ... But the four of us [captains Morwood, Reichenbacher, Maybury, and Hansen] coming out of Convairs and the Convair will take, you know, some ice and some contaminants prior to departure before, you know, you're really starting to get upset about it.
>
> (Transcript, vol. 94, p. 72)

This reference to Convair aircraft taking "some ice and some contaminants" suggests that some Air Ontario pilots were accustomed to making successful takeoffs in the Convair 580 aircraft with some degree of wing contamination, even though they knew that it would not likely blow off. This group of pilots probably included Captain Morwood, since he was one of the "four" referred to by Captain Hansen in his evidence.

During hearings of the Commission that occurred subsequent to the release of my first *Interim Report*, evidence was heard indicating that takeoffs with contaminated wings were not confined to Air Ontario pilots of Convair 580 aircraft. The evidence shows that some Air Ontario pilots of HS-748 turboprop aircraft performed takeoffs in that aircraft with contaminants adhering to aircraft surfaces. Two such incidents are reviewed in chapter 24 of this Report, Flight Safety.

In examination of the circumstances involved in a December 15, 1987, HS-748 Austin Airways incident (see chapter 24), it was discovered that Captain Joseph Deluce and First Officer Scott Jensen had used an unapproved procedure on takeoff referred to as "the 80-knot check." This unofficial procedure involved a check of the wings by the pilots upon achieving a speed of 80 knots on the takeoff roll to ensure that snow or slush, previously observed on the wings, was blowing off the wings and not continuing to adhere. The evidence with regard to the "80-knot check" further indicates that some Air Ontario (or predecessor company) pilots had attempted takeoffs under the hazardous condition of wet snow or slush contaminating the surface of their aircraft. Because other Air Ontario pilots testified that they had heard of the "80-knot check," it would appear that this was more than just a procedure adopted by Captain Deluce on December 15, 1987.

The majority of the evidence referred to in this section pertaining to Air Ontario's policy for commencing flights in conditions conducive to wing contamination was not heard until after publication of Interim Recommendation No. 2 in my first *Interim Report*. Everything I have heard has reinforced the importance of a speedy transition in policy and attitude to the "clean wing concept." I am fully aware that the "clean wing" order in the United States has not alone precluded contamination-related accidents and incidents in that country. It is therefore of utmost importance that persons at all levels of flight operations be made fully aware of the potentially disastrous consequences of wing contamination on aircraft performance. This was the tenor of my Interim Recommendation No. 3 published in the first *Interim Report*, which I repeat below for emphasis, that:

> The Department of Transport forthwith develop and implement a mandatory and comprehensive education program for all aircrew engaged in commercial operations, including an integrated program for cockpit crew members and cabin crew members, on the adverse effects of wing contamination on aircraft performance, with provision for knowledge verification; and
>
> The Department of Transport similarly develop and implement a mandatory safety-awareness program for all other personnel involved in flight operations, including managers, dispatchers, and support personnel, on the adverse effects of wing contamination on aircraft performance."
>
> (Interim Recommendation No. 3, p. 29)

Winter Operations Advisories

It is vitally important that an airline maintain an efficient system for the distribution of operational information to its pilot group and other operational personnel. Given the number of changes that were going on at Air Ontario in 1987 and 1988, including the introduction of the F-28 jet aircraft into the fleet, and a pilot group new on that aircraft type, the ability to produce and disseminate information was particularly important. Evidence presented before this Inquiry revealed, however,

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" MCR 3 in Part Nine, Consolidated Recommendations. Under letter dated March 15, 1990, from then Minister of Transport Doug Lewis, Transport Canada responded favourably to Interim Recommendation No. 3 by agreeing to amend ANO Series VII, Nos. 2, 3, and 6, to require air carriers to establish and maintain a Transport Canada-approved training program concerning the adverse effect of wing contamination on aircraft performance and to provide this training to all crew members and to other air carrier personnel involved in flight operations. On November 1, 1990, the ANOs were amended appropriately (SOR/90-758; SOR/90-759).

that Air Ontario's response to the need to distribute operational information to its pilot group, particularly a winter operations advisory package for operation of the F-28, was deficient.

Mr Teoman Ozdener, a professional engineer employed by Air Ontario as its F-28 maintenance manager from February 1988 to February 1989, had a great deal of experience with F-28 aircraft. He testified that he was aware that an operator had to be "very careful" with the F-28 in icing conditions (Transcript, vol. 101, pp. 220–21), and that he was therefore anxious to implement special procedures for Air Ontario's F-28 winter operations.

On his own initiative, and with the initial support of Air Ontario management, Mr Ozdener had made arrangements to visit the Swedish carrier, Linjeflyg, which operated a large fleet of F-28 aircraft in a winter climate similar to that in which Air Ontario operated. By observing the experienced operator, Linjeflyg, Mr Ozdener had intended to familiarize himself with the practical aspects of F-28 winter operations and then to develop a winter operations information package for Air Ontario. This visit was to have been carried out in April 1988. However, the trip was delayed, and in late summer 1988 Mr Ozdener was told by Mr Kenneth Bittle, vice-president of maintenance, that the trip would not be authorized.

As a result of the cancellation of Mr Ozdener's trip to Sweden, Air Ontario pilots were deprived of what probably would have been a valuable and practical winter operations resource.[10]

Air Ontario Memorandum on F-28 De-ice/Anti-ice Instructions

Mr Robert Mauracher, director of maintenance at Air Ontario, prepared a memorandum, dated September 28, 1988, for the company's reliability committee, on the subject of "F-28 De-ice Anti-ice Instructions." Mr Mauracher's memorandum was based on an operation and maintenance publication produced by Fokker Aircraft, entitled, "Cold Weather Operation," which had been obtained by Mr Ozdener (Exhibit 318, "Operation and Maintenance of Fokker Aircraft, No. 3, Cold Weather Operation," February 1984). The general content of Mr Mauracher's six-page memo is apparent from the following introductory paragraph:

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[10] It should be noted that in January 1988, Captain Joseph Deluce and Captain Robert Murray attended at Norcanair/TimeAir to observe its F-28 operation. However, these visits were not specifically related to winter operations, nor were winter operations procedures disseminated to the pilot group as a result of the visits. Also to be noted is that both Captain Joseph Deluce and Captain Robert Murray flew for TimeAir in February–March 1988.

> This memorandum details precautions necessary to protect the aircraft during cold weather ground conditions. Details are also given of the recommended methods for snow and slush removal, de-icing and anti-icing protection.
>
> (Exhibit 317, p. 1)

Mr Mauracher's memorandum contained very useful information for personnel connected with all aspects of the F-28 operation and maintenance, including the F-28 pilots. In fact, as indicated in the following excerpts, it appears that some passages of the memorandum are directly aimed at the flight crew:

> NEVER: Spray while main aircraft engine's are running!!!
>
> ...
>
> The following are Flight Crew or Maintenance Functions:
>
> Check all drains and vent holes are free from obstructions. At this point, remove all protective covers. Check that all control surfaces, including lift dumpers and speed brakes move freely over their complete operating range.
>
> NOTE: Airframe anti-icing system is not intended for de-icing the aircraft on the ground.
>
> WARNING: Even a slight ice roughness (or frost on the wing leading edge) may seriously [impair] the wing lift characteristics. Extreme care must be taken to clean the wing of any ice roughness.
>
> NOTE: If severe weather makes it necessary to de-ice while the APU is running, the APU bleed load control valve and air conditioning main valves must be closed to prevent glycol being blown into the cabin.
>
> (Exhibit 317, pp. 3, 4–5)

Clearly, Mr Mauracher's memorandum contained critical information that should have been required reading for everyone associated with the F-28 operation. It appears from the evidence, however, that distribution of the memorandum was extremely limited.

Mr Ozdener testified that although he was not involved with the reliability committee, he assumed that the various Air Ontario departments that were represented on it would pass the information on to their respective departments. Vice-president of maintenance, Mr Kenneth Bittle, testified that although it was the sort of memorandum that would

usually be circulated to all Air Ontario stations, he did not know if in fact the stations had received it.

It was the evidence of certain Air Ontario system operations control (SOC) personnel that they were familiar with Mr Mauracher's memorandum, and that a copy of it was kept for their reference in SOC. Messrs Wayne Copeland, Danilo Koncan, Warren Brown, and Daniel Lavery all testified that they were familiar with the memorandum. In fact, because of the operational restriction contained in the Mauracher memorandum, Air Ontario duty operations manager (formerly dispatcher) Mr Koncan testified that he would have advised the pilots to overfly Dryden had he been dispatching flight 1363 on March 10, 1989:

> Q. Could you tell the Commissioner what your understanding on the 10th of March of last year was with regard to de-icing the F-28 with engines running.
> A. Engines are to be shut down, as well as APUs are to be shut down while de-icing.
> Q. Was there any further instruction given to you about the dispatch of aircraft, F-28s, unserviceable APUs, into line stations where there was no air starts and the possibility of de-icing?
> A. No, there was not.
> Q. What would you have done in the situation where there was forecast weather and the potential for the necessity of de-icing and an unserviceable APU on an F-28?
> A. If the aircraft was en route, one would be to overfly, to either down-line station, whether it be the alternate. Or, if the aircraft was already on the ground and engines shut down with an unserviceable APU, and the aircraft is parked until such time as a ... portable air start ... can be provided or actually flying a Convair or other aircraft into that station and giving him a buddy start, which consists of hoses for the start capabilities.
>
> (Transcript, vol. 47, pp. 38–39)

The evidence revealed that the F-28 pilot group did not have the same familiarity with the Mauracher memorandum as did the SOC personnel. Several F-28 pilots testified that they had not received a copy of Mr Mauracher's memorandum or, what would have been more appropriate, a pilot bulletin with similar content. While F-28 pilot Christian Maybury testified that he had received the Fokker cold-weather operations publication – the document from which Mr Mauracher derived his memorandum – and understood that it had been provided to all F-28 pilots on the line at that time, F-28 pilots Deborah Stoger, William Wilcox, and Erik Hansen all testified that they had not seen the Fokker publication. Based on the evidence of pilots Stoger, Wilcox, and Hansen, which I accept, I find that the Mauracher memorandum was not distributed to all Air Ontario F-28 pilots.

This issue is further clouded by the evidence of the director of flight operations, Captain Robert Nyman. With respect to Mr Mauracher's memorandum, Captain Nyman recalled having seen it at a meeting of the reliability committee, but he did not believe it was ever distributed to the pilots. However, with respect to the Fokker publication, Captain Nyman testified that, through Air Ontario's internal mailing system, he had personally sent it to all F-28 pilots in August or September 1988, and that he could not explain why Captain Hansen had not received it. Moreover, Captain Nyman believed that he would have sent Captain George Morwood a copy of the Fokker cold-weather operation publication. Captain Nyman confirmed the importance of distributing this material to the pilot group:

> Q. Do you have any knowledge as to whether the memo was disseminated to the pilot group?
> A. I never saw it in the form of a pilot bulletin. I certainly never distributed it to the pilot group.
> Q. Now, the information contained within this particular document, would it be the sort of information that ought to be included either in a standard operating procedure for an aircraft type or the flight operations manual?
> A. Yes, indeed. It should probably be included in either the flight – well, not the flight operations manual. Probably more particular ... an SOP [manual].
> Q. So you are saying that this particular type-specific information ought to be included –
> A. It's the kind of information that you are interested in getting, yes.
>
> (Transcript, vol. 108, p. 124)

The body of evidence on this point does not support a conclusive finding, one way or the other, as to whether Captain Morwood and/or First Officer Mills received the Fokker cold-weather operation publication or the Mauracher memorandum, which contained, among other important information, the crucial proviso, "NEVER: Spray while main aircraft engine's are running!!!" (Exhibit 317, p. 3). What is clear is that a specific pilot bulletin was never disseminated on this point, and there is strong doubt, based on the above-mentioned evidence of Air Ontario pilots, as to whether pilots Morwood and Mills had received the Fokker cold-weather operation publication.

Air Ontario pilots Hansen, Wilcox, Stoger, and Monty Allan testified that they were not aware of specific restrictions against spraying the F-28 for the purpose of de-icing while one engine was running. Only Captain Maybury, who had received the Fokker publication, was aware of such restrictions. In the absence of specific instruction or a company policy on this point, Air Ontario pilots who were questioned in this regard (in

particular, pilots Hansen, Wilcox, and Allan) testified that they considered the practice of de-icing with a main engine running unsafe, because of the risk of ingesting glycol into the engine and the danger of having a person in a de-icing bucket in close proximity to a running engine. However, the evidence of experts in the fields of aircraft ground de-icing, aircraft engines, and cold-weather operations indicated that aircraft ground de-icing is routinely performed in Europe and the United States with engines running. Clearly, an operational matter of such importance requires a standard company policy that is made explicitly known to all pilots and operational personnel. What is to be avoided are situations where crew members, faced with the stresses of their operating environment, are without the support of a company policy to assist in their decision making. This most likely was the situation facing Captain Morwood and First Officer Mills on March 10, 1989.

De-icing of Aircraft Nearer to Runway End: Interim Recommendations – Second Interim Report

I recommended in my *Second Interim Report* (Recommendation No. 1)[11] that Transport Canada design and construct permanent de-icing/anti-icing facilities near to runway ends, at Lester B. Pearson International Airport (LBPIA) in Toronto, to satisfy both safety and environmental concerns. I wish to deal briefly with events that have subsequently occurred.

By a letter dated June 6, 1991, the minister of transport, Jean Corbeil, wrote to me in response to the 13 recommendations made in my *Second Interim Report* (see appendix K at the end of this Report). Referring to Recommendation No. 1 of my *Second Interim Report*, he confirmed that Transport Canada accepts the need for dedicated facilities for de-icing of aircraft, and that there was general agreement between Transport Canada and the air carriers that dedicated de-icing facilities are required at LBPIA. I have subsequently been informed that Transport Canada, on August 13, 1991, published an Invitation to Tender for construction at LBPIA of a dedicated touch-up de-icing facility and has announced plans for the construction at LBPIA of a major permanent de-icing centre, with provisions for recovery of fluids, located near the takeoff ends of the runways that are primarily used in bad weather. Transport Canada and the air carriers are to be commended for this initiative.

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[11] MCR 5 in Part Nine, Consolidated Recommendations

National Resource Specialist – Aircraft Ground De-icing/Anti-icing

In my *Second Interim Report*, I noted at page 1 that Mr Richard Adams, an aeronautical engineer and aviation consultant, was, until recently, the national resource specialist for aircraft icing with the Federal Aviation Administration in the United States. Mr Adams testified that this position was established as a result of a recommendation by a United States commission, similar to this Commission, based on a finding of a lack of technical expertise in certain areas. Mr Adams described the function of the national resource specialist as follows:

> A. .... Now, very briefly, the National Resource Specialist is intended to be a specialist who is a national resource or whose talents and capabilities can be tapped by anyone; in other words, they put us there, ask us to stay abreast of technology, and then they took turns using us, basically.
>
> (Transcript, vol. 80, p. 12)

In my view, the concept of a highly qualified national resource specialist within Transport Canada, dedicated to matters pertaining to aircraft surface contamination and de-icing/anti-icing of aircraft in its broadest sense, including methods, procedures, fluids, and advances in relevant technology, to name the most obvious, based upon the United States model, would be worthy of consideration by Transport Canada.

Findings

- The F-28 aircraft, because of its critical wing, required an operator of such aircraft to be very careful in conditions conducive to wing contamination to ensure that the aircraft's wings were clean for takeoff. (See discussion in chapter 20 of this Report, F-28 Program: Flight Operations Training.)

- The Air Ontario Flight Operations Manual (FOM) prohibited takeoff with frost or freezing precipitation adhering to the surfaces of an aircraft. Thus, the Air Ontario FOM was more restrictive than section 25(3) of Air Navigation Order Series VII, No. 2, which included the discretionary words "does not adversely affect the safety of flight."

- The Air Ontario FOM, however, did not prohibit takeoff with snow adhering to the aircraft wing, as was the case at Dryden on March 10, 1989.

- The omission by Air Ontario of any reference in its FOM to takeoff with snow adhering to the wings could have given Air Ontario pilots the mistaken impression that it was acceptable to take off with snow adhering to the wings of an aircraft.

- The Air Ontario FOM did not adequately address the phenomenon of cold soaking. (See the discussion of cold soaking in chapter 12, Aircraft Performance and Flight Dynamics.)

- Air Ontario did not issue a specific pilot bulletin to its F-28 pilots containing F-28 cold-weather operations information or de-icing and anti-icing information for the F-28 aircraft.

- A memorandum dated September 28, 1988, based on a Fokker Aircraft publication entitled "Cold Weather Operation," on the subject of "F-28 De-ice Anti-ice Instructions," was issued by Air Ontario's director of maintenance, Mr Robert Mauracher, for the company's reliability committee. This memorandum received limited distribution among Air Ontario system operations control (SOC) personnel.

- Although the Mauracher memorandum contained specific F-28 cold-weather operational restrictions and information of interest to F-28 pilots, it was distributed to few, if any, Air Ontario F-28 pilots.

- Had the operational restrictions contained in Mr Mauracher's memorandum been followed by the Air Ontario SOC dispatcher on March 10, 1989, the pilots of flight 1363 would have been advised to overfly Dryden on that date because of the potential necessity of de-icing with engines shut down and the unserviceable auxiliary power unit (APU) and lack of ground-start facilities at Dryden.

- Some of the Air Ontario F-28 pilots, probably including Captain Morwood, had in the past made takeoffs in propeller-driven Convair 580 aircraft and/or HS-748 aircraft with some wing-surface contamination. (See the discussion in chapter 12, Aircraft Performance and Flight Dynamics.)

- Prior to March 10, 1989, some Air Ontario pilots flying the HS-748 propeller-driven aircraft used a dangerous and unapproved procedure during the takeoff roll, referred to as the "80-knot check." The procedure involved a check of the wings upon achieving a speed of 80 knots, to determine whether snow or slush observed on the aircraft wings prior to commencement of the takeoff roll was blowing off the wings.

- Air Ontario's ground-handling agent at Dryden, Dryden Flight Centre, did not have its personnel attend a ground-handling training course for the F-28 aircraft, sponsored by Air Ontario, although invited to do so.

- It is of utmost importance that all pilots and all operational personnel be made fully aware of the potentially disastrous consequences of wing contamination on aircraft takeoff performance.

- Aircraft ground de-icing with a main engine running is routinely performed in the United States and Europe.

- Aircraft ground de-icing with a main engine running is an important operational matter requiring a standard company policy that is made explicitly known to all pilots and operational personnel.

- An Air Ontario internal memorandum was circulated throughout the Air Ontario SOC facility, prohibiting the de-icing of the F-28 aircraft with main engines running.

- The information contained in the memorandum, including the prohibition against de-icing with a main engine running, was taken from a Fokker publication that had limited circulation among pilots.

- Air Ontario dispatchers were familiar with the company prohibition against de-icing with main engines running, while some Air Ontario F-28 pilots were not familiar with it.

- Air Ontario failed to have in place an effective system for distributing information regarding the de-icing of F-28 aircraft to all pilots and operational personnel, including information regarding de-icing procedures with a main engine running.

- There should have been an operational policy in place at Air Ontario, and understood by all pilots and operational personnel, regarding the de-icing of the F-28 aircraft and, in particular, the de-icing of the F-28 aircraft with a main engine running.

- Captain Morwood may have been aware of the Air Ontario prohibition against de-icing the F-28 aircraft with its main engines running.

- The Air Ontario prohibition against de-icing its F-28 aircraft with main engines running may have been an influencing factor in Captain Morwood's decision on March 10, 1989, not to de-ice the aircraft in

Dryden because of the circumstances that confronted him, including the non-functioning APU and the lack of ground-start facilities.

RECOMMENDATIONS

It is recommended:

Hot Refuelling

MCR 76 That Transport Canada ensure that the flight operations manuals of all air carriers specify that hot refuelling is an abnormal and potentially dangerous procedure and that they outline in detail the appropriate procedures to be followed in order to conduct hot refuelling safely.

MCR 77 That Transport Canada, during the process of approval of air carrier manuals, ensure that the provisions of the proposed manuals are consistent and, specifically, that they coordinate the duties of the cabin crew with those of the flight crew concerning hot-refuelling procedures, with appropriate cross-referencing between the manuals.

MCR 78 That Transport Canada ensure that all aircraft fuellers are adequately trained to standards set by Transport Canada.

MCR 79 That Transport Canada ensure the adequate monitoring of aircraft fuelling procedures at Canadian airports.

Aircraft Ground De-icing

MCR 80 That Transport Canada encourage air carriers to adjust their operational procedures and policies, where technically feasible, to permit the de-icing of an aircraft with a main engine running.

MCR 81 That Transport Canada ensure that the intention of the "clean-wing" concept, as embodied in Interim Recommendations 2 and 3 of this Commission (Consolidated Recommendations MCR 2 and 3) and in recent amendments to the Air Regulations (SOR/90-757) and the Air Navigation Orders (SOR/90-758, and SOR/90-759), be incorporated into and

given effect in the appropriate operational manuals of Canadian air carriers.

MCR 82 That Transport Canada ensure, during its normal certification and inspection of Canadian air carriers, that the air carriers have well-organized and effective systems in place for the coordinated distribution to all pilots and operational personnel of comprehensive operational information – including, but not limited to, information regarding aircraft ground de-icing procedures.

MCR 83 That Transport Canada give serious consideration to appointing an appropriately qualified person as a national resource specialist dedicated to all matters pertaining to aircraft surface contamination and the ground de-icing and anti-icing of aircraft in Canada, in the broadest sense, based upon a similar position in the Federal Aviation Administration of the United States and with similar objectives and responsibilities.

22 THE F-28 PROGRAM: FLIGHT ATTENDANT SHOULDER HARNESS

Throughout the course of the hearings there were a number of occasions when evidence arising directly out of the Dryden crash prompted inquiries into larger questions of flight safety. Evidence regarding the forward flight attendant station of C-FONF prompted one such inquiry.

Mrs Katherine Say, an Air Ontario employee for 10 years and the senior flight attendant assigned to flight 1363, did not survive the crash of C-FONF. During the takeoff from Dryden she was seated in the forward flight attendant station.

Post-mortem and accident reconstruction evidence revealed that Mrs Say's chances of surviving the crash may have been enhanced if the flight attendant seats on C-FONF had been upgraded to standards existing in the United States. I heard, with considerable consternation, testimony that Canadian regulations permit the operation of the F-28 Mk1000 with flight attendant seats that are below United States safety standards for the same aircraft.

The rationale behind increasing the crash survivability of flight attendant seats is straightforward and obvious. The surviving flight attendant, Mrs Sonia Hartwick, gave testimony on the subject. Her words need no embellishment:

> Q. And why is it important for a flight attendant to be secure?
> A. So that, in the event of an emergency ... we are able to assist our passengers once the impact has occurred and able to assist our passengers with a quick evacuation as we are, again, a piece of an emergency equipment on that airplane and we are trained in order to assist in a rapid evacuation through our exits.
>
> (Transcript, vol. 12, p. 127)

The forward flight attendant seat on C-FONF (and also on C-FONG) consisted of a forward-facing pedestal to the right of the aircraft's centre line, in the galley and adjacent to the starboard service/emergency exit.[1]

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[1] The other flight attendant seat, of similar construction, was at the back of the passenger cabin and was unoccupied on March 10, 1989. Flight attendant Sonia Hartwick was seated in seat 8D, which was adjacent to the overwing emergency exit.

The seat was equipped with a lap belt but not with armrests, side restraints, rigid back, or shoulder harness.

Canadian regulations have never required the installation of a flight attendant's shoulder harness on aircraft of C-FONF's certification vintage. Such requirements have existed in the United States since 1980. The relevant United States regulations regarding flight attendant seats are as follows:

> 14 Code of Federal Regulations (CFR) 25.785:
>
> **Seats, berths, safety belts, and harnesses**
>
> (h) Each seat located in the passenger compartment and designated for use during takeoff and landing by a flight attendant required by the operating rules of this chapter must be:
>
> ...
>
> (5) Either forward or rearward facing with an energy absorbing rest that is designed to support the arms, shoulders, head, and spine.
>
> (6) Equipped with a restraint system consisting of a combined safety belt and shoulder harness unit with a single point release. There must be a means to secure each restraint system when not in use to prevent interference with rapid egress in an emergency.
>
> 14 CFR 121.311:
>
> **Seats, safety belts, and shoulder harnesses**
>
> (f) Each flight attendant must have a seat for takeoff and landing in the passenger compartment that meets the requirements of 25.785 of this chapter, effective March 6, 1980.
>
> [Note: The section goes on to list exceptions not relevant to the present case.]

Despite the lack of a Canadian regulatory requirement, the absence of a shoulder harness was specifically referred to in the notes of Mr Ole Nielsen of Transport Canada, who inspected C-FONF in France in March 1988. In his notes, Mr Nielsen wrote: "Flight attendant seats require approved shoulder harness" (Exhibit 1000, p. 4). Similar comments were made by Mr Nielsen in May 1988, immediately prior to the aircraft's importation and its addition to the Air Ontario operating certificate. This and other evidence, described below, indicate that both Transport Canada and Air Ontario were well aware of the cabin safety implications of inferior flight attendant seats installed in C-FONF.

At times, the regulator's primary role of protecting the travelling public is thwarted by what may be described only as bureaucratic lassitude and pliancy. The evidence before this Inquiry offers no other reasonable explanation as to how this inferior level of cabin safety was allowed by Transport Canada to persist in Canada.

Accordingly, I feel bound to review the evidence on this issue in some detail to illustrate how such failures in the regulatory and operational sectors of the air transportation system can occur.

The Forward Flight Attendant Station of C-FONF

The "Cause of Death" section in the report of the post-mortem examination of Katherine Say reads simply: "Generalized body burns" (Exhibit 23, "Compilation of Post-Mortem Records of Air Crash Victims"; tab 22). In the same report, however, the following significant notation was included under the heading "Summary of Abnormal Findings":

> The only impact injury found was the metal foreign body which had embedded itself in the frontal bone. The presence of soot in the respiratory passages indicated some respiratory activity during the fire.
>
> (Exhibit 23, tab 22, p. 5)

There were two metal objects that caused the head injury to Katherine Say. These were examined and photographed in the early stages of the investigation; however, at some point during or after the post-mortem examination, they were misplaced.[2] The Commission's human factors and crash survivability investigative group used its best efforts to determine the origin of the metal pieces, comparing the photographs with the galley configuration on the sister aircraft, C-FONG. Unfortunately, the source of the pieces of metal could not be identified.

The evidence disclosed that Mrs Say's body was found in the wreckage some distance from her seat.[3] This evidence and toxicological evidence reported by the Ontario Region aviation medical officer of

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[2] Mr David Adams, chairman of the Commission's human factors and survivability investigative group, testified that he was quite annoyed when he learned that the metal objects were misplaced. For present purposes, it is sufficient to note that I share Mr Adams's chagrin at the careless handling of this significant forensic evidence.

[3] Flight attendant Hartwick confirmed that in fact Mrs Say was in the forward flight attendant's seat at commencement of the takeoff. See figure 22-1, Pre- and Post-Accident Locations of Individuals Seated in Forward Positions on Flight 1363.

Transport Canada led to the following finding by the human factors and survivability group:

> *Survival time* was likely **less than a minute** but this value could vary and post impact voluntary movement cannot be ruled out! It appears that some evidence suggests minimal respiratory activity after impact and that death was probably less than a minute, however body location may suggest some form of post impact, voluntary movement. The head injury, Katherine Say received, may not have resulted in a loss of consciousness. The latter would be supported by the fact that this head injury did not cause any internal cerebral damage. In summary, Katherine Say may have died shortly after impact and never regained consciousness or she may have been conscious enough to make a vain attempt at egressing the aircraft before losing consciousness.
>
> (Exhibit 1258, Human and Survival Factors Group Chairman Report; tab 2, p. 24)

Because of the extensive post-crash burns to her body, it was impossible to determine whether Katherine Say suffered other impact injuries.

There was evidence as to the location in the aircraft of the "male" portion of a buckle from Mrs Say's seat belt. Because the investigators were unable to locate the buckle's "female" portion or any other part of the seat belt, it could not be determined conclusively whether the flight attendant's seat-belt buckle opened on impact or was undone before or after the crash.[4]

Attempts to draw inferences from the physical evidence remaining after a crash and fire of this magnitude are naturally fraught with uncertainty. There are a number of possible explanations for the location of Katherine Say's body after the crash.

The only impact injury revealed at autopsy was the penetration injury to her forehead, from which area the two metal objects were extracted. If one assumes that Katherine Say was seated in her flight attendant seat at the time of impact, then the natural forces at work on impact would have thrown her upper body forward. There is therefore a high probability, based on all of the evidence, that the head injury suffered by Mrs Say resulted from the forward impact of her head against a metal object located immediately adjacent to her cabin attendant seat.

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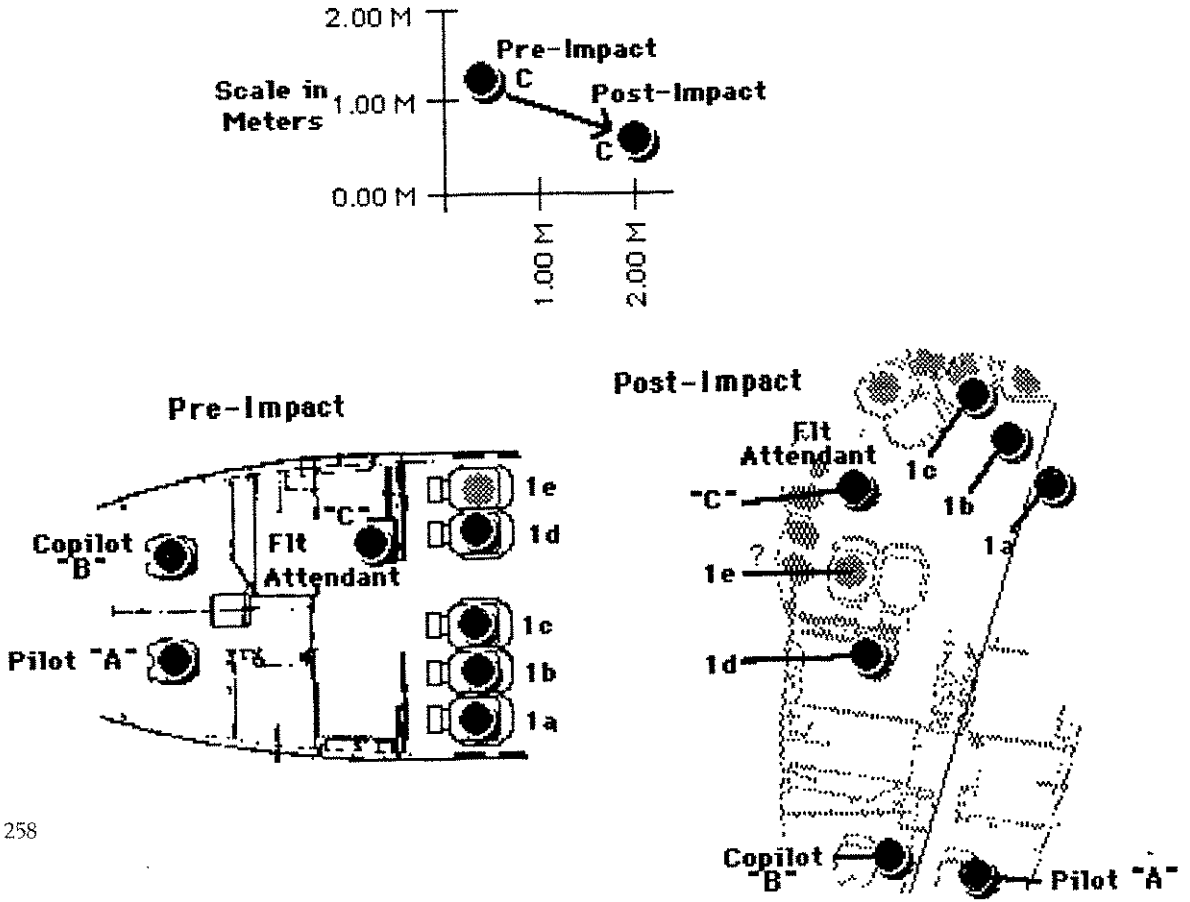
[4] Mr Adams was able to determine with a high degree of probability that the "male" portion of the buckle located was in fact Mrs Say's. It was the testimony of Mr Adams that flight attendant seat-belt buckles are different from those on regular passenger seat belts. The "insert" and "latch" portion of the buckle has two holes in the flight attendant buckle and only one hole in the passenger buckle. The buckle attributed to Mrs Say's seat belt was the only two-hole buckle found in the forward section of the cabin (Transcript, vol. 156, pp. 149–51).

Figure 22-1 Pre- and Post-Accident Locations of Individuals Seated in Forward Positions on Flight 1363



Source: Exhibit 1258

Although other factors may have intervened to cause her head injury during the breakup sequence, it is beyond dispute that, had she been secured by a shoulder harness, her upper body would have been markedly better restrained and protected from injury caused by forward motion on impact. This, after all, is the function of a shoulder harness.

Whether Mrs Say would have been able to aid passengers or eventually to make her way out of the wreckage had she not sustained the head injury cannot be stated. What can be said is that her chances for survival may have been enhanced if she had had the protection of a shoulder harness.

If C-FONF had been a United States–registered aircraft, there would have been, pursuant to United States law, a shoulder harness in place for Katherine Say. Instead, this Canadian-registered aircraft, because of the lack of Canadian regulatory requirements, was legally flying without this critical piece of flight safety equipment.

I now turn to the relevant Canadian and United States legislation: design and manufacturing criteria; operational standards and regulations. A review of the history of the flight attendant shoulder harness issue will then follow.

Governing Legislation

To enhance the safe carriage of passengers in transport category aircraft such as the F-28 Mk1000, regulatory authorities stipulate criteria under which aircraft are to be designed, manufactured, and operated. Design and manufacturing criteria are generically referred to as "certification standards" or "airworthiness standards." Only if these certification standards are met will a type certificate and a certificate of airworthiness be issued and the aircraft type be allowed by law to fly in commercial service. Operational standards are defined by the regulations and orders governing air carriers.

Design and Manufacturing Criteria

Aircraft meeting the airworthiness standards of design and manufacture of a particular jurisdiction will typically be permitted to operate by way of some form of certification process. Various jurisdictions have, over time, developed a system of bilateral and multilateral acceptance of one another's certification criteria. The most common certification criteria to which transport category aircraft are designed and manufactured are those of the United States. Because the United States has historically been the largest manufacturer of transport category aircraft, there is wide acceptance of its certification criteria.

Canadian regulators accept, for the most part, United States design and manufacturing criteria when granting "type approval" to an aircraft for operation within this country.

The United States certification criteria for transport category aircraft are set forth in Part 25 of the Federal Aviation Regulations (FAR 25).[5] These criteria must be met before the Federal Aviation Administration (FAA) will grant a United States type certificate to a model of aircraft. FAR 25 is a vast compendium of certification requirements addressing everything from engines and electrical systems to passenger and crew member seats.

Prior to the enactment in the United States of FAR 25 in 1964, the United States criteria for the certification of transport category aircraft were contained in a certification regime designated as Civil Aviation Regulation (CAR) 4(b). According to the testimony of Mr Ole Nielsen, the Transport Canada inspector who supervised the importation of C-FONF into Canada, it was under CAR 4(b) that the F-28 Mk1000 aircraft received its United States type certification. CAR 4(b) did not require the installation of either flight attendant seat shoulder harnesses or energy-absorbing seats. In fact, until 1980, FAR 25 did not require such installation.[6]

In 1972 the Canadian Department of Transport granted the F-28 aircraft type approval, thereby authorizing its operation by Canadian air carriers. By granting the F-28 type approval, the Canadian authorities accepted the United States certification of the aircraft. At the time of the granting of the type approval in 1972, neither Canada nor the United States required the installation of flight attendant shoulder harnesses on the F-28.[7]

By the late 1970s, however, the issue of cabin safety had undergone a comprehensive review in the United States, resulting in a number of significant improvements. In 1980, FAR 25 was amended to require the installation of flight attendant seats of a safer design. All transport category aircraft designed and manufactured after the effective date of the amendment to FAR 25 (March 6, 1980) had to meet the new criteria in order to receive a United States certificate of airworthiness. United States aircraft of older design were permitted to continue in commercial operation provided that they conformed with another Federal Aviation

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[5] FAR Part 25 is cited as 14 CFR 25. These regulations are promulgated and administered by the Federal Aviation Administration of the U.S. Department of Transportation.

[6] FAR Amendment 25-51, "Airworthiness Review Program - Amendment No. 8: Cabin Safety and Flight Attendant Amendments"

[7] Exhibit 679, "Aircraft Type Approval, A-108, Fokker F-28 Mark 1000 and Mark 2000" (February 27, 1973)

Regulation specifically directed at the operational accommodation of the new technology in older aircraft. These "operational requirements" were set out in FAR Part 121.[8]

United States Operational Standards

Application of Standards to New Aircraft

The certification standards set out in FAR 25 delineate requirements for aircraft design and manufacture. The operation of aircraft is governed by operational regulation. In the United States the operational regulations are contained in FAR 121. In Canada they are dealt with in the Air Navigation Orders.

One significant purpose of the certification standards outlined above is to inform aircraft builders of the criteria that their products will have to satisfy before such products will be permitted to be operated in private or commercial service. In short, the certification standards represent conditions precedent to the entry into the marketplace of new aircraft.

The certification criteria in FAR 25 are amended from time to time to incorporate new technology in aircraft design and materials. Aircraft designed and manufactured after an amendment to a certification criterion will thereafter be built to the new standard.

Application of New Standards to Existing Aircraft

FAR 25 does not accommodate the problem of incorporating new technology into existing aircraft. The application of new technology to old aircraft is typically addressed through operational regulation, which, if appropriately drafted, will complement the certification regime.

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[8] 14 CFR 25.785:

Seats, berths, safety belts, and harnesses

(h) Each seat located in the passenger compartment and designated for use during takeoff and landing by a flight attendant required by the operating rules of this chapter must be:

... (5) Either forward or rearward facing with an energy absorbing rest that is designed to support the arms, shoulders, head, and spine;

(6) Equipped with a restraint system consisting of a combined safety belt and shoulder harness unit with a single point release. There must be means to secure each restraint system when not in use to prevent interference with rapid egress in an emergency ...

[Note: The "operating rules" in section 25.785(h) refer to FAR Part 121; specifically, FAR 121.311 (cited as 14 CFR 121).]

New Seat, Safety Belt, and Shoulder Harness Requirements (1980) In 1980, the FAA incorporated various developments in cabin safety technology into both the FAR 25 certification criteria as well as the FAR 121 operational criteria. New requirements for flight attendant seat construction in existing aircraft were set out in FAR 121.311, which states:

> **121.311 Seats, safety belts and shoulder harnesses**
>
> ...
>
> (f) Each flight attendant must have a seat for takeoff and landing in the passenger compartment that meets the requirements of FAR 25.785 of this chapter, effective March 6, 1980, except that -
>
> (1) Combined safety belt and shoulder harnesses that were approved and installed before March 6, 1980, may continue to be used; and
>
> (2) Safety belt and shoulder harness restraint systems may be designed to the inertia load factors established under the certification basis of the airplane.

The result of this operational requirement was, in essence, that the requirements set out in FAR 25.785, including the provision of flight attendant shoulder harnesses, were made mandatory for all transport category aircraft, regardless of their date of manufacture.

Canada has never adopted the United States operational requirements of FAR 121. The applicable Canadian operational standard that was in place on the date of the accident was Air Navigation Order (ANO) Series II, No. 2, the Aircraft Seats, Safety Belts and Safety Harnesses Order. This order had been in force since May 1966.

ANO Series II, No. 2, contains no provision specifically dealing with flight attendant seating, seat belts, or shoulder harnesses.

The Canadian Approach to the Shoulder Harness Issue

In July 1987, some seven years after the promulgation in the United States of FAR 121.311, the Canadian authorities published a proposed amendment to the Aircraft Seats, Safety Belts and Safety Harnesses

Order.[9] The proposed amendment addressed, among other things, the issue of flight attendant seats. The relevant amendment to the existing requirement was the following:[10]

> s. 4 (4) After January 1, 1988, no person shall operate an aircraft on a commercial air service unless it is equipped with an approved safety belt, consisting of a lap strap combined with a shoulder harness, for each flight attendant seat.

An additional concern in the proposed amendment was that regarding "Use of Safety Belts." The relevant section stated:

> s. 8 (1) Except as provided in subsection (2)[11] or (3), every person carried on board an aircraft, other than an infant or a passenger or parachutist referred to in Section 6 or 7, shall keep a safety belt, including the shoulder harness, if any, properly fastened about him while the aircraft is taxiing, taking off or landing, and at any other time when so directed by a crew member or by a safety belt sign displayed in the aircraft.
>
> ...
>
> (3) A crew member is not required to comply with subsection (1) when the aircraft is being operated otherwise than on take-off or landing and the crew member is performing assigned safety related duties.

The proposed implementation date of January 1, 1988, came and went with no approval of the amendment to ANO Series II, No. 2, and, therefore, there was no compliance required by Canadian operators.

The delay in the implementation of the proposed ANO is attributable, in part, to protracted discussions between Transport Canada and the Air Transport Association of Canada (ATAC). ATAC is the national service organization for the Canadian commercial air transport industry. Its membership, comprised of individuals and companies involved in the

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[9] *Canada Gazette*, Part I, July 18, 1987, pp. 2311–15. *Canada Gazette* is the publication through which the Government of Canada provides notification of proposed regulatory change. After the government has considered comments arising out of the notice of proposed regulation, the public is notified of the promulgation of the regulation by its publication in *Canada Gazette*, Part 2.

[10] In addition to addressing flight attendant seats, the proposed amendment considered passenger seats and seat belts; pilot seats and seat belts; seats and seat-belt requirements for "special purpose operations" (e.g., aerial spraying); seats and seat belts for parachutists; approved child restraint systems; crew member activities while the aircraft is operating and the seat-belt sign is displayed; and the use of seat belts by pilots.

[11] Subsection 2 refers to the use of child restraints.

Canadian airline industry, includes airlines accounting for approximately 95 per cent of Canadian commercial air transport revenue. Among its many other roles, ATAC reviews developments in legislation that could potentially affect the aviation industry. There is regular contact between ATAC and the Government of Canada regarding aviation-related legislation, and, for this reason, ATAC has been variously described as an industry interest group and an industry lobby group.

Amending the Aircraft Seats, Safety Belts, and Safety Harnesses Order

The Role of ATAC

When faced with the operational changes that would be necessitated by the amendment to ANO Series II, No. 2, ATAC appears to have marshalled its forces, effectively forestalling its implementation. The concern of the industry was not with the necessity of installing safer flight attendant seats; rather, the industry was concerned primarily with the proposed restrictions on flight attendant activities when the safety belt sign is displayed in the cabin. The debate over the wording of the proposed amendment appears to have commenced more than a year following its July 1987 publication.

On October 11, 1989, Mr Donald E. Lamont, ATAC vice-president of flight operations, met with the ATAC cabin operations subcommittee with regard to the proposed amendment. Certain concerns were expressed regarding the proposed restriction on the ability of flight attendants to provide passenger services while the safety belt sign is illuminated. On October 20, 1989, Mr Lamont met with Mr Weldon Newton, the director-general of aviation regulations, and Mr William Slaughter, the director of flight standards, Transport Canada, to discuss the ATAC concerns. Mr Lamont reported to the ATAC cabin operations subcommittee on his meeting with Transport Canada:

> The concern was expressed that if the Order as written became a regulation, attendants would be compelled to be seated and strapped into a seat while the safety belt sign was illuminated except while performing assigned safety related duties.
>
> Transport Canada has agreed to revise these paragraphs to permit the performance of other related duties (meals, service, etc) while the seat belt light is turned on. The qualification will be that the Captain has approved of such service(s) taking place while the seat belt sign is displayed.
>
> Transport Canada will consult with ATAC on the revisions and I will keep you advised of developments as they occur.
>
> (Exhibit 1168, tab 3)

There was, apparently, no discussion between ATAC and Transport Canada regarding the proposal that flight attendant seats be equipped with shoulder harnesses. The industry was concerned primarily with in-flight service.

On October 24, 1989, Mr Slaughter wrote a memorandum to Mr Arthur LaFlamme, also of Transport Canada, stating that, following his meeting with Mr Lamont and Mr Newton, there was agreement that the wording of subsection 8(3) of the amendment to ANO Series II, No. 2, was too restrictive. Mr Slaughter suggested the following alternative amendment to the order:

> A crew member is not required to comply with subsection (1) where the aircraft is being operated otherwise than on take off or landing and the crew members performing assigned duties related to the safety of passengers, or other duties as approved by the Captain.
>
> (Exhibit 1168, tab 5)

Mr Slaughter stated further that this amendment would enable the "in-charge" flight attendant to make decisions as to whether to continue or discontinue passenger service during periods when the "fasten seat belt" light is illuminated.

On December 11, 1989, Mr LaFlamme, exercising, in my view, good judgement, replied to Mr Slaughter that making changes relevant to flight attendants' in-flight activities would delay the requirement for safer flight attendant seats. Mr LaFlamme wrote:

> Any changes to the order at this time can delay publication in Canada Gazette, Part II and may require the document to be republished again in Part I for consultation. The order also contains the requirement for shoulder harnesses on flight attendant seats, permits use of infant/child restrain[t] devices, securing of stretchers, etc., all highly sensitive regulatory safety issues which will not be resolved until the proposed rule change is published as a final rule.
>
> For all the foregoing reasons, it is requested that the revised wording of subsection 8(3) as contained in your memorandum be reconsidered in favour of the paragraph contained in the present amendment.
>
> (Exhibit 1168, tab 6)

I heard evidence that, following Mr LaFlamme's advice to Mr Slaughter, there were many communications between Canadian air carriers and Transport Canada regarding the proposed amendment to the Air Navigation Order. These communications, which persisted until as late as April 1990, all addressed the subject of permissible flight

attendant activities. None appeared to canvass the subject of safer flight attendant seats.[12]

Mr Slaughter, in his evidence before me, seemed to have grasped the essential point, albeit belatedly. His testimony was as follows with regard to the issue of the proposed amendment to ANO Series II, No. 2:

> A. ... there's three major and independent regulations in being, and for the sake of discussions over one line in one area of it, we have held up the whole Air Navigation Order.
>
> And perhaps that should be separated in some way so that we can examine one in isolation without impeding the progress of the other two.
>
> (Transcript, vol. 145, p. 55)

The issue of mandatory flight attendant shoulder harnesses is still unresolved, some four years after the initial proposed amendment to ANO Series II, No. 2, and twelve years after the issue had been carefully considered and resolved by the United States regulator and industry.

This is the bureaucratic lassitude and pliancy referred to earlier. In light of the evidence, I offer no apologies for my choice of language.

One final note on the subject that is worthy of mention came to light during the evidence of the director of flight standards for Transport Canada, Mr Slaughter. The Air Transport Association of Canada is often called upon by the carriers, whom it represents, to lobby Transport Canada in support of positions being advanced or favoured by air carriers regarding the content of existing or proposed legislation. In certain instances, such as with the shoulder harness issue, such legislation may have financial implications for the carriers as well as having aviation safety implications. Transport Canada officials responsible for the development and implementation of such rule changes therefore must be vigilant to ensure that the safety component of the legislation is not effectively diluted or neutralized as a result of industry pressure.

It was therefore surprising to discover during Mr Slaughter's evidence that the selection board, which was put in place by Transport Canada in early 1989 to hire Transport Canada's new chief of air carrier standards, included the vice-president of operations of the industry lobby group, the Air Transport Association of Canada, Mr Donald Lamont. The successful candidate was Mr Arthur LaFlamme.

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[12] Exhibit 1168, tabs 8-17: A series of memoranda and notes regarding permissible flight attendant activities while the seat belt sign is illuminated, and the proposed amendment to ANO Series II, No. 2

I do not in any way question the integrity of either Mr Lamont or Mr LaFlamme. Certainly, Mr LaFlamme's actions regarding the shoulder harness issue and ANO Series II, No. 2, following his selection as chief of air carrier standards, were in my view not only entirely appropriate but indeed commendable. However, the Transport Canada practice of appointing, or acquiescing in the appointment of, individuals to its hiring-selection board who may subsequently be required, by the very nature of their own aviation industry positions, to bring pressure to bear on the future decisions of the successful candidates is, in my opinion, an unacceptable practice that should be discontinued. Mr Slaughter was questioned on the appearance of a conflict of interest arising under these circumstances, and he agreed that such was to be avoided:

> Q. All right. Well, if you can, you should avoid even the appearance of conflict so as not to call the integrity of Transport Canada into disrepute; isn't that right?
> A. I agree. When you put it in this light, I certainly agree.
>
> (Transcript, vol. 145, p. 248)

The Role of Air Ontario

I would not like to leave the impression from the foregoing that Air Ontario is itself without a measure of responsibility for allowing substandard flight attendant protection in its aircraft.

Both Air Ontario's own employee Mr Teoman Ozdener, and its outside consultant Mr Derek Hicks, noted the flight attendant shoulder harness deficiency during the survey of sister aircraft C-FONG and reported the deficiency to Air Ontario management.[13] Mr Hicks, in his survey report to the company, made the following comments:

> Front Stew seat considered unsatisfactory as is and is not to be used on take off or landing. Rear seat is satisfactory if and when a shoulder harness is fitted. Seat not to be used for take off and landing until shoulder harness is fitted.
>
> (Exhibit 832, Derek Hicks, M.L.B. Associates, to Douglas Christian, Air Ontario, March 28, 1988)

The approach suggested by Mr Hicks would seem to be a sensible compromise. Until the shoulder harness/flight attendant retrofit could have been completed, both flight attendants would have been required

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[13] Although Mr Ozdener and Mr Hicks initially inspected aircraft 10070 (C-FONG), it was acknowledged by witnesses Mr Ozdener and Mr Bittle that the inspection comments regarding the absence of a flight attendant shoulder harness on C-FONG were equally applicable to aircraft C-FONF.

to take seats in the passenger compartment on takeoff and landing. Although the passenger seats did not offer an equivalent protection to a proper flight attendant seat with a shoulder harness, they were superior to the flight attendant seats that were in place on C-FONF. The passenger seats provided back and lateral support while the flight attendant seats did not. Having stated this, I would add that ANO Series VII, No. 2, requires all cabin attendants to be seated at their approved stations with safety belts fastened on takeoff and landing (sections 19(2), 19(3)).

Transport Canada and Air Ontario therefore created a predicament for the senior flight attendant on the F-28. A greater level of safety could have been achieved by sitting in a passenger seat; however, for the senior flight attendant, in the absence of any authorization from Transport Canada, it was illegal to be seated in any but the approved flight attendant station.[14] Ironically, in the case of the F-28 C-FONF, the approved flight attendant station was the substandard forward jump-seat. Transport Canada could have readily designated an appropriate passenger seat as the approved flight attendant station, had Air Ontario so requested.

In March 1988 Mr Ozdener reported to Mr Kenneth Bittle, the Air Ontario vice-president of maintenance, on the progress of the F-28 importation. With regard to the present issue, Mr Ozdener noted: "Shoulder harnesses for flt. attendants are on order by TAT" (Exhibit 811, p. 5).

Mr Bittle testified that he initially thought that the installation of the shoulder harnesses was a regulatory requirement and that TAT would be assuming the cost of installation. He testified further that, when TAT informed Air Ontario that it was not going to install the harnesses, he made inquiries regarding the cost of the installation. When Mr Bittle became aware that there was no regulatory requirement for the shoulder harnesses, he recommended to the Air Ontario flight operations department that they not be installed. Mr Bittle's recommendation was based largely on economic considerations. He testified that the shoulder harness modification on the F-28s would have cost approximately U.S.$90,000, and, because Air Ontario was leasing the aircraft, he was of the opinion that it would have been a poor business decision to incur the cost. Mr Bittle's evidence clearly indicated that Air Ontario took advantage of the laxity in the regulation in order to avoid the expense

[14] The Air Ontario Flight Attendant Manual required the junior flight attendant in the F-28, when there were fewer than 65 passengers, to be seated in seat 8D, adjacent to the mid-aircraft emergency exit. When the aircraft had 65 passengers, the junior flight attendant was required to be seated in the rear flight attendant jump-seat. The senior flight attendant, in all instances, was to be seated in the forward jump-seat.

of replacing the substandard flight attendant seats and the installation of the shoulder harnesses in the F-28:

> Q. It was not necessary to have the front harness, in your opinion?
> A. That's right, in my opinion. And I stand to be corrected, but I still don't think it has been put through.
>
> I think it was published in the Canada Gazette and has ceased any activity since then, but I could be proved wrong on that.
>
> But at that time, certainly my understanding that was not a requirement, and we were pretty familiar with what was a requirement, due to us having to research all this stuff, floor track lighting, seat flammability, GPWS. You name it, it was all covered by ANOs. This was not.
>
> So at that time, we elected to wait on ordering. We were also trying to see if there was another way to do it. Maybe we would redesign the whole front of the airplane ourselves.
>
> But you have to keep in mind that this airplane was not the long-term airplane for Air Ontario. It was a one-year lease, and when we received our permanent airplanes, then you would be much more interested in investing some heavy money into modifications that would stick with you.
>
> Because this would go back - this airplane ... will go back to TAT at some point, and anything we had done to it, it would be money wasted.
>
> (Transcript, vol. 103, pp. 172–73)

Mr James Morrison assumed the position of vice-president of flight operations in July 1988, shortly after the commencement of the F-28 operation. He was informed by Mr Bittle of the flight attendant seat deficiency, and he accepted Mr Bittle's assessment of the situation (Transcript, vol. 116, pp. 36–37).

From the period of the importation of the aircraft in May 1988 to the addition of the F-28 on Air Ontario's operating certificate in June 1988, the issue was considered by both Air Ontario and Transport Canada. Mr Ozdener, who was supervising the importation for Air Ontario, informed Mr Nielsen of Transport Canada of the status of certification requirements for the two F-28 aircraft. Mr Ozdener noted the following in one communication to Mr Nielsen:

> Shoulder Harnesses F/A seats S.B. ordered. Seats not to be occupied until shoulder harness installed[:] N/A: not mandatory until 89/06.
>
> (Exhibit 1001, p. 1)

Mr Nielsen noted on his own "aircraft importation check sheet" for C-FONF that the seat belts for the aircraft were acceptable "except F/A

seat belts" (Exhibit 1002, "Aircraft Importation Check Sheet," May 1988). Mr Nielsen explained that he discussed the matter with Mr Ozdener and Mr Hicks and was under the impression that the flight attendant shoulder harnesses were required. Subsequently, Mr Nielsen consulted the Engineering Branch of Transport Canada and was advised that there was no requirement for flight attendant shoulder harnesses on the F-28 Mk1000. Air Ontario took the position that it would not install the shoulder harnesses until it was a regulatory requirement (Transcript, vol. 130, pp. 198–99).

Mr Nielsen was asked whether, as the inspector in charge of the certification of the F-28 C-FONF, he had any discretion to insist upon the installation of the shoulder harnesses, regardless of the state of the amendment to ANO Series II, No. 2. Mr Nielsen acknowledged that the shoulder harnesses would enhance the safety of the aircraft, but, absent any legislative authority, he would not insist upon their installation. Mr Nielsen testified:

> A. ... The shoulder harness had been a FAR 25 requirement for many years before this airplane ever came into the country, so it was obviously deemed to be a safety factor prior to this airplane ever arriving.
>
> But as far as advising the carrier to install it, we are not going to do that unless we've got some legislative background to do it on.
>
> (Transcript, vol. 129, p. 139)

As late as December 1988, Mr Ozdener wrote to Mr Bittle about the installation of the shoulder harnesses on the F-28 (Exhibit 812). This was the last documentary reference to the shoulder harnesses at Air Ontario until the crash of C-FONF. Mr Ozdener left the employ of Air Ontario in January 1989.

In May 1989 Air Ontario flight safety officer Captain Ronald Stewart noted the absence of flight attendant seat shoulder harnesses during an inspection of C-FONG. He addressed the issue to Mr Bittle in a memorandum dated May 19, 1989, recommending installation of the harnesses.

On May 29, 1989, two and one-half months after the accident, chief inspector Douglas Christian of Air Ontario wrote to Fokker Aircraft (United States) requesting information regarding the cost of the installation of shoulder harnesses on the remaining F-28, C-FONG. Shortly thereafter, Air Ontario discontinued its F-28 program.

From the evidence it was clear that both Transport Canada and Air Ontario were fully aware of the flight safety implications of introducing C-FONF into commercial service without the flight attendant shoulder

harnesses. Air Ontario made a commercial decision not to enhance the standard of safety of the flight attendant seats above the minimum standard required by Transport Canada.

The aircraft was "legal" according to the witnesses; however, if the regulatory component of the air transportation system had not failed, a law requiring flight attendant shoulder harnesses would have been enacted in a timely fashion.

I must emphasize that it is the job of the regulator to look after the safety interests of the travelling public, not the commercial convenience of the carrier. Only with this appreciation of the regulator's role will the air transportation system function properly. Having stated this and regardless of the standards set by the regulator, I am of the view that the carriers should do what they are reasonably able to by way of securing the safe air carriage of their passengers and employees. It was acknowledged by a number of witnesses, including Mr Bittle, that the short, one-year lease of the aircraft inhibited the substantial expenditure for the shoulder harness installation. The chief executive officer, Mr William Deluce, testified that he became aware of the shoulder harness issue when an accommodation for the installation of shoulder harnesses appeared in Air Ontario's 1989 revised capital budget. Apparently, in December 1988 Air Ontario had budgeted for the eventual installation of the shoulder harnesses.

I am of the view that, had Air Ontario properly prepared for the introduction of the F-28, surveying the aircraft well in advance of accepting its delivery, then the flight attendant seat retrofit and shoulder harness installation could easily have been achieved prior to the start of commercial service. Air Ontario committed itself to the terms of the aircraft lease on November 19, 1987. The lease contained specific provisions for the mutual inspection of the aircraft in advance of aircraft acceptance, and Air Ontario commenced its comprehensive survey of the aircraft in early March 1988, with the expectation that the lease period would commence on March 15, 1988. The pilot strike intervened, and the Air Ontario importation team was ordered back to Canada. Upon Mr Ozdener's return to Canada, Air Ontario management was informed of the flight attendant shoulder harness deficiency. Air Ontario management equivocated on the necessity of the shoulder harnesses. The Air Ontario vice-president of maintenance and engineering, Mr Bittle, recommended initially that, in the absence of a regulatory requirement, Air Ontario not effect the installation.

Had Air Ontario properly planned the implementation of the F-28 program, it should have anticipated the cost of rectifying the deficiency of the flight attendants' stations. Even in the absence of such foresight, at the very least Air Ontario should have made application to Transport Canada for the designation of appropriate passenger seats for flight

attendant stations. This action, as an interim measure, albeit not desirable, would have resulted in a higher degree of safety for the flight attendants, pending completion of the flight attendants' shoulder harness retrofitting.

It should be noted that much later, after the introduction of the jet into commercial service, the carrier budgeted for the installation of the harnesses by May 1989.

Air Ontario had at least a six-month window of opportunity, from November 1987 to the commencement of commercial service in June 1988, to resolve the shoulder harness issue. The failure to do so reflects very poorly upon the planning and implementation of the Air Ontario F-28 program. This observation has been made repeatedly in assessments of other operational deficiencies arising directly out of the investigation of the crash of C-FONF.

This air carrier safety deficiency is not mitigated by the fact that the amendment to the Aircraft Seats, Safety Belts and Safety Harnesses order had stalled in Transport Canada. Air Ontario managers testified that they believed that approval of the shoulder harness order was in fact imminent and, more importantly, that the installation of the shoulder harnesses was a significant safety benefit to its cabin crews and passengers. In my view, it was inappropriate for Air Ontario to rely on an argument that C-FONF was "legal" and therefore "safe." A corporate commitment to flight safety requires more than a simple dependence on the regulator to set standards.

Findings

- Flight attendant Katherine Say was seated in the forward flight attendant station at the time of the crash. This forward-facing seat was not equipped with a shoulder harness, armrests, side restraints, or a rigid back.

- During the crash sequence, Mrs Say suffered an impact injury to her forehead: two small pieces of metal became embedded in her forehead.

- There is uncertainty about whether Mrs Say died shortly thereafter, having never regained consciousness, or whether she made an attempt to egress the aircraft before succumbing.

- Mrs Say's chances for survival may have been enhanced if she had been afforded the protection of a shoulder harness.

- Had C-FONF been a United States–registered aircraft on the date of the crash, United States law would have required the flight attendants' seats to be equipped with shoulder harnesses.

- United States law requiring a retrofit of shoulder harnesses and other safety-enhancing features for flight attendant seats in older aircraft such as the F-28 has existed in relation to United States–registered aircraft since 1980.

- Canadian efforts to legally require a retrofit of shoulder harnesses and other safety-enhancing features for flight attendant seats in older aircraft such as the F-28 were not formally proposed until 1987, some seven years after similar United States law had been enacted.

- The proposed Canadian law, which, if passed, would require a retrofit of shoulder harnesses and other safety-enhancing features for flight attendant seats, has been stalled for more than four years and remains unresolved twelve years after this same issue was carefully considered and resolved by the United States regulator and industry.

- Transport Canada airworthiness personnel were aware of the safety deficiencies of the flight attendant seats on C-FONF but felt powerless to require that such safety deficiencies be remedied in the absence of legislative authority.

- The delay in implementation of proposed amendments to Canadian law regarding flight attendant seats is due in part to bureaucratic pliancy and lassitude on the part of certain sections of Transport Canada.

- Air Ontario management was aware of the safety deficiencies on C-FONF prior to the importation of that aircraft into Canada.

- For economic reasons, Air Ontario decided not to incur the cost of retrofitting the flight attendant seats with shoulder harnesses and other safety-enhancing features until such time as it was a regulatory requirement.

- A consultant hired by Air Ontario suggested that, until a shoulder harness retrofit could be accomplished, flight attendants be required to be seated in the passenger compartment during takeoff and landing.

- The retrofit of flight attendant station shoulder harnesses could easily have been achieved prior to the start of commercial service if Air Ontario had properly prepared, in a timely way, the introduction of the F-28 program.

- Although passenger seats were not equipped with shoulder harnesses, they were superior to the flight attendant seats. Passenger seats provided back and lateral support. Flight attendant seats did not provide such support.

- Canadian law requires that flight attendants be seated at their "approved" stations during takeoff and landing. In the case of C-FONF, the approved flight attendant station was the substandard forward jump-seat.

- No request was ever put forward to Transport Canada by Air Ontario to have any passenger seats approved for seating flight attendants during takeoff and landing.

- As an interim measure, Air Ontario should have made application to Transport Canada for the designation of appropriate passenger seats as approved flight attendant stations.

- Transport Canada could readily have designated an appropriate passenger seat as an approved flight attendant station, had Air Ontario so requested.

- The Air Transport Association of Canada (ATAC), among its many other roles, acts as an industry interest group on behalf of air carriers in its dealings with Transport Canada.

- The delay in the implementation of legislation that would enhance the safety requirements for flight attendant seats is attributable in part to protracted discussions between ATAC and Transport Canada.

- In 1989 a promotional competition for the Transport Canada position of chief of air carrier standards was presided over by a three-person selection committee that included the ATAC vice-president of operations as one of the committee members.

RECOMMENDATIONS

It is recommended:

MCR 84 That Transport Canada immediately press ahead with appropriate amendments to Air Navigation Order Series II, No. 2, that would require the retrofit of shoulder harnesses and other safety-enhancing features for flight attendant seats on older aircraft types such as the F-28 aircraft.

MCR 85 That Transport Canada assess and amend, as necessary, the procedures required to enact aviation safety–related legislation so as to avoid the bureaucratic process that has delayed the enactment of flight attendant shoulder harness and other important aviation safety–related legislation for the 12-year period since similar legislation was enacted in the United States.

MCR 86 That Transport Canada ensure that individuals from aviation industry positions are not placed on Transport Canada hiring or selection committees where there is any appearance of those individuals having a conflict of interest between their industry positions and their positions on the selection committee.

23 OPERATIONAL CONTROL

The Purpose of Operational Control

In the introduction to this Report, I described the interrelationship of the various components that comprise the air transportation system. Central to the safety of this transportation system, and indeed to the safe operation of an airline, is the function of operational control. Operational control is defined in Air Navigation Order (ANO) Series VII, No. 2, as "the exercise of authority over, or the initiation, continuation, diversion or termination of, a flight." Implicit within it are the crucial functions of flight dispatch and flight following.

In a broad sense, operational control is intended to provide support to the flight crew by ensuring that they have available to them full-time communications systems providing access to up-to-date information which permits them to make the safest possible operational decisions. The circumstances of the Dryden accident illustrate the key role of operational control within the transportation system, as well as the tragic results of a breakdown in that system.

During the course of the hearings of this Inquiry, I heard extensive evidence which traced the events of Air Ontario flight 1362/1363 on March 10, 1989, and which, in my view, indicated a breakdown in Air Ontario's operational control. Flight crews rely on company dispatchers to plan flights and monitor their progress (flight following).[1] Decisions on flight planning necessarily require dispatchers to consider a range of factors including unserviceabilities on the aircraft, en route weather, fuel, en route station facilities, and passenger loads.[2] Operational control is intended to prevent circumstances of the sort that occurred at Dryden, that is, the operation of an F-28 with an unserviceable auxiliary power unit (APU) into a station with no ground-support facilities, under conditions of forecasted freezing rain.

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[1] The degree of the flight crew's reliance on the dispatcher is dependent on whether the dispatch system is a pilot self-dispatch system, as employed by Air Ontario, or a full co-authority dispatch system, as used by Air Canada. These systems will be expanded on below.

[2] The terms dispatcher, flight dispatcher, and flight operations officer are synonymous and are used interchangeably in this Report.

I also heard evidence about, and from, Air Ontario's dispatchers which revealed that the dispatcher of flight 1362/1363 was very inexperienced and inadequately trained for his job. Further, I heard evidence that the dispatcher responsible for the flight following of flight 1363 was also inadequately trained. The evidence suggested several breakdowns in Air Ontario's execution of its obligation to the travelling public which impacted directly upon flight 1363 on March 10, 1989. This section explores how this could have happened within the present regulatory framework, why the carrier did not live up to its obligation, and why the regulator allowed this to happen. In this discussion, I will examine the system of operational control that Air Ontario had in place at the time of the accident, and, based on the evidence of Mr Adrian Sandziuk, an experienced flight dispatcher from Air Canada, I will compare it with the system used by Air Canada. The importance of operational control, and the necessity to tighten its role in support of the flight crew, could not be clearer. Had a decision been taken by Air Ontario SOC for flight 1363 to overfly Dryden on March 10, 1989, the accident would not have occurred.

Because civil air transportation is regulated for the protection of the travelling public, and because the regulator obviously cannot monitor the safe planning and execution of every flight, the regulator requires a commercial carrier to exercise operational control over its flights. Transport Canada, being the regulator, is responsible for promulgating and enforcing aviation regulations and standards in Canada. During the course of the Commission hearings, the efficacy of existing Canadian standards relating to operational control, as well as dispatcher training requirements, was brought into question and both are therefore addressed in this section.

Operational Control and Operations Control

Considerable confusion surrounds the meaning of "operational control" and "operations control." The terms are not interchangeable, and the distinction between them is significant.

Operational control is defined by ANO Series VII, No. 2, section 2, as "the exercise of authority over, or the initiation, continuation, diversion or termination of, a flight." Operational control involves the control of the movement of a specific flight and is the responsibility of the pilots and the flight dispatchers.

Operations control is a broader term involving the organization of the carrier's equipment, personnel, and flights to ensure the efficient operation of the airline on a day-to-day basis and in the long run. The many aspects of operations control not directly connected with operational control would ordinarily include matters like crew scheduling,

long-term aircraft and personnel utilization planning, and reliability studies of system on-time performance. Operations control is often called system operations control (SOC), where it applies to an air carrier's total flight operations, or station operations control (STOC), where it applies to a single station in the system.

Operational control is the sole responsibility of pilots and dispatchers, while operations control is the responsibility of a diverse group, the composition of which depends upon airline size and organizational structure.

Mr Adrian Sandziuk, a senior flight dispatcher with Air Canada testifying before the Inquiry on behalf of the Canadian Airline Dispatchers Association (CALDA), described the confusion that exists surrounding the two terms. Mr Sandziuk testified that, ever since the creation of system operations control (SOC) centres in the early 1970s, neither Transport Canada nor the Federal Aviation Administration (FAA) in the United States has ever definitively described where system operations control terminates and operational control begins, thereby causing considerable confusion. In his evidence, Mr Sandziuk described incidents where unqualified individuals in SOC centres have interfered with operational control of aircraft with the potential for devastating results. He cited, by way of example, an incident in which a SOC centre, without consulting or advising the flight dispatcher, diverted a flight to Halifax, where the weather was below operating limits.

During the course of his testimony, Mr Sandziuk offered the following recommendation to the Commission:

> A. ... I think that one of the things that should be done through this Commission is a definitive line be drawn of what and where operational control starts and where ... Operations control ends.
>
> (Transcript, vol. 155, p. 19)

I strongly endorse Mr Sandziuk's recommendation. In my view this is clearly an area which requires specific delineation of authority by the regulatory body.

Throughout this chapter, the lack of clear delineation between operations control and operational control at Air Ontario is apparent, and its significance is discussed.

Operational Control: Governing Legislation

The Canadian regulations governing flight dispatch, which are to be found in ANO Series VII, No. 2, Part III, beginning at section 13, require

Canadian carriers to exercise operational control over their flights and set forth the methods by which this is to be accomplished. The object of this exercise of operational control is, or should be, to impose upon licensed carriers the obligation to ensure that flights are conducted in accordance with the Air Regulations and within the operating parameters of the aircraft type being flown. ANO Series VII, No. 2, Part III, sets out the minimum infrastructure and personnel requirements for flight operations which the carrier must satisfy prior to regulatory approval of its operation.

Approved Flight Watch System

Section 14 of ANO Series VII, No. 2, states that an air carrier "shall have an approved flight watch system, adequate for the nature of the operations to be conducted." A flight watch system is to ensure "proper monitoring of the progress of each flight," and be able to convey any information necessary for the safe conduct of the flight to the pilot-in-command.[3]

Operational Flight Plan

"Operational flight plan" is defined in ANO Series VII, No. 2, as "the operator's plan for the safe conduct of a flight based on consideration of aeroplane performance, other operating limitations and relevant expected conditions on the route and at the aerodromes concerned."

Section 15(1) of ANO Series VII, No. 2, provides that a flight cannot be commenced without an operational flight plan approved and signed – in the case of a pilot self-dispatch system – by the pilot-in-command, and – in the case of a full co-authority dispatch system[4] – by both the pilot-in-command and the flight operations officer authorized by the company to exercise operational control over that flight.[5] The co-authority nature of the full co-authority dispatch system is revealed in the requirement for pre-flight and other approval of the operational flight

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[3] The term "flight following," as found in FAR 121, the equivalent United States operational control legislation, was used interchangeably with "flight watch" by some witnesses at the Commission hearings.

[4] Throughout the hearings the terms "co-authority" dispatch system and "dispatcher-dispatch" system were used interchangeably. In this Report, I will use the term "co-authority" as appropriate.

[5] Pursuant to ANO Series VII, No. 2, the director of flight operations is the approved position responsible for the exercise of operational control; this responsibility can be delegated to a flight operations officer providing that person meets minimum qualifications as set out in ANO Series VII, No. 2, Part III.

plan by both the pilot-in-command and the responsible flight operations officer. Such a full co-authority dispatch system was not required by Transport Canada for use at Air Ontario.

Qualifications for Persons Exercising Operational Control

The qualifications required under Canadian law for an individual, acting within an approved flight watch system, to serve as a flight operations officer and to exercise operational control over a flight have been the subject of contention for many years. The circumstances of the Dryden crash and the evidence presented before this Commission call for a serious reassessment of the current regime.

Section 15(6) of ANO Series VII, No. 2, sets out in detail the minimum requirements for a flight operations officer (or dispatcher) operating in a full co-authority dispatch organization. There is no requirement that flight operations officers be licensed; there are no training standards; nor is there a requirement that Transport Canada approve the training syllabus for dispatchers. The responsibility to ensure the training and competency of flight operations officers is vested in the carrier and not the regulator. Section 15(6) states:

> (6) Where, under an approved flight watch system, operational control over a flight is to be exercised by a flight operations officer and not the Director of Flight Operations, that officer shall not be assigned to duty as a flight operations officer unless
>
> (a) he has satisfactorily demonstrated to the air carrier his knowledge of
>
> (i) the provisions of the *Air Regulations* necessary for the proper performance of his duties,
>
> (ii) the contents of the air carrier's *Operations Manual* and the operations specifications necessary for the proper performance of his duties, and
>
> (iii) the radio facilities in the aeroplane used;
>
> (b) he has satisfied the air carrier as to his knowledge of the following details concerning the operations for which he will be responsible:
>
> (i) the seasonal meteorological conditions and sources of meteorological information,
>
> (ii) the effects of meteorological conditions on radio reception in the aeroplane used,
>
> (iii) the peculiarities and limitations of each radio navigation facility that is used by the air carrier,
>
> (iv) the aeroplane loading instructions including preparation of aeroplane weight and balance forms, and
>
> (v) the aeroplane performance operating limitations; and

(c) he has satisfactorily demonstrated to the air carrier his ability to
  (i) assist the pilot-in-command in preparing the operational flight plan and flight plan,
  (ii) provide the pilot-in-command with all information required both before and during flight that is relevant to the flight,
  (iii) initiate such emergency procedures as are outlined in the air carrier's *Operations Manual*, and
  (iv) co-ordinate operational control so as not to conflict with established Air Traffic Control, Meteorological or Communication Services procedures.

These provisions provide minimum requirements for flight operations officers operating within a full co-authority dispatch system, but do not address a self-dispatch system, or the type of "hybrid" system employed by Air Ontario. Air Ontario's hybrid system will be discussed further below. While Air Ontario's Transport Canada–approved Flight Operations Manual (FOM) does outline that carrier's flight dispatcher qualifications and training requirements, they are less comprehensive in scope than the dispatcher requirements set out in section 15(6) of ANO Series VII, No. 2. In particular, Air Ontario's FOM does not contain the prerequisites relating to knowledge of meteorological conditions, sources of meteorological information, and the effects of meteorological conditions on radio reception that are found in ANO Series VII, No. 2, section 15(6)(b)(i) and (ii). Because the flight watch provisions of the air carrier's FOM are approved by Transport Canada, both Air Ontario and Transport Canada must share responsibility for this unsatisfactory state of affairs.

Although Air Ontario described its operation as "pilot self-dispatch," I find, on the basis of extensive evidence presented before this Inquiry, that its dispatchers were *de facto* exercising some measure of operational control. That it was not a requirement for Air Ontario's system of operational control to comply with the dispatcher training standards in ANO Series VII, No. 2, section 15(6) is a serious omission. However, it is necessary not to overlook the larger issue, namely the inadequacy of the regulatory provisions that wholly vest the training of dispatchers with the carriers, and the corresponding absence of Transport Canada from the process.

The Operating Certificate

Prior to granting an operating certificate to a carrier, Transport Canada is supposed, according to the sections of ANO Series VII, No. 2, noted above, to satisfy itself that the carrier is able to exercise "adequate" and

"proper" operational control over its flights. The carrier accomplishes this operational control through, among other things, adequate communications with its aircraft, a system of flight authorization, an operational flight plan that conveys sufficient information to the crew for the safe conduct of flights, and flight operations officers who are properly trained with regard to both the routes to be flown and the operating specifications of the aircraft under their control. Finally, there should be an operations manual, approved by the regulator, which clearly outlines what the carrier intends to do to fulfil these requirements, and against which the carrier should be audited.[b]

As I discussed in greater detail in chapter 15, F-28 Program: Planning, the operating certificate is the regulatory document that licenses Canadian air carriers' operations. When Air Ontario sought to introduce the leased F-28 aircraft to its operation, it was necessary for Air Ontario to apply to Transport Canada for an amendment to its operating certificate.

Air Ontario's application to amend the operating certificate, dated January 24, 1988, included a number of representations about the current status of its dispatch operation, as well as a proposed F-28 training program for its flight operations officers. Although these representations may simply have been too ambitious, in retrospect they were clearly inaccurate. For example, the portion of the application entitled "Personnel" includes a certification, signed on behalf of Air Ontario by the director of flight operations, Robert Nyman, that 11 flight operations officers (along with 9 captains, 9 first officers, and 25 cabin attendants) have been trained and qualified to "meet the requirements and/or the applicable ANO for operating the proposed service" (Exhibit 855, p. 23). In addition, further on in the same application, it states that:

> operations officers will receive training by Air Ontario supervisory pilots who are qualified on the F-28 to familiarize them with the aircraft and its systems with a special emphasis on flight planning, performance and MEL procedures.
>
> (Exhibit 855, p. 32)

Despite Air Ontario's certification to Transport Canada that 11 flight operations officers had received or would receive the critical F-28 training, the fact is that only duty operations managers, who performed

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[b] ANO Series VII, No. 2, sections 31-37, provide that an operations manual shall be provided for the use and guidance of operations personnel in the execution of their duties.

a supervisory function with respect to Air Ontario dispatchers, received any effective training on the aircraft.

From the evidence described below it became clear that neither the carrier nor the regulator took the operational control requirements seriously. I heard evidence that:

- the regulations regarding operational control are imprecise, incomplete, and not adhered to by either Air Ontario or Transport Canada;
- Air Ontario made undertakings to Transport Canada regarding its operational control facility and personnel that were not fulfilled; and
- Transport Canada had no meaningful audit or surveillance of Air Ontario that could have ensured sufficiency of operational control of the air carrier.

I found this latter point regarding the lack of surveillance particularly disturbing. In the case of regulated industries where statutory obligations are imposed, it is only prudent for the regulator to anticipate that individual companies may backslide on those obligations. This does not necessarily result from improper intentions; it can occur through simple misunderstanding of the regulations or disorganization.

Pilot Self-Dispatch System versus Full Co-authority Dispatch System

Air Ontario's approved flight watch system at the time of the Dryden accident, and that which was deemed by Transport Canada to be "adequate to the nature of the operations," was a pilot self-dispatch system. A pilot self-dispatch system is one of two recognized types of flight watch systems, the other being a full co-authority dispatch system, as employed by Air Canada.

In a self-dispatch system the pilot is charged with the responsibility of flight planning and maintains sole authority to make operational decisions regarding the flight. A co-authority dispatch system, in contrast, is characterized by co-authority between the dispatcher and the pilot. The dispatcher responsible for operational control of a particular flight prepares, approves, and signs the operational flight plan before submitting it to the pilot-in-command. The co-authority rests on the fact that the pilot-in-command must also approve and sign the operational flight plan; in the event the dispatcher and the pilot-in-command disagree over the dispatch of a flight, the most conservative operational opinion must prevail. Indeed, safety is enhanced in this co-authority dispatch system by building in the requirement of a conservative

resolution of any operational disagreement between the pilot and the dispatcher.

Mr Sandziuk, while comparing pilot self-dispatch to a full co-authority dispatch system, spoke of the pressures put upon a pilot in a marginal weather situation under a self-dispatch system. The pilot must decide whether to cancel a flight while facing a room full of passengers waiting to get to other destinations, and must then explain his or her decision to do so to management. Under a full co-authority dispatch system, the decision to cancel a flight can be made by, or at least shared with, the dispatcher, thus reducing the pressure on the pilot.

Air Ontario's Hybrid Dispatch System

Air Ontario's system of operational control was described in its approved Flight Operations Manual (FOM) as pilot self-dispatch.[7] On the basis of the evidence presented before this Commission, it can be said that Air Ontario's system was not in fact a pure pilot self-dispatch, but a mixture or "hybrid" of pilot self-dispatch and co-authority dispatch systems. This was confirmed by Air Ontario's director of flight operations, Robert Nyman. Air Ontario's system involved having a dispatcher in SOC prepare flight releases in much the same manner as in the full co-authority dispatch system, but with final acceptance of the flight release being the sole responsibility of the pilot.

Legally, and in the eyes of Transport Canada, Air Ontario operated a pilot self-dispatch system. In practice, however, it employed a hybrid system which, in normal day-to-day scheduled operations, more closely resembled a full co-authority system than a pilot self-dispatch system.

Air Ontario's FOM provides that no pilot shall commence any flight, other than local circuits, unless a flight dispatch clearance form/flight release, or operational flight plan, has been completed prior to flight. It is the evidence that operational flight plans, or flight releases, were generated at Air Ontario exclusively by its system operations control (SOC) centre. It can therefore be stated, as per the definition of operational control in ANO Series VII, No. 2, section 2, that Air Ontario dispatchers were exercising authority over the initiation of a flight. It follows by regulatory definition that dispatchers at Air Ontario were exercising a degree of operational control over flights. Clearly, therefore, the requirements of section 15(6) of ANO Series VII, No. 2, should have applied to Air Ontario at all material times regardless of the fact that Air Ontario labelled its operation a pilot self-dispatch system, and the fact that Transport Canada approved such a characterization.

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[7] Only two components of a company operating manual require Transport Canada approval: flight watch and crew member training.

Mr Sandziuk agreed with this proposition in his evidence:

> A. ... I would say to you that in my opinion that if this wording exists in the manual, then I have to agree with you, I believe that they do have a flight watch system in accordance with the Air Navigation Order.
> Q. ... If you tell a pilot, look you can't take off unless you have got a flight release from dispatch, then you have got a situation where dispatch is exercising operational control, correct?
> A. That is correct.
> Q. And, therefore, the requirements of section 15 (6) apply whether you employ the rules of calling it a pilot self-dispatch system or not?
> A. I would have to agree with that.
>
> (Transcript, vol. 155, pp. 114–15)

The Air Ontario system described as pilot self-dispatch not only reduced somewhat the legal obligations on Air Ontario, particularly in the critical area of dispatcher qualifications, but also created a potentially hazardous uncertainty as to the true role of the dispatch operation within the company. In the final analysis, even though final authority rested with the pilot-in-command in Air Ontario's pilot self-dispatch system, the dispatch department maintained a measure of operational control over any flight. It follows that Air Ontario should have had on duty a flight operations officer who met the criteria set out in section 15(6). In the case of Mr Daniel Lavery, the flight operations officer or dispatcher who dispatched flight 1362/1363 on March 10, 1989, Air Ontario did not comply with the requirements of the Air Regulations.

Co-authority Dispatch System: Classification Proposal

It is generally acknowledged that a full co-authority dispatch system of operational control should not be required for every level of air carrier operation. Mr Ian Umbach, Transport Canada superintendent of air carrier operations, had proposed a four-tier categorization of operational control delineated on the basis of the relative sophistication of air carrier operations (Exhibit 1114). At one end of the scale, Mr Umbach advocated what he termed a "Type A" system for large scheduled domestic passenger carriers operating turboprop or turbojet aircraft and for all carriers operating turbojet aircraft internationally. The "Type A" system would require that dispatch be exercised jointly by a flight operations officer and the pilot-in-command of the flight in a full co-authority dispatch system. Further, it would involve advanced communications between the aircraft and the dispatcher, and a staff of trained and

qualified dispatchers. At the other end of the scale is what Mr Umbach termed a "Type D," a pilot self-dispatch system. Types "B" and "C" define plausible alternatives for levels of service that are somewhere between the major national and international carriers and small bush operations. Mr Umbach's proposal sets out in some detail levels of training expected of flight operations officers at the various tiers.

Mr Sandziuk testified that he agreed in principle with Mr Umbach's proposal. While he was uncertain as to how air carriers ought to be properly classified for the purposes of required dispatch organizations, he was certain that CALDA would strongly support required co-authority dispatch systems for Canadian air carrier operations as complex as those of Air Ontario, AirBC, and the like.

I support the recommendation of CALDA that all passenger-carrying IFR commercial air operations to the level of Air Ontario and like operations be required to put in place a co-authority dispatch system. It would obviously be unreasonable to impose such requirements on small-scale or northern bush operations below that level.

Dispatcher Training

In 1980 the Dubin Commission of Inquiry on Aviation Safety considered an application from CALDA requesting that Canadian dispatchers be licensed. Based on the evidence then before him, Mr Justice Dubin stopped short of recommending such licensing. He recognized the need for proper training of dispatchers, however, and the need for dispatchers to be inspected by the regulator.

Since 1980 there has in fact been no change in the regulatory requirements for the training of flight dispatchers. The Air Navigation Order vests the authority to train and approve the flight operations officers solely with the carriers. Furthermore, there has been no apparent monitoring by Transport Canada of the level of training provided by the carriers or of the proficiency of the individual dispatchers.

The need for adequate training of flight dispatchers has been highlighted by the Dryden accident and the evidence presented before this Commission. As a result, CALDA sought the opportunity to appear before me and revive its application to require that Canadian dispatchers be licensed. I discuss CALDA's application later in this chapter.

Dispatcher Training at Air Ontario

According to Air Ontario's F-28 Revised Project Plan (Exhibit 802), training of SOC personnel with respect to the F-28 aircraft was to have been completed by April 11, 1988. This goal was not attained. The dispatchers who appeared before me testified that they received no

effective training on the F-28 and acknowledged a lack of familiarity with F-28 systems. The dispatcher responsible for the preparation of the flight release for the ill-fated flight 1363 and the flight following of the aircraft until its turnaround in Thunder Bay was Mr Lavery. Mr Lavery admitted that he was not adequately trained and not qualified for this highly responsible position.

Mr Lavery, a young Air Ontario ramp attendant, was promoted from his outside ramp work in May 1988 and given only one week of a projected two-week dispatcher training course by an Air Ontario dispatch supervisor.[8] He then sat with an experienced dispatcher in the SOC control room at London for about one week, before being designated as a dispatcher and set to work with minimal supervision. He was not given any tests or examinations following the one-week course. Mr Lavery, who had no aviation background, described his meagre training and qualifications as a flight dispatcher as follows:

> Q. ... Now, when you went and took your brief course to train to be a dispatcher, had you had any previous aviation experience or exposure to aviation that prepared you in any way to be a dispatcher ...
> A. No, I came directly from the ramp, so.
> Q. ... so this would be your first exposure to reading weather reports and to legal requirements for landing minima, alternate minima, all that?
> A. Yes.
> Q. ... Now, at the end of the one-week course, could you in fact read the weather sequences, the terminal forecasts and area forecasts and so on?
> A. Enough to get by.
> Q. ... Were you familiar with the Flight Operations Manual at the end of a week? Let me ask you, had you read it from cover to cover?
> A. No.
> Q. ... you had looked at it but you really hadn't even read it, correct?
> A. Yes.
> Q. And when you were turned out to run or to operate on your own on a shift, had you even by that time read the flight operations manual?
> A. I don't believe so.
>
> (Transcript, vol. 48, pp. 179–80)

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[8] Mr Martin Kothbauer, Air Ontario duty operations manager, taught the training course taken by Mr Lavery.

Mr Lavery further testified that when he began working as a dispatcher he was not familiar with the F-28's operating specifications or performance limitations, nor had he been trained on the F-28 manual prior to dispatching F-28 aircraft.

When asked about the legal implications of an operational flight plan, Mr Lavery replied as follows:

> Q. ... Do you know whether or not the pilot is required by law to have an operational flight plan before he departs?
> A. *I don't know the answer to that one.*
>
> (Transcript, vol. 48, pp. 255–56)

A dispatcher requires a knowledge of the air regulations. The job involves complex mathematical calculations, and a dispatcher requires specific knowledge and expertise, as well as familiarity with such things as aircraft performance, fuel burns at various altitudes, load limitations for various atmospheric and runway conditions, and many other matters Mr Lavery, after the most cursory and rudimentary introductory training, was left to dispatch Air Ontario aircraft, including the F-28 jet aircraft, on his own. Not only had he not received training on the Piedmont F-28 manual, but his testimony reveals that Mr Lavery had not even familiarized himself with that manual. Mr Kothbauer described Mr Lavery as a "weak dispatcher"; he said he was doubtful of Mr Lavery's competence to generate the flight release given the weather conditions on March 10, 1989, and that Mr Lavery was not given adequate training for the tasks that were required of him as dispatcher (Transcript, vol. 49, pp. 44–45).

The evidence before this Inquiry establishes conclusively that Mr Lavery as a flight operations officer was not qualified to exercise operational control over flight 1362/1363, on March 10, 1989.

On that day, Mr Lavery went off shift at Air Ontario SOC at 10:30 a.m.; replacing him was Mr Wayne Copeland. When Mr Copeland arrived at work at 9:45 a.m. for his shift, which commenced at 10:00 a.m., he briefed himself on the area weather and received a "handoff briefing" from Mr Lavery. While Mr Lavery was principally responsible for the dispatch of flight 1362/1363 and the flight following of flight 1362, Mr Copeland, from 10:30 a.m. on, was principally responsible for the flight following of flight 1363. The transition from Mr Lavery to Mr Copeland occurred at the same time that the F-28 aircraft was flying into Thunder Bay as flight 1362 and being turned around in Thunder Bay as flight 1363.[v]

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[v] On March 10, 1989, flight 1362 arrived at Thunder Bay at 10:35 a.m. and departed as flight 1363 for Dryden at 11:55 a.m.

Mr Copeland's testimony regarding his training from Air Ontario echoed that of Mr Lavery. While Mr Copeland had the benefit of some aviation experience prior to joining Air Ontario, he did not in any way receive adequate training on Air Ontario dispatch procedures and, in particular, he did not receive any training on F-28 systems.

Mr Copeland completed a two-year air carrier and airport management course offered by Confederation College of Thunder Bay, Ontario. He testified that the course was very general in nature, touching upon most aspects of small air carrier and airport operations. Mr Copeland described the training that he received when he joined Air Ontario as a dispatcher in May 1988:

> Q. - did you take any courses within the organization before the commencement of your duties as a dispatcher?
> A. Any courses with Air Ontario?
> Q. Yes.
> A. No, I did not.
> Q. Were there courses available within Air Ontario?
> A. Just prior to my employment, there was, I believe, a one-week course for dispatchers, but I was hired on after its completion.
> Q. And so you did not receive a formal course training?
> A. Correct.
> Q. What sort of training did you have?
> A. My training included working side by side with another dispatcher. I can't remember the exact duration, but it was one to two weeks, just working with him, and then he would give me instruction on all parts of the operation at that time.
> ...
> Q. What then occurred? Did someone just come in and say, okay, Wayne, you're on your own?
> A. I assume the dispatcher I was working with communicated with the manager of SOC at that time and they discussed it and I was then allowed to work the desk by myself.
>
> (Transcript, vol. 45, pp. 4-5)

Mr Copeland went on to testify that he would have liked to have had more training prior to his commencing his duties as a dispatcher. He stated that he had a low level of confidence:

> Q. Well, did you feel that you had enough training after two weeks to operate as a dispatcher and tell the captain everything he needed to know about fuel needed to get to the alternate, tell him everything he needed to know about what kind of weather he might expect to encounter, tell him everything he needed to know about whether he would break out the bottom of an ILS in the clear or in the clag, tell him about whether or not he

could expect to get stopped on that runway under those conditions, that kind of thing?

...

A. At the end of two weeks, there could have been things that I could have passed on to him that I wasn't passing on to him because of my low level of confidence.

(Transcript, vol. 45, pp. 143–44)

Mr Copeland was questioned at length on the dispatcher qualifications and familiarization training described in the Air Ontario Flight Operations Manual (FOM). Mr Copeland conceded that much of what was represented in the company's approved FOM was, in fact, not achieved in his case:

Q. And nor were you familiar with company rules and regulations at the end of the two-week apprenticeship, correct?

A. I guess I was partially, but not as much as I would have liked to have been.

...

Q. And so, really, the apparent requirements of the Flight Operations Manual with respect to the training that you should require before you're turned loose apparently weren't met; isn't that right?

...

A. I would have liked to have been trained more, yes.

(Transcript, vol. 45, p. 147)

The evidence before me establishes beyond any doubt that Mr Copeland was not properly trained or qualified to exercise operational control over flight 1363 on March 10, 1989.

Air Canada's Dispatcher Training

A comparison of Air Ontario's training of Mr Lavery or Mr Copeland with Air Canada's training of Mr Sandziuk provides a striking disparity. Mr Sandziuk first accepted a position in flight dispatch with Air Canada in 1966. At that time his initial training included one week in a classroom followed by seven years working as an assistant dispatcher under the supervision of a qualified flight dispatcher. Although he stated that two to three years as an assistant dispatcher should be adequate qualification to work as a dispatcher, Mr Sandziuk indicated that promotion was a function of industry demand and that seven years had not been an unusually long apprenticeship prior to his elevation to full dispatcher.

Air Canada's current training regime for its dispatchers is far superior to that which Air Ontario provided. Upon hiring, an Air Canada

dispatcher spends four to six weeks in classroom training during which time most of the functions in dispatch are introduced. In addition, Air Canada dispatcher trainees are required to take an eight- or ten-part home study course in meteorology. Thereafter, the new dispatcher works with an experienced dispatcher for approximately one year, and must pass an examination (Air Canada requires a passing grade of 80 per cent) before being given authority to sign off flight releases. Even then, the company imposes certain limitations on the dispatcher, such as a requirement for an additional qualification on transatlantic flights.

When asked in cross-examination to characterize the Air Ontario dispatch system, based on Mr Lavery's evidence, Mr Sandziuk was unequivocal in his condemnation of it. He described it as "unbelievable" and was emphatic that it was impossible for anyone to become a qualified dispatcher after one or two weeks' training.

> Q. ... Now, just having looked at those bits of his evidence, give me your characterization of a dispatch system which would allow this calibre of dispatch to support the pilots of passenger-carrying turbo-jet aircraft.
>
> A. Well, firstly, I must say that it's unbelievable that we could expect that type of a system to fit into the criteria that the Air Navigation Order sets out. I don't think under any view whatsoever could you consider that a flight watch system. Perhaps the system is acceptable, but I think the system fell apart in the training procedures.
>
> I do not think it is – in fact, I know it is impossible for any one person in a one- or two-week course to have been trained in the extensive knowledge required of all the subjects involved, and then be able to operate a functional airline as he has described his tasks.
>
> I'm not surprised he wasn't - that he felt incapable of doing them. I'm sure that people with much more training than he received would not be capable to cope with it. And I certainly wouldn't be surprised of the fact that it didn't cross his mind about the de-icing problem.[iv]
>
> (Transcript, vol. 155, pp. 129–30)

Mr Sandziuk expressed the belief that a competent dispatcher would have adverted to the possibility of the need to de-ice the aircraft at Dryden without a serviceable APU and would have in all probability opted to overfly Dryden:

[iv] See pp. 719-20 infra.

> Q. Would an experienced ... dispatcher, a competent dispatcher have adverted to this problem, the possibility of the need to de-ice without an APU?
> A. I believe he would have. I would suggest in our office, this type of thing occurs every day and decisions are automatically made.
> Q. All right. And the decision would be to overfly?
> A. In all probability, yes.
>
> (Transcript, vol. 155, p. 130)

It was Mr Sandziuk's opinion that the Air Ontario dispatch system, employing as it did dispatchers lacking proper training, was unsafe. In his view a pilot would be better off with no dispatcher than one lacking proper training:

> Q. Is it, in your opinion, safe to have turbojet passenger-carrying aircraft dispatched by a system which allows individuals with this lack of training to dispatch aircraft?
> A. I could not accept that it is reasonable to operate an airplane under those conditions. I believe you would be better off not to have a dispatcher, because at least the pilot would do his own calculations, and he'd know where he is. But, I would contend, that you would be far better off by having a flight watch system that is functional.
>
> (Transcript, vol. 155, pp. 130–31)

It was Mr Sandziuk's evidence that an experienced Air Canada dispatcher would in all probability have caused flight 1363 to overfly Dryden on March 10, 1989.

Operational Flight Plan: Flight Release

An operational flight plan is the fundamental document used by an air carrier to fulfil its obligation to exercise operational control over its aircraft. Pursuant to section 2 of ANO Series VII, No. 2,

> "operational flight plan" means the operator's plan for the safe conduct of a flight, based on consideration of aeroplane performance, other operating limitations and relevant expected conditions on the route and at the aerodromes concerned;

While this ANO definition provides a conceptual overview of the importance of an operational flight plan, nowhere else in the ANO does Transport Canada provide a guide to operators in devising their own systems. Moreover, because Transport Canada has not prescribed a form for carriers to follow, operational flight plans in use by carriers may be disparate in both form and substance. This disparity was vividly

highlighted by evidence before this Commission that contrasted the operational flight plans in use by Air Ontario and Air Canada.

Typically, an operational flight plan contains significant operational information, including planned alternates, aircraft weights, fuel consumption, passenger loads, and other operational information necessary for the crew to plan and conduct its flights in a safe and orderly manner. It is the practice of Air Canada to issue a flight release, the company document that authorizes dispatch of the flight, only after an operational flight plan has been signed off by both the flight crew and the dispatcher.

In contrast, Air Ontario used just a flight release to serve the dual role of operational flight plan and flight release. Hence, there was much discussion during the hearings of this Commission as to whether Air Ontario's F-28 flight release in fact satisfied the ANO Series VII, No. 2, requirement for an operational flight plan. Legal or otherwise, the flight release format (Exhibit 345) utilized by Air Ontario for its F-28 operation was roundly criticized in testimony before this Commission by experienced dispatchers, pilots, and air carrier inspectors.[11] Both Mr Randy Pitcher, Transport Canada Ontario Region's lead inspector on the F-28 and himself a former dispatcher, and Mr Sandziuk were pointed in their criticism of the Air Ontario F-28 flight release format. They both identified the lack of detail to assist the pilots in ascertaining the basis of the dispatcher's calculations as a fundamental and glaring flaw in Air Ontario's flight release.

In the following excerpt from his testimony, Mr Pitcher described as "minimal" the information provided to Air Ontario's flight crews in the flight release and used the words "scraping the bottom of the barrel minimal" in saying that the flight release barely fit within the ANO Series VII, No. 2, definition of operational flight plan:

> Q. And can you explain generally to the Commissioner, first of all, what sort of information this flight release provides you with as a captain of an airplane?
>
> A. This particular flight release provides very little. In fact, I believe it provides minimal knowledge to the captain.
>
> He needs to know, for example, in situation here, he is given a time but he is not given any idea of how the time was calculated. There's no true air speed ... there's no mach number, there's no ground speed, there's no wind component, there are no fuel flows.

---

[11] Air Ontario's Flight Operations Manual provides a Convair 580 operational flight plan that includes far more information for the flight crew than could be found on the F-28 flight release. This operational flight plan is set out in chapter 19 of this Report, Flight Operations Manuals.

> I see that the fuel on board in the first column, 326, of this Exhibit 345 says "fuel on board of 16,000 pounds," I imagine that is.
>
> But ... this meets, I think, the minimum standard that the ANO speaks of ... when it defines operational flight plan. And when I say "minimal," I mean scraping the bottom of the barrel minimal.
>
> As a pilot, I would want to know a breakdown, at the very least, of my fuel. What's my burn-off, for example?
>
> But in all fairness, this form, with the type of operation that Air Ontario has and had at the time of the accident, is a pilot self-dispatch system. The pilot-in-command is absolutely responsible for ensuring that he is knowledgeable in terms of the stuff presented here.
>
> I just think that this form could be far more forthcoming in terms of making the pilot's job easier, because what he has to do in order to confirm this figure, he has to go back and work the whole thing up, whereas if they had ... broken it down in terms of burn-off, contingency factors, alternate and reserve fuels, he would have a much easier job of getting the whole picture.
>
> (Transcript, vol. 127, pp. 116–18)

Mr Sandziuk was equally critical of Air Ontario's F-28 flight release. When shown Exhibit 345 and asked to comment whether, based on his experience, it met with the definition of "operational flight plan" in ANO Series VII, No. 2, Mr Sandziuk responded:

> A. Well, I would have to say that the information presented is absolutely minimal. There are no guidelines as to what considerations were given to the calculations, how they arrived at them, what factors were considered with reference to any portion of it. Basically, all we have here is ... the minimal fuel, the alternate, via alternate. We have come up with a weight and fuel and the number of passengers.
>
> But short of that, I would suggest to you that a clearance like that is tantamount to giving a pilot a dart board and saying, you know, try and find how I got there. I say that without derision, and I'm serious that, if you look at the AFPAC [Automatic Flight Planning, Air Canada] that's presented by Air Canada, each of these items is very clearly explained so that the pilot knows how I arrived at that point.
>
> (Transcript, vol. 155, p. 68)

To the extent that Air Ontario operated a hybrid system of dispatch, such that the flight release prepared by dispatch was subject to approval by the captain, it would have been especially important to have a form that permitted an easy review of the dispatcher's calculations. However,

as Mr Sandziuk added, easy review of the Air Ontario flight was not possible; further, he did not believe that the flight release satisfied the ANO Series VII, No. 2, requirements for an operational flight plan:

> A. ... how in the world could the pilot ever arrive at these statistics to match the figures they've got here [in the flight release]? I believe it's terribly incomplete. There's certainly not sufficient evidence to justly expect a pilot to come up with the same answers and be able to explain how the dispatcher did it.
> Q. And, do you believe in this format [the F-28 flight release] ... meets with the requirement of the ANO, that it should provide a plan for the safe conduct of a flight?
> A. I don't believe it does because it doesn't enable the ... pilot to consider all the factors. If they are, it's guesswork.
>
> (Transcript, vol. 155, p. 69)

Another deficiency in the operational flight plan used by Air Ontario dispatchers in the operational control of F-28 aircraft concerned the calculation of minimum fuel. The Air Regulations, sections 551 and 552, require that no IFR flight[12] can be commenced unless the aircraft carries sufficient fuel to get to its destination and thence to an alternate airport, still with a specified reserve of fuel remaining. By regulation, the amount of fuel must take into account wind and other anticipated meteorological conditions as well as any anticipated air traffic delays. The evidence revealed that Air Ontario dispatchers did not include in their minimum fuel calculations any additional fuel for abnormal meteorological conditions or anticipated traffic delays. Instead, the need for such additional fuel was factored into the fuel on board (FOB) figure on the F-28 flight release.[13]

Mr Martin Kothbauer, formerly an Air Ontario dispatcher and duty operations manager, and himself a commercial pilot, testified that the minimum fuel figure on the Air Ontario F-28 flight release was occasionally less than the minimum fuel required by law. This information came out in the context of Mr Kothbauer being questioned on fuel calculation practices at Air Ontario.

He testified that the standard operating procedure at Air Ontario was to add contingency fuel to the fuel on board for the purpose, for example, of deviating around thunderstorms. This resulted in the minimum fuel not reflecting the fuel that might be required for deviation around weather shown on weather reports, or fuel that might be required for an air traffic control (ATC) hold. Mr Kothbauer stated that

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[12] Most if not all scheduled Canadian commercial flights under normal operating circumstances are conducted pursuant to instrument flight rules (IFR).

[13] FOB refers to the total amount of fuel on board an aircraft.

this standard operating procedure at Air Ontario was different from what was legally required and what he had known as a commercial pilot. He testified that he was surprised to discover this situation at Air Ontario:

> Q. Do you know why the standard operating procedure at Air Ontario concerning minimum fuel as reflected in the flight release did not follow the notion of minimum fuel as the law requires and that would be in the minds of commercial pilots?
> A. No, sir, I don't know.
> Q. That was never explained to you?
> A. Not that I can remember, no.
> ...
> Q. I take it it was a surprise to you when you first discovered that?
> A. Yeah, it was.
>
> (Transcript, vol. 49, pp. 99–100)

I find Mr Kothbauer's surprise to be understandable given the training all commercial pilots receive concerning legal minimum fuel requirements.

Air Ontario pilots were questioned on their understanding of the minimum fuel figures on the F-28 flight release. Monty Allan, who was a first officer on the F-28, testified as follows:

> Q. ... Now, is it your understanding that ... minimum fuel that is required by law is also the min fuel in the flight release?
> A. No, it's beyond that, I believe. The company, albeit they use the Transport's minimum requirements, I believe that the way it's been resolved is the company min has added a little bit more. I think we have provided ourselves – it's outlined in the company route manual specifically, but I believe we have allowed ourselves an approach at destination and an approach at alternate which I don't think Transport requires, but it's contained in the route manual.
>
> (Transcript, vol. 91, p. 225)

Captain Robert Nyman, Air Ontario director of flight operations, who had "ultimate responsibility" for operational control according to the Air Ontario FOM and who was an F-28 check pilot, was questioned on the evidence of Mr Lavery with regard to his minimum fuel calculations. He conceded that there were some fundamental problems with the training of F-28 dispatchers at Air Ontario:

> Q. And further, we see from page 210 and 211 of the transcript that when Lavery was calculating the min fuel, he would not account for known deviations due to weather or known holds due to ATC. He wouldn't include that in min fuel, but he would add

that to granny fuel and it would be added – it would be part of fuel on board but would not be reflected in min fuel. Do you follow me?

A. Absolutely.

Q. ... Now, first of all, shouldn't the dispatchers have been trained on – to a certain extent, at least, on the performance of the F-28?

A. Yes, a certain amount, yes.

Q. ... So they should know what altitudes the plane is likely to use, what the fuel burn is likely to be, how much fuel it's going to burn in climb and so on and so forth?

A. Absolutely.

Q. ... Definitely, the dispatcher should know how to calculate maximum payload available, correct?

A. Yes.

Q. And as a pilot, you would expect the dispatcher to include in minimum fuel any fuel required to get around known meteorological problems or to accommodate expected ATC delays?

A. That would have to be part of minimum fuel, yes.

Q. Sure, all right. So then, having reviewed that evidence in a cursory way, is it now evident to you that there were some problems, some fundamental problems with the training of dispatchers for the F-28 at Air Ontario?

A. If they didn't understand that, and it appears that this particular one did not, then I would have to say yes.

(Transcript, vol. 109, pp. 191–93)

The basic cause of this rather intolerable situation at Air Ontario was the fact that dispatchers who prepared the F-28 flight releases, and the pilots who relied upon the flight releases had different understandings of the meaning of the critical minimum fuel (MIN) figure. The difficulty caused by the lack of a common understanding of the meaning of MIN could be manifest in a situation like that encountered by flight 1362/1363 in Thunder Bay on March 10, 1989. A pilot like Captain Morwood, faced with a last-minute increase in passenger load, would look to a difference between FOB and MIN to see whether the increased passenger load could be accommodated by decreasing fuel load. If the MIN figure was relied upon by a pilot to ensure minimum legal fuel, it is conceivable that fuel could be off-loaded to the MIN level and below the legal requirement. For this reason, the minimum fuel indicated on a flight release should never be less than the minimum fuel required by regulations. It must be noted, however, that there is no evidence that the minimum fuel figure caused such a problem on March 10, 1989.

A further deficiency in the operational flight plan used by Air Ontario dispatchers in their operational control of the F-28 aircraft concerned the absence of a minimum reserve fuel figure. Minimum diversion fuel at a given location, usually the destination airport, is the minimum amount

of fuel required to fly from that location to the alternate destination, arriving with the fuel reserves required by law. Mr Randy Pitcher, when asked about minimum diversion fuel and whether that figure should be included in an operational flight plan, testified as follows:

> Q. On March 10, the day the plane crashed, the pilots were stretched to the limit for fuel because of general bad weather and full loads.
> A. They were stretched likely because the nearest alternate required them to carry this fuel.
> Q. That's right. So the alternate that they were carrying for Winnipeg was Sault Ste Marie?
> A. Yes.
> Q. ... Now, in cases in like that, you should have a good idea what your minimum diversion fuel is in case you have to hold in Winnipeg, don't you think?
> A. I'm sure they did.
> Q. ... A pilot should know that?
> A. Yes.
> Q. All right. Well, if a pilot should know that for safe flight, shouldn't it be part of the operational flight plan?
> A. It would be a good idea to be on the operational flight plan.
> Q. ... I'm not asking you whether it's a good idea or not. I'm asking you whether if the minimum diversion fuel in a situation like that is a number that's required for safe flight.
> A. In a situation as you described, yes.
>
> (Transcript, vol. 128, pp. 148–49)

It should be noted that the flight release form used by Air Ontario dispatchers in their operational control of F-28 aircraft (Exhibit 345) did not provide flight crews with an estimate of minimum diversion fuel. I agree with Mr Pitcher that this information should have been provided to pilots.

It was the opinion of Mr Pitcher, and one with which I emphatically concur, that ANO Series VII, No. 2, should be amended to define explicitly the minimum acceptable requirements for an operational flight plan. Mr Pitcher stated:

> A. Under the ANO definition of operational flight plan, because it is so vague, it does permit the type of document that Air Ontario was utilizing as their dispatch form to be accepted by Transport.
>
> Maybe a schedule of some sort to set out exactly what should constitute an operational flight plan with at least the basic knowledge or information that a pilot requires would, I believe,

> be very advantageous and would certainly prevent situations such as we have seen with the operation of the F-28.
>
> (Transcript, vol. 128, pp. 4–5)

As earlier alluded to by Mr Sandziuk, and in obvious contrast to the inadequate operational flight planning employed for Air Ontario's F-28, Air Canada's AFPAC provides extensive and useful information.[14] Not only are calculations clearly explained, but the system permits the flight crew to run checks that allow them to monitor their progress on an ongoing basis. Mr Sandziuk's preference for the AFPAC system is readily apparent from his evidence:

> A. It's very comprehensive. All the information is there: What I based the planning on, what the pilot's based the planning on is there. And not only that, but he has the opportunity to check it to make sure it is going ... according to plan. And for that reason, I think it's a very comprehensive and efficient way to do it.
>
> To go to the Air Ontario plan, it has, I guess, the minimum requirements ... of fuel burn, minimum and takeoff weights, but I would not say that it's a very ... efficient flight plan. I really would not be very happy with it. I think it's incomplete because I don't think it meets the requirements as indicated here in the ANO.
>
> (Transcript, vol. 155, pp. 71–72)

Ability of Air Canada To Provide Flight Dispatch Expertise to Air Ontario

As discussed elsewhere in this Report, Air Canada, despite its extensive experience and expertise in commercial jet transport operations, did not provide any significant operational consultation for its subsidiary, Air Ontario, during the implementation of its F-28 program. This was particularly true in the case of operational control. During Mr Sandziuk's testimony, he left little doubt as to Air Canada's ability to provide such expertise in setting up a proper flight dispatch system. Moreover, he clearly thought that such consultation was needed.

The Flight Release Requirement

Each Air Ontario revenue flight must, in accordance with Air Regulations and the company's flight operations manual, be specifically

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[14] AFPAC (automatic flight plan Air Canada) refers to Air Canada's computer-generated flight plan.

authorized before departure. Normally Air Ontario SOC, London, does this by issuing a flight release. The flight release is sent by telex to the point of departure, where it is picked up by the captain of the planned flight, and to all en route stations.

In light of the fact that Air Ontario ostensibly operated a pilot self-dispatch operation, the question was raised in the Commission hearings as to whether a pilot-in-command could initiate a flight on his own accord, without a flight release. Mr Danilo (Dean) Koncan, Air Ontario's duty manager of operations, indicated in his evidence that the pilot-in-command of an Air Ontario revenue flight would not take off without either a printed or verbal flight release (for example, in the event of a computer failure) from SOC. In fact, it is clear from Mr Koncan's testimony that Air Ontario pilots relied on SOC to dispatch them even in the absence of a printed or verbal flight release:

> A. ... under the pilot self-dispatch system, if I were to lose the computers because of power failure or what not, we can still verbally, through the flight watch system, issue him an aircraft, advise him of which crew he is working with, advise him the last reported alternates that we were carrying for him to double check through flight service if his computers are down as well, and what basic information we have; i.e., what flight numbers he is doing at which times which he will have a copy of.
> ...
> Q. ... If Captain Morwood or any other captain on a revenue flight did in fact not even receive a flight release of any kind, either verbal or printed, would he phone SOC?
> A. Yes, he would.
> Q. I take it from your evidence that he can't go unless he either gets a verbal or printed flight release approval, is that correct?
> A. That is my understanding, yes.
>
> (Transcript, vol. 47, pp. 94–95)

The procedure described by Mr Koncan reinforces the fact that, notwithstanding its description as a self-dispatch system, Air Ontario's dispatchers were exercising a degree of operational control over revenue flights.

Reliance of Air Ontario Pilots on Flight Releases

The evidence shows that because company dispatchers were exercising a degree of operational control in what has been termed a hybrid between the pilot self-dispatch and the full co-authority systems, there was a degree of uncertainty in Air Ontario's operational control of its aircraft.

Even though Air Ontario dispatchers would make all necessa calculations in the course of preparing flight releases, the degree t which Air Ontario flight crews relied on these calculations was not clear It was the evidence of Air Ontario pilots and dispatchers that F-28 flight releases often contained errors in calculations. However, in that pilots were responsible for checking the accuracy of the flight release, both pilots and dispatchers tended to downplay the significance of such errors. Air Ontario pilots would routinely contact dispatchers in SOC to rectify any errors in flight releases.

A senior Air Ontario captain, William Wilcox, testified that in his view the flight releases were less reliable when the weather was bad. He added that he believed this view was shared by the Air Ontario pilot group. Another Air Ontario captain, Erik Hansen, testified that, although he did not always find Air Ontario flight releases to be accurate, this never caused him any problems.

Captain Christian Maybury, when asked whether he ever had occasion to question the accuracy of flight releases he received from Air Ontario SOC, gave the following evidence:

> A. ... after a while, you get to know that they are human too and they make mistakes.
>
> You just learn to skim the - you know, have a look at your flight release, and after a while, you get used to seeing a certain set of numbers that match. And sometimes ... that one isn't right. And usually call them up and they will change it and reissue the release, a correct one.
>
> Q. Would it be fair to assume, sir, that you then wouldn't accept blindly a release that you received from SOC?
>
> A. I always look at mine.
>
> Q. Look at them for what purpose?
>
> A. Well, make sure the numbers jibe as far as operational weights. Also check them especially weather-wise, looking at alternate airports and whether the alternate airports that they have given in the release jibe with the weather forecasts.
>
> (Transcript, vol. 92, pp. 63-64)

The fact that Air Ontario pilots, as a rule, knew they could not rely on calculations in flight releases issued to them and routinely redid the calculations themselves was corroborated in the evidence of Mr Kothbauer and Air Ontario dispatcher Warren Brown. Mr Kothbauer testified as follows:

> Q. Did you ever receive any comments back from flight crews as to whether or not they considered the system of the issuance of the flight releases as adequate?
>
> A. Yes, sir, I did.

Q. And could you enlighten us on that.
A. They were not considered accurate.

(Transcript, vol. 49, p. 50)

Mr Brown, when questioned at to what reliance the Air Ontario pilots put on the flight release, stated:

A. ... they look at it and they – I'm sure they take some of it for - ... I would hope they take it all as valid information.
Q. And they would use it for planning their day, would they?
A. Yes, they would.

(Transcript, vol. 48, p. 88)

He stated that it would be the pilot's responsibility, if they were going to rely on the details in the release, to ensure that they were accurate, and that he knew this when he prepared the release:

Q. You know that the pilots are not going to rely on this release as the last word?
A. That's correct.

(Transcript, vol. 48, p. 88)

When asked for his perception as to what Captain Morwood's attitude towards SOC and flight releases had been, Captain Hansen was resolute in stating that Captain Morwood would not have hesitated to assert his authority in dealings with SOC:

Q. And you heard George Morwood a few times have a few tiffs with SOC?
A. Absolutely.
Q. And what kind of a posture would he be adopting when he had these?
A. There would be no doubt in the other individual's mind what George wanted, and he wasn't going to go along with whatever plan of attack they might have picked for the day, and he would tell them.
Q. It was George's plan or no plan?
A. That's right.

(Transcript, vol. 94, p. 137)

The Flight Release for Flight 1362/1363, March 10, 1989

Because of the deficiencies in the Air Ontario operational control system, the F-28 aircraft C-FONF was dispatched with a non-functioning auxiliary power unit (APU) into Dryden airport, an airport that had no

F-28 ground-start equipment, with forecasted freezing rain conditions. The flight release that was prepared for Captain Morwood on March 10, 1989, contained serious errors.

The flight release for flight 1362/1363 on March 10, 1989, is reproduced below (figure 23-1). A discussion of some of its specific errors, as well as its likely impact on the events of March 10, 1989, follows.

Figure 23-1 Flight Release: Flight 1362/63, March 10, 1989

OU YWGOOAC YHDTRGX YQTOOAC YQTTRAC YXUOWGX
.YXUOWGX 03101257

< T608F > FLIGHT RELEASE

CAPT: MORWOOD ACFT: 281/ONF DATE/TIME:10/0753L
F/O: MILLS PURSER: SAY F/A: HARTWICK

FLT	DEP	ARR	VIA	ALT	MIN	FOB	WT.	LOAD	PAX	STD	REMARKS
362	YWG	YHD	YQT	YAM	126	160	610	121	11	0725L	
362	YHD	YQT	==>	YAM	92	116	614	155	30	0830L	
363	YQT	YHD	YQT	YAM	130	158	617	121	55	1055L	
363	YHD	YWG	YQT	YAM	146	150	606	103	52	1100L	
364	YWG	YQT	==>	YAM BALANCE OF RELEASE TO FOLLOW							
365	YQT	YWG	==>	YHD	89	120	638	—	65	1515L	

CARGO ALLOTMENT 1000 LBS UNLESS OTHERWISE NOTED
S.O.C.: — CAPTAIN:

;101257 0222

Source: From Exhibit 345

The flight release (Exhibit 345) must be read together with the daily system operations control log (Exhibit 348). The SOC log is prepared by SOC personnel in anticipation of the flights scheduled for a particular day. The flight release is generated by SOC personnel on the basis of the SOC log and the latest available weather and passenger load information.

Both Messrs Kothbauer and Koncan, who were duty operations officers at SOC, testified that the figures generated by Mr Lavery on the flight release for flight 1362/1363 on March 10, 1989, did not match with

the figures on the computer-generated daily SOC log. In fact, after reviewing Mr Lavery's figures, both Mr Koncan and Mr Kothbauer identified numerous errors in the actual calculations and testified that the flight release made no sense. When asked to explain why the figures did not make sense to him, Mr Kothbauer responded that, while the numbers on the flight release should mirror what is on the SOC log, it was "clearly evident" to him that they did not (Transcript, vol. 49, p. 49).

On the morning of March 10, when he was to prepare the flight release for Captain Morwood's flight segments that day, the dispatcher, Mr Lavery, was faced with making several changes to the standard entries on the SOC log. The standard routing for the first segment of flight 1362 (Winnipeg to Dryden) had Thunder Bay as an alternate, a minimum dispatch fuel of 10,000 pounds, required fuel on board of 15,000 pounds, and a maximum takeoff weight of 62,000 pounds, yielding a maximum payload of 12,100 pounds. Because of the weather, Mr Lavery had to change the alternate to Sault Ste Marie, thereby requiring a change in minimum dispatch fuel (MIN), to his mind, of 12,600 pounds and a maximum takeoff weight (WT.) of 62,400 pounds; figures that he pencilled in on the SOC log. On the flight release, however, the takeoff weight for this segment was recorded as 61,000 pounds.

When Mr Koncan was asked to examine these two documents the first discrepancy he noted was that, contrary to standard company policy, the flight release had not been signed. Second, the takeoff weight on the first segment of flight 1362 on the flight release was 61,000 pounds. On the SOC log, however, Mr Lavery had crossed out the computer-generated 62,000 pounds and pencilled in 62,400 pounds. Mr Lavery was not able to provide an explanation for this inconsistency.

Mr Koncan was also unable to explain the maximum takeoff weight of 62,400 pounds. In fact, Mr Koncan explained that because the structural landing weight of aircraft C-FONF was 59,000 pounds, the maximum takeoff weight of 62,400 pounds would have required an unusually high fuel burn of 3400 pounds between Winnipeg and Dryden to meet the 59,000-pound landing limit.

Another problem detected in the flight release was the entry of 12,100 pounds under the payload column (LOAD). The payload is calculated by subtracting the basic empty operating weight of the aircraft – in the case of C-FONF 37,723 pounds – from the takeoff weight of 61,000 pounds, which yields 23,277 pounds.[15] The difference between the

[15] The takeoff weight must also take into consideration that, after the appropriate fuel burn to the destination, the maximum landing weight of 59,000 pounds will not be exceeded.

23,277 pounds and the fuel on board (FOB) is the allowable payload. Mr Koncan explained that the payload figure represents a recommended maximum figure not to be exceeded when calculating the combined weight of the passengers, cargo, baggage, and everything that is to be carried on the aircraft other than fuel. Obviously, the ability to refer to the appropriate weight calculation formula and to generate the correct allowable payload is fundamental to competent operational control.

The minimum dispatch fuel on the first leg of flight 1362, recorded on the first line of the flight release, was 12,600 pounds.[10] The fuel on board, or the actual amount of fuel carried, that Mr Lavery noted for the first leg of flight 1362 on March 10 was 16,000 pounds. However, according to Mr Koncan's calculations, subtracting the 16,000 pounds fuel on board from the 23,277 pounds (the difference between the empty weight of the aircraft and the maximum takeoff weight), results in a figure of 7277 pounds, instead of the payload figure of 12,100 pounds as on the flight release. Although, during his testimony, Mr Koncan carefully reviewed Mr Lavery's calculations, he was unable to explain the incongruities, which prompted him to comment: "How he came up with 12,100 is beyond me" (Transcript, vol. 47, p. 77).

Mr Koncan identified yet another error in the flight release, this time pertaining to the second leg of flight 1362, from Dryden to Thunder Bay (second row). Again, there was a discrepancy between the maximum takeoff weight of 62,400 pounds from the SOC log and the 61,400 pounds entered on the flight release. Mr Koncan could not rationalize Mr Lavery's entry of 15,500 pounds as a maximum payload available for the leg, prompting him to comment: "The basic fundamentals of adding and subtracting were totally in error in coming up with this figure" (Transcript, vol. 47, p. 80).

Errors were also identified in the flight release on the Thunder Bay to Dryden leg of flight 1363. As per the flight release, Captain Morwood ordered an uplift of 15,800 pounds of fuel upon arrival at Thunder Bay and awaited what he thought would be 55 passengers to be boarded. With the 61,700 pound takeoff weight and 15,800 pounds of fuel, using the same calculations as above, the available payload would have been 8177 pounds. With 55 passengers and 1000 pounds of cargo the payload would be 12,000 pounds; some 2800 pounds beyond that permitted to make allowable takeoff weight of 61,700 pounds.

Further evidence disclosed that Mr Lavery's errors in calculating maximum payload were attributable to his consistent application of an

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[10] In the Air Ontario system, in accordance with the requirements of ANO Series VII, No. 2, minimum dispatch fuel consists of fuel required for start and taxi, takeoff, climb to altitude, an IFR approach at destination and a missed approach, a diversion to the alternate, plus, on the F 28, a 30-minute reserve.

erroneous formula. Mr Lavery substituted "minimum allowable fuel" for "fuel on board" in applying this formula. Hence, the allowable payload weight, by his calculations, was always too high because it erroneously included the weight of any fuel carried in excess of the minimum allowable fuel.

The question remains, why did the crew of flight 1362/1363 order the uplift of 15,800 pounds of fuel called for by the flight release when, as stated by many witnesses, Captain Morwood would have noticed such an obvious error?

During his testimony, Mr Lavery admitted his confusion in compiling the flight release, particularly with regard to the maximum payload figures:

> Q. ... Now, it appears, then, that in the very early morning hours of the 10th of March, 1989, there was some confusion in your mind about what the correct formula was for coming up with the maximum payload; is that right?
> A. It appears that way.
> Q. And that confusion apparently accounts for the erroneous maximum payload figures; is that right?
> A. Yes.
> Q. And all of those erroneous maximum payload figures find their way onto the flight release which you issued a little later that morning; is that right?
> A. I believe so.
> Q. Yes, 12.1, 15.5, 12.1 and 10.3? [payload figures from flight release]
> A. Okay.
> Q. Now, are you able to explain why some of the other figures on the SOC log did not get transposed verbatim or why they're not reflected in the SOC log? How did those disparities happen?
> A. I don't know.
>
> (Transcript, vol. 48, p. 184)

Deteriorating Dryden Weather and Air Ontario SOC

In my view, there were two critical weather forecasts which should have been accommodated by Air Ontario SOC in the operational control of flight 1363. These were the amended Dryden terminal weather forecast issued at 1502Z (10:02 a.m. EST) and valid at 1523Z (10:23 a.m. EST) and the terminal weather forecast for Dryden issued at 1630Z (11:30 a.m. EST) and valid at 1703Z (12:03 p.m. EST). Both forecasts called for light freezing rain at Dryden, and both were available to the Air Ontario SOC personnel and the crew of flight 1363 via Reservac computer terminals located in London SOC and the Thunder Bay airport crew room, respectively.

Aircraft C-FONF arrived at Thunder Bay at 10:35 a.m. EST and departed for Dryden at 11:55 a.m. EST. As stated earlier, on March 10, 1989, Mr Lavery went off shift at Air Ontario SOC at 10:30 a.m., and was replaced by Mr Wayne Copeland. When Mr Copeland arrived at work at 9:45 a.m. for his shift, which commenced at 10:00 a.m., he briefed himself on the area weather and received a "handoff briefing" from Mr Lavery (Transcript, vol. 45, p. 75).

It was the responsibility of Mr Lavery and Mr Copeland, as dispatchers, to monitor the weather that would be encountered by the flights they were following. In particular, with respect to the weather that would likely be encountered by flight 1362/1363, Mr Lavery should have been aware of the 1502Z (10:02 a.m. EST) amended terminal forecast for Dryden, and Mr Copeland should have been aware of both the 1502Z (10:02 a.m. EST) and the 1630Z (11:30 a.m. EST) forecasts.

Mr Lavery testified that, in the normal course of his duties, he should have been aware of the 1502Z amended terminal forecast calling for freezing rain at Dryden. Although he stated that he had no specific recollection of seeing that particular forecast, Mr Lavery testified that he was aware that freezing rain was a possibility for the entire area (Transcript, vol. 48, pp. 175–77). In this regard, Mr Lavery acknowledged that he had not had sufficient weather training and he conceded that, because of his lack of experience, he did not make the critical connection between the weather forecast for freezing rain at Dryden and the possibility that the aircraft might need de-icing there. Mr Lavery testified that in retrospect, if he had made such a connection, it "definitely" would have been better to overfly Dryden:

> Q. ... if you take a look at the weather for Dryden that day, which would have been available to you, if you had looked at that, you might have been clued in to the fact that the F-28 might have needed de-icing in Dryden; is that right?
> A. Yes.
> Q. And, if you had thought about that, is that something that you would have discussed with the duty dispatcher to see whether or not the F-28 should overfly Dryden?
> A. Yes.
> Q. But you did not have enough experience at that time to have your mind click on that issue; is that right?
> A. I don't think I did.
> Q. ... Today, if the same scenario came up, you would think about that possibility of de-icing, that it may be better to have the plane overfly since the plane doesn't have an APU, is that right?
> A. Definitely.
> Q. On March the 10th, did you know what the ramifications of not having an APU working were? I mean, did you know that the plane could not start without an APU?

A. Yes.
Q. ... and you knew that the plane would have to shut down in order to de-ice. At least that was your opinion, is that right?
A. Yes.
Q. And do you agree that it is part of dispatch's responsibility to follow the flight by looking at the new and updated weather as it comes out, and considering whether or not that might impact on the flight?
A. Yes.
Q. ... And if you had done that, you would have seen other indications that there might be freezing rain in Dryden, isn't that right?
A. Yes.

(Transcript, vol. 48, pp. 211–12)

Mr Copeland testified that he would have reviewed the weather when he commenced his shift, and he would have noticed any changes in the weather which had any operational significance. Having stated this, Mr Copeland claimed that he had no specific recollection of seeing either the 1502Z or the 1630Z terminal forecasts calling for freezing rain in Dryden. Mr Copeland acknowledged that, as the dispatcher on duty on March 10, 1989, it was his responsibility to monitor the weather which could affect flight 1363. He stated that had he been aware of the terminal forecasts calling for freezing rain in Dryden, he would have appreciated the possibility of having to de-ice the aircraft in Dryden and he would have brought the scenario to the attention of the duty manager, Mr Kothbauer. Mr Copeland was questioned on this issue:

Q. ... it was your responsibility to see this forecast in a timely way, isn't that right?
A. Yes.
Q. ... assuming that you saw this forecast, you would have known that there is a possibility that if the F-28 landed in Dryden, it would need to be de-iced, right?
A. Yes.
Q. But you knew that was a big problem because it couldn't de-ice with the engines running, right?
A. True.
Q. And it couldn't shut the engines off because if it did that, it couldn't get started again and you would have a bunch of people stuck in Dryden, right?
A. True.
Q. So once again, assuming that you saw the forecast, the logical thing for you to do would have been to relay this information to the captain so he could consider whether or not to overfly Dryden, is that right?

A. If it did happen the way you describe, I would have not at that time instructed the aircraft to overfly. I would have asked the duty manager, here is the way it is, what do you want to do.
Q. All right.
A. That decision would be his.
Q. So he would have had the option, then, of getting ahold of the aircraft and suggesting to the captain that he might want to consider overflying Dryden, right?
A. That's a possibility.
Q. I take it you don't tell these captains anything, you suggest things to them?
A. True.
Q. All right. Now, did you tell your duty manager that there is a possibility the F-28 might have to de-ice in Dryden and you might want to do something about it?
A. I don't remember doing that.

(Transcript, vol. 45, pp. 182–84)

Mr Kothbauer, the duty manager supervising the SOC facility at Air Ontario on March 10, 1989, testified that the two terminal forecasts calling for freezing rain in Dryden were not brought to his attention as they should have been. Mr Kothbauer explained how the weather forecasts were significant to the operational control of flight 1362/1363:

Q. ... Did you have occasion to look at either of those two sequences when you say you looked at the weather for Dryden after the departure of 363?
A. I don't remember seeing the amended terminal forecast.
Q. You don't remember seeing it. The 1502 amended FT for Dryden is, of course, 10:02 local London time, is that correct?
A. Yes, it is.
Q. And in the ordinary course, would that FT generated at 10:02 have been available on the RESERVAC system in London during the length of the turnaround at Thunder Bay being 10:35 ramp time to 11:55 departure time local Thunder Bay?
A. It should have been available, yes.
Q. ... could I direct your attention to the end of that sequence where it says two miles in light rain, light freezing rain and fog. Do you see that?
A. Yes, I do.
Q. But you [didn't] have occasion to have looked at that document?
A. No, sir, I didn't.
Q. ... If you would have had occasion to look at that document, would this amendment including ... light freezing rain ... have influenced your decision one way or the other with regard to the continuation of Flight 363 to Dryden with an unserviceable APU?

A. Yes, sir, it would have.
Q. And what ... conclusion would you have come to?
A. Normally, if it was just an occasional as it is in that terminal forecast, I would at least confer with the captain to see what his thoughts on it were, but I would plan a no-stop or to overfly the station.

(Transcript, vol. 49, pp. 74–75)

It is clear that there was a breakdown in Air Ontario SOC regarding the two terminal forecasts. Mr Lavery would have been in a position to see the 1502Z amended forecast calling for freezing rain in Dryden, and Mr Copeland would have been able to see both the 1502Z and the 1630Z terminal forecasts calling for freezing rain in Dryden. There is evidence that, at least in Mr Copeland's case, had he seen the forecasts, he would have appreciated their operational significance to aircraft C-FONF with an unserviceable APU flying into Dryden where there was no ground-start capability. In any event, neither Mr Lavery nor Mr Copeland notified his duty manager, Mr Kothbauer, or the crew of C-FONF regarding the forecast freezing rain for Dryden. Both forecasts were issued prior to the 11:55 a.m. EST aircraft departure from Thunder Bay.

Overfly Options

The evidence of the three individuals in Air Ontario SOC responsible for the dispatch and flight following of flight 1362/1363 led me to consider the possibility of Captain Morwood's deciding to fly directly to Winnipeg and overflying Dryden. None of the three individuals involved suggested this possibility to Captain Morwood and it is not known whether Captain Morwood considered this alternative.

The fuel required to fly from Thunder Bay to Winnipeg with Sault Ste Marie as an alternate would have been 13,000 pounds with no reserve fuel, using the formula of 5000 pounds for the first hour and 4000 pounds for each additional hour of flying. This is the formula that the testimony indicates the dispatchers would have used. Since the flight departed Thunder Bay with 13,000 pounds of fuel, the option of overflying Dryden and proceeding to Winnipeg after departure from Thunder Bay was not possible since the 30-minute holding fuel as required by ANO Series VII, No. 2, would not have been on board. In order to overfly Dryden, Captain Morwood would have had to take on additional fuel at Thunder Bay to meet legal requirements.

In practical terms, if, while airborne from Thunder Bay to Dryden, Captain Morwood had decided not to land at Dryden for whatever reason, he would have had to find a suitable alternate for Winnipeg that was within the range of his fuel on board, or he would have had to

abandon Winnipeg as his destination early enough to allow the flight to fly back to Thunder Bay or to Sault Ste Marie with required fuel reserves.

The time for Captain Morwood and Air Ontario SOC to have considered these options would have been during the one hour and 20 minute station stop at Thunder Bay.

Captain Morwood and the Flight Release

Several witnesses were asked, based on their knowledge of Captain Morwood, what they believed his reaction would have been upon receipt of the flight release on March 10, 1989. Early on March 10, prior to the dispatch of flight 1362 from Winnipeg, Mr Kothbauer had left word for Captain Morwood to call SOC so that Captain Morwood could be updated about what he would encounter that day, including the fact that ground starts had been set up at all en route stations except Dryden. However, as Mr Kothbauer testified, Captain Morwood did not return this message from Winnipeg. Mr Kothbauer testified further that, given his knowledge of Captain Morwood, he found it unusual that Captain Morwood did not return his message.

The evidence indicates that Captain Morwood received the flight release in Winnipeg the morning of March 10, 1989. However, notwithstanding the evidence cited above that Air Ontario pilots, including George Morwood, did not rely on the accuracy of SOC's flight releases and routinely reviewed the calculations themselves, Captain Morwood did not telephone SOC to advise of calculation errors in the flight release.

Both Mr Koncan and Mr Kothbauer testified that they would have expected Captain Morwood to call had he not received a flight release or had he received a flight release so error-laden as the one supplied to him. On the basis of his prior experience in dispatching Captain Morwood's flights, Mr Kothbauer was questioned about his expectations of Captain Morwood in the circumstances:

> Q. ... Mr. Kothbauer, if a pilot – and let's use the example of Captain Morwood on the 10th of March last year early in the morning in Winnipeg – if he did not receive a flight release, what would you expect him to do?
> A. Standard procedure was for the crew to call London SOC.
> ...
> Q. And you had, I take it, flight-followed or dispatched his flights before?
> A. Yes, sir.
> Q. From your recollection of Captain Morwood, would it be your opinion that, upon his viewing of this Flight Release, if indeed

he received it, he would consider it in the same light that you have considered it?

A. Yes, sir.

Q. I take it he would have known that it was erroneous?

A. I believe so, yes.

Q. Now, you've stated that you would have expected Captain Morwood to call you if he did not receive a flight release.

Would you have expected Captain Morwood, from your recollection of the man, to have called you if he received a flight release that, as you put it, he would have known was erroneous?

A. Yes, sir, I would expect the call.

(Transcript, vol. 49, pp. 51–52)

Similarly, the other duty operations manager, Mr Koncan, also expressed his opinion that in the circumstances he would have expected Captain Morwood either not to accept the flight release or to call SOC to discuss the errors:

Q. ... If Captain Morwood, or any other captain, for that matter, received a flight release such as the one we have in Exhibit 345, and it was as patently incorrect as you have described in terms of its payload, what would you expect the captain to do?

A. Knowing Captain Morwood –

Q. And did you know Captain Morwood?

A. I have known Captain Morwood since the day I started with Air Ontario. I have known him quite well. And in personally releasing flight releases as acting dispatcher on previous occasions with Captain Morwood, there have been instances whereby the flight release is issued at the same time as Captain Morwood is checking in, and within the time span of the issuance of the flight release, Captain Morwood getting the copy in hand, turning to his computer and reviewing the weather, Transport Canada amends the terminal forecast, your alternate has just gone down, and he will call you and ask you for a revision to the flight release.

... Captain Morwood, if indeed he got ... this particular flight release, I can only say that (a), he would not accept it, (b), he would definitely call dispatch as to why these numbers are so far out and incorrect.

(Transcript, vol. 47, pp. 92–93)

The evidence supports the conclusion that the errors in the March 10, 1989, flight release were not detected by pilots Morwood and Mills, and that they probably relied on the erroneous flight release.

The Thunder Bay Station Stop: Passengers versus Fuel

The cancellation of a Canadian Partner flight in Thunder Bay on the morning of March 10, 1989, and the accommodation of its passengers on Air Ontario flight 1363 presented operational problems for the flight crew and SOC personnel. The circumstances surrounding the fuel-versus-passengers question were clearly described by Mr Kothbauer in the following excerpt from a handwritten memorandum he prepared on March 11, 1989, regarding his involvement with flight 1362/1363, which he read in testimony:

A. "At approximately 1100 o'clock Eastern Standard Time Air Canada in Thunder Bay notifies SOC that 363 is overloaded and will require offloading of ten passengers and their bags. Air Canada advised us that it was now a full load, 65 passengers. The projected load had been 55. Apparently Canadian Partner had cancelled their Thunder Bay-Dryden-Winnipeg sched and their passengers were protected on our flight.

"Due to the heavy workload in SOC, the last check of projected passenger loads" would have been ... "prior to the issuance of the flight release.

"Air Canada had not notified SOC of the increased passenger load and no load restriction had initially been placed on the flight by SOC.

"I told Air Canada that I would check to see if we could defuel the aircraft while they checked further into the overload condition.

"Initially SOC, [meaning myself] placed a 35 minute delay on the flight as we sorted it out. I did not want to bump 10 passengers if we could avoid it, and hot refuelling was required in Dryden anyway.

"I called Thunder Bay ESSO and set up the defuelling. Since Air Canada couldn't give me exact figures, I told them to check with the captain on how much to remove.

"At approximately 1130 Eastern Standard Time Air Canada called and advised that 2,000 pounds of fuel was being off-loaded as well as [and I can't remember exactly but I believe they said] 4 or 5 passengers. At this time, SOC forecast a departure out of Thunder Bay ... for 1145 Eastern Standard Time.

"And the flight actually departed Thunder Bay 1 hour behind schedule at 11:55 Eastern Standard Time.

"I spoke again with ESSO in Thunder Bay regarding billing procedures for the defuelling and, at this time, I again checked Dryden weather, and it was still VFR.

"This is the last thing that I did related to this flight before the accident."

(Transcript, vol. 49, pp. 88–90)

As stated earlier, after the aircraft arrived at Thunder Bay at 10:35 a.m. EST, the passengers from flight 1362 were deplaned and the aircraft was fuelled up to 15,800 pounds FOB, as specified in the flight release, by Mr Jack McInnis of ESSO Thunder Bay. The fuelling of the F-28 took approximately 15 to 20 minutes.

After the passengers of flight 1363 were boarded, approximately 15 minutes after the aircraft arrived, it was discovered that there were 65 passengers on board rather than the 55 passengers indicated on the flight release. The extra passengers had been moved to flight 1363 by Air Canada STOC in Thunder Bay after the cancellation of a Canadian Partner flight. Because of the extra 10 passengers, flight 1363 was overweight. There was some deliberation on the flight deck of C-FONF as to how to resolve the weight problem. They could off-load passengers, fuel, baggage, or any combination of these to get down to the proper weight.

Approximately 15 minutes after the aircraft arrived, Mr Morgan Brown, an Air Canada station attendant, boarded the aircraft to advise Captain Morwood of the baggage count for flight 1363. Mr Brown testified as to his discussion with the flight crew of C-FONF:

Q. ... Now, did the captain say something to you about passengers coming on and about taking off some fuel? Did he make a comment to you about that?
A. Yeah, he asked where all the passengers came from, and he said he was overweight, he would either have to defuel or take passengers and baggage off.
Q. ... And did the co-pilot say anything in relation to the defuelling of the aircraft?
A. He said it was available at Thunder Bay, they did defuel in Thunder Bay, and that's when I told him that, You make up your mind what you're doing, and when you've got – passengers or fuel, whatever you're taking off, because I had a Dash 8 to work. I left.
Q. Oh, you had another aircraft –
A. I had another aircraft to work.
Q. So you said, Make up your mind what you want to do and then I'll be back?
A. That's exactly what I said.

(Transcript, vol. 56, pp. 99–100)

Flight attendant Hartwick testified that she advised Captain Morwood that there were five non-revenue or contingent passengers on board.[17] Captain Morwood then tried to contact the Air Canada STOC to request that they take off the contingent passengers and their baggage.

Because there was no direct radio link between Air Ontario aircraft and the Air Canada STOC in Thunder Bay (or Air Ontario SOC in London), Captain Morwood relayed his message through an Air Canada radio operator, Mr Peter Shewchuk. Mr Shewchuk testified that he received the request from C-FONF approximately 15 minutes after its arrival and then tried unsuccessfully to contact Air Canada STOC. Because he received no answer from STOC, Mr Shewchuk contacted the Air Canada baggage room and spoke with an Air Canada passenger agent. Mr Shewchuk testified that he advised the passenger agent that the Air Ontario aircraft needed a passenger agent on board to deplane 10 passengers and their baggage because of an overweight problem. Mr Shewchuk testified that, approximately 15 minutes later (at approximately 11:00 a.m. EST), one of the crew of C-FONF called back advising that no passenger agent had come on board and requesting that Mr Shewchuk contact Air Canada STOC again. Mr Shewchuk then called the Air Canada customer service manager, who sent a ticket agent out to the aircraft.

Flight attendant Hartwick testified that the flight crew was trying to radio Air Canada STOC and the ESSO fuelling agent from on board the aircraft. At one point, Captain Morwood asked her to try to get the attention of some baggage handlers who were loading the aircraft. Mrs Hartwick provided the following testimony as to how these deliberations in Thunder Bay were affecting the crew:

> Q. ... In speaking to the pilots, Mrs Hartwick, did you ... get a feel of what their mood was starting to be?
> A. They were ... becoming very frustrated. They felt like we were all being ignored. No one was coming to our rescue. We sat there and we were actually delayed one hour in Thunder Bay.
> Q. As a matter of fact, did the captain to the best of your recollection make a bit of a comment that you recall?
> A. Well, he was very upset. He may have swore and said God damn it like this but ...
> Q. He felt ignored, didn't he?
> A. We all felt ignored. Passengers had connections to make in Winnipeg and we were delayed a total of an hour in Thunder Bay. So, we were worried about them as well.
>
> (Transcript, vol. 10, p. 191)

[17] Contingent passengers or "cons" are those passengers flying on a special pass. They would usually be company employees.

Apparently the ticket agent sent out to deplane passengers was stopped before reaching the aircraft and advised by one of the ground handlers that they were going to defuel rather than take passengers off.

Some time after his last conversation with the flight crew of the aircraft, Mr Shewchuk was again contacted by them. One of the flight crew explained to him that they were going to defuel rather than off-load passengers, and asked him to contact the ESSO fuelling people at Thunder Bay. Mr Shewchuk telephoned ESSO but received a busy signal. He the called Air Ontario SOC in London to apprise them of the situation, but was advised by them that they had already made the arrangements and the ESSO fuelling agent was already taking steps to off-load the necessary fuel. This was Mr Shewchuk's last involvement with the defuelling/passenger situation. Mr Shewchuk testified that during his discussions with the flight crew, they expressed concern regarding the delay and the connections that passengers had to make in Winnipeg.

At approximately 11:10 a.m., Mr Kothbauer contacted Mr Gary Linger of Thunder Bay ESSO and arranged for the defuelling. Fifteen minutes later, at about 11:35 a.m., Mr Linger and Mr McInnis of ESSO commenced the defuelling of the F-28 aircraft. Mr Linger spoke with Captain Morwood, who was standing outside C-FONF, and he instructed them that the aircraft was to be defuelled down to 13,000 pounds FOB. Mr Linger testified that Captain Morwood was very calm and professional but somewhat apologetic about the defuelling. The defuelling was completed approximately 20 minutes later. The aircraft then departed, approximately one hour late.

In my view, the additional delay and accompanying frustration experienced by the passengers and crew of flight 1363 in Thunder Bay was a result of poor communications among Air Canada STOC, Air Ontario SOC, and the crew of C-FONF. Air Canada STOC apparently determined that 10 additional passengers were to be loaded on Air Ontario flight 1363, yet it was tardy in entering this information in the Reservac computer. As a result, Air Ontario SOC was not notified of the change until approximately 11:00 a.m. EST, after the fuelling of the aircraft had been completed and the overweight situation was manifest. Had the increased passenger load been made known to Air Ontario SOC in a more timely manner, prior to the arrival of flight 1362 in Thunder Bay at 10:32 a.m. EST, they could have made arrangements for a change in the scheduled fuel uplift. With more timely and better organized communications, the passengers-versus-fuel difficulty could have been avoided altogether, and the crew of C-FONF would have been spared the frustration of having to communicate indirectly with Air Ontario SOC, Air Canada STOC, and the fuelling agent via the Air Canada radio operator and avoided the unnecessary delay at Thunder Bay.

The Performance of Air Ontario SOC: Conclusions

I am of the view that there were two significant shortcomings with respect to the operational control of flight 1362/1363: first, the preparation of the erroneous flight release; and second, the failure to accommodate for the forecast freezing rain for the Dryden area.

The question remains as to how Air Ontario's operational control of flight 1362/1363 could break down in the manner that it did. As in much of this investigation, several factors can be identified as at least contributing to the critical system failure, although a single cause is often difficult to identify.

Certainly, as he acknowledged himself, Mr Lavery erred in his preparation of the flight release. That there was such an error was not entirely unpredictable. It was stated by all of the operational control personnel who testified that the training and qualification of the Air Ontario dispatchers was inadequate. Mr Kothbauer, Mr Lavery's immediate supervisor on March 10, 1989, testified that Mr Lavery was a "weak dispatcher" who tended to have difficulty when the pressure was on, but the evidence suggested that Mr Lavery might not have been alone in this regard. For example, Captain William Wilcox testified that, when the weather was bad, the reliability of flight releases tended to diminish. This evidence suggests to me that the preparation and review of such flight releases by Air Ontario operational control could have been more hurried and less careful during poor weather operations, the exact opposite of what should have been required in such circumstances.

With regard to the accommodation of the forecasted freezing rain for Dryden, clearly Air Ontario SOC personnel should have been aware of the changing weather and made appropriate arrangements. Mr Kothbauer acknowledged this in questioning:

> Q. ... It is your evidence that had the flight watch system worked properly, had the weather been monitored with ... a properly trained and experienced dispatcher, what would have happened is the F-28 would have ended up overflying Dryden, is that right?
> A. Possibly, yes.
> Q. Possibly or probably?
> A. Probably.
> Q. ... thank you. It would have ultimately, I suppose, been up to the captain, but your advice to him would have been overfly?
> A. Correct.
>
> (Transcript, vol. 49, p. 187)

It is clear that the time for arranging an overflight of Dryden would have been during the one hour and 20 minute station stop at Thunder

Bay. One would have expected the dispatchers immediately responsible for the following of flight 1362/1363 to have detected the amended terminal forecast of 1502Z and the terminal forecast of 1630Z and passed along the information regarding freezing precipitation to the flight crew and/or the duty manager, Mr Kothbauer. From the evidence of Messrs Lavery and Copeland, it is not certain whether they saw the two critical terminal forecasts. From all of the evidence, I am certain that the information regarding freezing rain was not communicated by them to Mr Kothbauer or the crew of flight 1362/1363.

On March 10, 1989, Mr Kothbauer was the duty manager supervising the entire operational control function at Air Ontario. To the extent that Mr Lavery erred with respect to the flight release, it was Mr Kothbauer's responsibility to detect and prevent the error from taking on operational significance. At the same time, the F-28 C-FONF was not the only aircraft that Mr Kothbauer and Air Ontario SOC had to worry about – they were responsible for the operational control of all Air Ontario flights over their entire system. Mr Kothbauer was questioned at length on the failure of Air Ontario SOC on March 10, 1989. The following interchange provides, I believe, interesting insight into the problems encountered at Air Ontario SOC on that day:

Q. ... if you had not been so busy and if you hadn't been attending to other duties that were imposed on you, do you agree that there was weather information available to you as much as three hours before the crash which would have confirmed your concern from the area forecast about the need for de-icing?
A. Yes, sir, I agree.
Q. You agree with me that it is the duty of the dispatcher to follow the weather for the assistance of the pilots?
A. Yes, sir, I do.
Q. And, if you had a properly trained dispatcher who was doing his job, that is, following the weather, he would have seen that terminal forecast three hours before the crash which spoke of light freezing rain in Dryden, specifically, right?
A. Yes, sir, that terminal would have come out about the time that the dispatchers were shift changing.
...
Q. ... List all the things you think that may have combined to cause that proper system outlined in the Flight Operations Manual to break down.
A. I think the major factor that morning would have been the workload that not only the dispatchers but myself as well were under.
Q. What else?
A. I'm not sure that the dispatchers were aware that the auxiliary power unit was unserviceable. Or, at least, the dispatcher that

came on duty at about 10 o'clock, I'm not sure if he was briefed that it was.

...

Q. So what other reasons would there be for this system not working? You have mentioned workload.

A. Yeah, a lack of knowledge of what is required. The way – you would end up discarding things that you didn't have to do. You'd prioritize while you were on the shift, and if you didn't prioritize correctly, then that possibly wouldn't even be on your list of things to do.

...

Q. Now, the lack of knowledge, that goes back to poor training and lack of experience; is that right?

A. Yes, sir.

Q. You mentioned a shift change. Were there any other factors which you think might have contributed to the system not working, flight watch not working properly?

A. Going along with workload would be distractions, the telephone ringing, background noise off the radios, other people in the office. Crew Scheduling shared the same office that we did, and there was a lot of background noise during irregular ops in that office.

...

Q. You agree with me that the flight watch system broke down, it did not work the way it should have worked –

A. Correct.

(Transcript, vol. 49, pp. 173–78)

Mr Copeland, the dispatcher with the last chance, in my view, to have alerted Mr Kothbauer and/or the flight crew of the forecast freezing rain for Dryden, echoed Mr Kothbauer's evidence regarding the workload in SOC. On March 10, 1989, Mr Copeland would have been responsible for the flight following of six to ten aircraft over a large geographical area that included Winnipeg, Montreal, Toronto, and London, Ontario. Mr Copeland stated that he and everyone in SOC were quite busy that day as the weather was poor throughout the entire system:

Q. And if you're going to fulfil your duty as set out in the Flight Operations Manual, and that is, you're going to monitor every stage of each plane's progress across this broad geographical area, I take it that, at times, you were a very busy man?

A. Correct.

Q. Were you working in that scenario on March the 10th; that is, were you monitoring numerous airplanes simultaneously in a situation where you had generally bad weather and you had airplanes all over the place?

A. Are you asking me if I was busy?
Q. I guess. That's a pretty succinct way to put it ...
A. Yes, it was a busy day.
...
Q. ... All right, it was ... busy for the reasons that I mentioned: You had a number of aircraft, it was generally bad weather, and the aircraft that you were monitoring were spread over a large area; is that right?
A. That's not what I would call the reasons for being busy.
Q. Why were you busy?
A. Everyone in the room was busy. There was weather problems throughout the system. That keeps us busier. And there's a lot of other factors that can keep us busy that I can't really quote for sure, such as crew problems, rerouting aircraft, rerouting air crews, maintenance delays within the system, maintenance problems within the system.

I can't really account for why it was busy that day, but those are some possible factors.

(Transcript, vol. 49, pp. 161–62)

The explanations for the poor performance of Air Ontario SOC offered by Messrs Kothbauer and Copeland seem to boil down to the following:

- March 10, 1989, was a busy day which was getting busier as the weather deteriorated; and
- distractions, including noise and activity in the SOC centre, a shift change among dispatchers, and the activity generally associated with what could be called a bad day.

These factors all contributed to a situation where the personnel involved in the operational control of C-FONF performed in a less-than-optimal fashion.

I am not persuaded by these explanations. As was suggested by the questioning of Mr Kothbauer, when there is bad weather, aircraft unserviceabilities, or other irregular operational circumstances, SOC is especially relied upon by pilots. These sorts of demanding operational conditions are by no means unexpected. They call for prompt and professional attention by operational control personnel, and for this reason regulatory authorities require a high standard of training and qualification from operations control officers. A review of the evidence relating to these matters has convinced me that the most significant factors contributing to the breakdown in the operational control of flight 1362/1363 was poor planning and organization within SOC, a lack of

training and qualification of Air Ontario SOC personnel, and the failure of SOC personnel to appreciate the importance of their function.

Licensing and Training of Dispatchers

The Canadian Airline Dispatchers Association (CALDA) is a trade union with a membership of approximately 120 dispatchers employed by Air Canada, Canadian Airlines International, and AirBC. CALDA submitted a brief to this Commission of Inquiry (virtually the same brief as the one it prepared for the Dubin Commission of Inquiry on Aviation Safety in 1980) expressing in the strongest terms the need for proper training and licensing of flight dispatchers. The following passage from its introduction clearly indicates the impetus for CALDA's revival of its licensing application at this time:

> CALDA firmly believes that if a dispatcher dispatched system equivalent or better to the system at Air Canada or Canadian Airlines International (both of which systems are, in CALDA's submission, not perfect) this tragic accident would not have occurred. CALDA believes that if all air carriers in Canada were required to employ only federally licensed dispatchers, accidents of the nature of the accident at Dryden would be permanently prevented.
>
> (Exhibit 1232)

In 1971 the Department of Transport (DOT) announced its intention to establish licensing requirements for flight operations officers. This proposal was strongly opposed at that time by the Air Transport Association of Canada (ATAC), whose position was that "[t]here is no evidence that the standard of flight dispatch has ever had an adverse effect on safety, therefore, there is no reason to believe that licensing dispatchers will in any way contribute to a higher degree of safety" (Exhibit 1233). Although, in correspondence through to 1973, the DOT director-general, civil aeronautics, vacillated on the subject, he did finally initiate a study in 1974 which found that licensing of dispatchers appeared to be unnecessary. In 1976 the director, aeronautical licensing, supported CALDA's position on the need for detailed information and guidelines for an acceptable operational control system.

Following the Dryden crash, regulatory interest was revived, and in 1990 CALDA presented a proposed flight dispatcher training syllabus to Transport Canada and has continued to press for implementation of a standardized training system for flight dispatchers and for their licensing.

Report of the Dubin Commission of Inquiry on Aviation Safety

Based on the evidence then before him, Mr Justice Dubin stopped short of recommending the licensing of flight dispatchers in 1982. He did, however, recognize in the following recommendations the need for proper training of dispatchers and the need for dispatchers to be inspected by the regulator:

> Recommendation 240: A flight dispatcher's training manual should be prepared by the airline carriers and approved by Transport Canada.
>
> Recommendation 241: Transport Canada's inspectors should inquire into whether the airlines carriers are complying with the proposed Flight Dispatcher's Training Manual, once introduced ...

Despite Mr Justice Dubin's recommendations, there has been little change in the training requirements of flight dispatchers since his Commission of Inquiry was established in 1980. Training is still left up to the carriers. There is no approved training manual, and, as the evidence before this Commission revealed so clearly, Transport Canada has not, in any meaningful sense, monitored the training provided by the carriers or the proficiency of the individual dispatchers.

CALDA's Application for Licensing of Dispatchers

It is high time to increase the level of regulatory involvement in dispatcher training. This is not in issue. There is some controversy, however, over the two principal options. In general terms, these two options are:

1 A system along the lines recommended by Mr Justice Dubin in 1980, whereby training remains in the hands of the carriers but follows a Transport Canada–approved training manual, and Transport Canada carries out regular and effective compliance checks.

2 A system in which flight dispatchers would be licensed by Transport Canada.

The deficiencies observed in Air Ontario's dispatch operation would be alleviated, and the CALDA concerns satisfied, through implementation of an approved standard to which dispatchers must be trained, coupled

with Transport Canada enforcement of those standards. However, Mr Sandziuk pointed out that little, if anything, was implemented from the 1980 recommendations of Mr Justice Dubin and that in the intervening period the Dryden accident occurred, at the expense of 24 lives. Referring to the Dubin recommendations, Mr Sandziuk provided the following compelling testimony:

> A. ... [I]n general, perhaps his conclusions were correct. The only thing that was wrong with it is that very little, if anything, has ever been implemented. I think the concept that Justice Dubin perceived, if I understand it correctly, was to attain all the goals the flight dispatchers were looking for.
>
> Unfortunately ... there is no obligation upon the companies to meet his suggested program. Transport Canada, to my knowledge, does not do the inspections of the company to see that these things are fulfilled.
>
> And despite all the good things that are said in the report, my contention comes right back to what I initially said, and that is, that I view it, as long as Transport Canada vests the responsibility for flight operations solely within the company and the duties of the flight dispatcher in the company, rather than giving the flight dispatcher that authority, nothing really is going to change.
>
> Because, although they are very well-intentioned, they have every reason to follow the program, the ... hard cold facts are that monetary restraints cause companies to cut corners. And the first place they cut corners is a small group like flight dispatch ... [L]ook at Air Canada's example, they give us two days recurrent training; last year because we got the Airbus, we got two days on the Airbus – which we are very grateful and I think it is great – but as a result, we didn't get any recurrent training, and that is what we consider a really good airline.
>
> The question I have to ask is: What is happening in what we consider the not really good airlines? Are they getting any training? So, the concept that Justice Dubin had suggested is a very good concept, but I am saying it is unworkable, it will never be workable as long as Transport Canada vests that responsibility in the company and not in the flight dispatcher then nothing is going to change.
>
> ...
>
> A. ... And I'm saying to you that I have to believe, right or wrong, that part of the reason is that there was no inspection of the flight dispatchers by Transport Canada. I am saying to you, if one of those or I, as a dispatcher, have a licence, it is my responsibility to make sure that it's current because I know that at the end of the year if I don't meet ... their criteria, I don't

> have a job. But as long as you vest that responsibility in the company, there really are no rules that way.
>
> (Transcript, vol. 155, pp. 102–105)

ICAO and Licensing of Dispatchers

Canada is a contracting state to the 1944 Chicago Convention at which the International Civil Aviation Organization (ICAO), was created, and is a member of ICAO.

The Annexes to the Chicago Convention, also known as International Standards and Recommended Practices, set out minimum standards in areas that are recognized as necessary or desirable for the safety, regularity, and efficiency of international air navigation. Annex provisions are not binding on contracting states. Rather, when a contracting state is unable to comply with an international standard, it is required to file with ICAO a notification of difference.

ICAO has non-mandatory provisions for licensing flight operations officers (FOO); when a contracting state chooses to require licensing, it can use ICAO provisions setting out minimum prerequisites to be followed by the licensing body in issuing licences to its FOOs.

Where, however, a contracting state does not chose to license its flight operations officers, it is still required that operators establish and maintain an approved method of supervision of flight operations. In this scenario, as is the case in Canada, the responsibility for ensuring that dispatchers are properly instructed in their duties and responsibilities is vested in the operator.

In 1986, the Air Navigation Commission of ICAO rejected an internal committee's recommendation to abolish dispatcher licensing and stated in its decision that:

> Notwithstanding the recommendation of the panel to delete from Annex 1 the provisions for the flight operations officer licence, and the fact that the majority of replies support that recommendation, the Secretariat is impressed by the cogent arguments advanced for retaining the licence. It also feels that, because of the non-mandatory nature of the FOO licence, many States who agreed with the panel's proposal may, in fact, be content if a decision was made to retain the licence.
>
> (Exhibit 1236)

Canadian Position

The Canadian position on this question was to support deletion of the licensing requirements for the flight operations officer. The reasons for the Canadian position, as described by Mr Sandziuk, portray a Transport

Canada that was unresponsive to the interests of CALDA and the safety of the travelling public:

> A. ... I would like to say though at this point, that as a representative of CALDA at the time, I had approached Transport Canada hoping to convince them that they should support retention of licensing. Unfortunately the decision was already made.
>
> The Government of Canada and Transport Canada ... in particular, did not ever consult the flight dispatch groups in Canada for an opinion on retaining licences. And this is all despite the fact that I previously had a letter from the then Transport Minister Jean Luc Pepin that they would consult the addressed parties in the future, and that did not happen.
>
> (Transcript, vol. 155, p. 92)

Licensing and Labour Relations

A major issue to parties against licensing of dispatchers is the concern that licensing will be used as a labour relations tool in the hands of the dispatchers. Theoretically, if a company operates a full co-authority dispatch system of operational control, and if the law requires that dispatchers be licensed, a strike by dispatchers would possibly affect a carrier's ability to operate efficiently. I do not believe that logic supports this argument. Instead, I concur with the remarks of Mr Sandziuk on this point:

> A. Well, that has always confused me as to the contention of the licence for a flight dispatcher being used as an industrial weapon, because nothing could be more further from the truth.
>
> Today, I am not a licensed flight dispatcher and, yet, under the certification that Air Canada has, if the CALDA group at Air Canada decided to take strike action against Air Canada, we would literally close down the airline. It's unequivocal. It cannot be denied. They would close down.
>
> If we had a licence, the same thing would happen. If this were to happen - and I have to point out to you that throughout the history of CALDA there has never been an industrial strike. We have never had a strike in the flight dispatch groups in Canada that I know of. We have a very good rapport with the companies. We feel we do a very professional job and our people are very proud of the work we do.
>
> ... We don't have licences but under the certificate Air Canada, Canadian Airlines International have, if the dispatchers walked out of the office, the airline would shut down.
>
> Now, I could look at the recourse. What is the recourse? The recourse would be, if the dispatchers walked out of the office, it

> is not legal to just parachute pilots or anybody else into the function of flight dispatcher. They don't meet the criteria of their Navigation Order. Therefore, the option in my view that the airline company would have would be to go to Transport Canada, ask for a recertification as a pilot self-dispatched airline.
>
> But what is different whether I have a licence or no licence? There is zero difference. There is no difference. So, I don't understand the concept of anybody thinking that we would use it as an industrial weapon.
>
> (Transcript, vol. 155, pp. 107–108)

CALPA Position

On behalf of Canadian Air Line Pilots Association (CALPA), the following statement was offered with respect to the CALDA proposal that flight dispatchers be licensed:

> CALPA's position at present is that providing that the consequences (enforcement) of licensing are understood and that the ICAO and ANO standards are met, and that Transport Canada audits are performed, and that certain additional training topics are considered, CALPA's position is that it will not oppose licensing of dispatchers.
>
> The second portion of the statement is that CALPA would like to participate in the training programs to assist in presenting the flight deck point of view for the benefit of the dispatchers.
>
> (Transcript, vol. 155, p. 146)

United States Licensed Dispatchers and FAR Provisions

In the United States, the FAA licenses flight operations officers. Applicants must not only have two to three years of appropriate aviation experience, but they must also undergo formal training pursuant to an FAA-approved training course and pass a written "knowledge requirements" examination, as well as a practical "skill requirements" test before being licensed.[18] No such regime exists at present in Canada. The Air Ontario experience is in my view proof that such an initiative is overdue.

Moreover, Part 121 of the Federal Aviation Regulations, entitled "Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft," contains provisions on dispatch of far greater scope and detail than the corresponding provisions of Canada's Air Navigation Orders. For example,

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[18] "Knowledge Requirements," as set out in 14 CFR 65.55, include Federal Aviation Regulations, Meteorology, principles of aircraft navigation, and air traffic control procedures.

FAR 121 contains individual sections addressing the following relevant areas:

- Flight following system: requirements (14 CFR 121.127)
- Crew member and dispatcher training requirements (14 CFR 121.415). This section includes minimum instruction time allotments; requirement for "differences training" to ensure competence in dispatching different aircraft of the same type.
- Aircraft dispatchers: initial and transition ground training (14 CFR 121.422)
- Recurrent training (14 CFR 121.427)
- Aircraft dispatcher qualifications (14 CFR 121.463)
- Duty time limitations (14 CFR 121.465)
- Responsibility for operational control (14 CFR 121.533)

While the scope of this section does not warrant a more detailed scrutiny of the United States FARs, their superiority to Canadian ANOs in this regard is readily apparent. Canada's provisions are vague, ambiguous, and open to a variety of interpretation by both operators and regulator. In contrast, the FARs provide a clear and comprehensive code setting out the duties and obligations of all parties involved in the operational control of aircraft.

Findings

- There exists within the aviation industry confusion as to where system operations control begins and terminates and where operational control begins and terminates, and there is a need for Transport Canada to delineate the two concepts clearly and definitively.

- Air Ontario made undertakings to Transport Canada regarding its operational control facility and the training of its operational control personnel, undertakings which were not fulfilled.

- The Transport Canada regulations regarding operational control are imprecise and incomplete and were not adhered to by either Transport Canada or Air Ontario.

- The most significant factors contributing to the breakdown in the operational control of flight 1362/1363 were poor planning and organization within Air Ontario SOC, a lack of training and qualifica-

tion of Air Ontario SOC personnel, and the failure of SOC personnel to appreciate the importance of their function.

- Air Ontario flight dispatchers exercised a degree of operational control over aircraft flights, within the meaning of ANO Series VII, No. 2.

- Because Air Ontario flight dispatchers were exercising a degree of operational control over flights, they were operating as flight operations officers within the meaning of ANO Series VII, No. 2. (The terms flight dispatcher and flight operations officer are interchangeable.)

- Air Ontario's application to amend its operating certificate to include the F-28 aircraft, dated January 24, 1988, included a number of representations about the status of its dispatch operation that were clearly inaccurate.

- Air Ontario held itself out as having a pilot self-dispatch system, whereas its dispatchers were in fact exercising a degree of operational control over flights. This resulted in a hybrid dispatch system which introduced an element of uncertainty among flight operations personnel, in particular pilots and dispatchers, regarding their respective duties and responsibilities.

- Transport Canada approved a pilot self-dispatch system as adequate for Air Ontario.

- The hybrid dispatch system in place at Air Ontario on March 10, 1989, was not an adequate flight-watch system given the nature of the F-28 operation.

- A full co-authority dispatch system, which requires the concurrence of both the dispatcher and the captain in operational decisions, would have been a safer and more appropriate dispatch system for Air Ontario than the hybrid system that was in place on March 10, 1989.

- Transport Canada failed to monitor and inspect Air Ontario's system of operations control adequately.

- There is no Canadian regulatory requirement that flight dispatchers be licensed. Responsibility for the training and competency of flight dispatchers is left to the air carrier.

- The Air Ontario FOM that was approved by Transport Canada outlined qualification requirements for Air Ontario flight dispatchers that were less comprehensive in scope than the minimum training requirements required by law in a full dispatch system.

- Air Ontario provided inadequate training to its flight dispatchers.

- The flight dispatchers who exercised operational control over C-FONF on March 10, 1989, did not meet the qualification requirements for flight operations officers (dispatchers) as set out in ANO Series VII, No. 2.

- The operational flight plan (flight release) issued to the flight crew of C-FONF at Thunder Bay on the morning of March 10, 1989, contained serious errors and inaccuracies.

- The operational flight plan used by Air Ontario dispatchers did not contain sufficient detail to assist flight crews to understand and validate the dispatchers' calculations.

- The operational flight plan used by Air Ontario for the F-28 did not include an estimate of minimum diversion fuel.

- A procedure followed by Air Ontario F-28 dispatchers occasionally resulted in an operational flight plan which showed as minimum fuel an amount of fuel that was less than the minimum fuel required by Air Regulations.

- Inaccuracies in Air Ontario F-28 flight releases were not an unusual occurrence.

- Air Ontario F-28 pilots were accustomed to finding inaccuracies in their flight releases and customarily reviewed them to check their accuracy.

- It was the usual practice for Air Ontario captains, including Captain Morwood, to telephone SOC when they noted a problem with their flight release.

- Because Captain Morwood and First Officer Mills did not communicate to Air Ontario SOC on March 10, 1989, that they noted any problem with the flight release which was subsequently shown by the evidence to contain errors, it is probable that they relied on the erroneous information contained therein.

- Air Ontario SOC personnel should have been aware of the 1502Z and 1630Z terminal forecasts calling for freezing rain for Dryden on March 10, 1989, and should have made appropriate arrangements to have flight 1363 fly direct to Winnipeg without stopping in Dryden.

RECOMMENDATIONS

It is recommended:

MCR 87 That Transport Canada re-examine its regulatory requirements pertaining to air carrier operational control and flight watch systems, and that it consider putting into place the four-tiered scheme for such systems discussed in chapter 23, Operational Control, of my Final Report.

MCR 88 That Transport Canada proffer for enactment legislation requiring the licensing of flight dispatchers as a prerequisite to their acting as flight dispatchers and training to standards set by Transport Canada, including the passing of appropriate Transport Canada licensing examinations. I commend for Transport Canada's consideration the Federal Aviation Administration licensing regime for flight operational officers (flight dispatchers) in the United States.

MCR 89 That pending implementation of Recommendation MCR 88 above, Transport Canada direct its air carrier inspectors to be diligent in ensuring that flight dispatchers who exercise any operational control over flights meet the minimum training requirements of Air Navigation Order Series VII, No. 2.

MCR 90 That Transport Canada proffer for enactment amendments to Air Navigation Order Series VII, No. 2, that spell out minimum acceptable requirements for an operational flight plan (flight release).

MCR 91 That Transport Canada direct air carrier inspectors to be diligent during in-flight and base inspections in monitoring the accuracy of operational flight releases.

MCR 92 That Transport Canada, when approving air carrier manuals, ensure that flight dispatcher training qualifications set out in a flight dispatcher training manual are no less comprehensive than those requirements set out in the Air Navigation Orders in all cases where such dispatchers may exercise any operational control over flights.

MCR 93 That Transport Canada initiate a continuing program for the monitoring, inspection, and audit of air carrier flight dispatchers and flight dispatch and flight watch systems, with provision for spot checks and no-notice audits.

MCR 94 That Transport Canada introduce appropriate amendments to the Air Navigation Order Series VII, No. 2, Part III, so as to describe clearly and definitively where system operations control begins and terminates and where operational control begins and terminates.

MCR 95 That Transport Canada require that air carriers provide a system, automated or otherwise, for alerting dispatchers to significant changes in the weather, actual or forecast, at stations significant to flights for which a flight watch is provided.

MCR 96 That Transport Canada require that flight-planning data and procedures used by air carriers for pre-flight planning be accurate and sufficient to provide fuel reserves as stated in Air Navigation Order Series VII, No. 2, and to ensure that aircraft will be operated within the certificated weight restrictions.

MCR 97 That Transport Canada ensure that any flight watch system required under Air Navigation Order Series VII, No. 2, and approved by Transport Canada, provide for direct pilot-to-dispatch communications from the flight deck, where the necessary communications links exist.

MCR 98 That, if a pilot self-dispatch system is to be approved, both Transport Canada and the air carrier ensure that the duties and responsibilities of pilots and dispatchers are clearly and comprehensively covered in the Flight Operations Manual (FOM). It should be made clear in the FOM that no operational decisions are to be made without the captain's agreement.

MCR 99 That *Transport Canada* require all air carriers to have in place a system that requires ground-handling agents to inform dispatch and/or the captain of any significant change to aircraft passenger or freight loads immediately upon such a change becoming known to the ground-handling agent.

24 FLIGHT SAFETY

Introduction

During the hearings of this Commission a great deal of evidence was presented on the importance of flight safety within air carrier organizations. In particular, I heard evidence from experts and other informed individuals in the aviation industry regarding the necessity of a corporate commitment to flight safety within air carriers, and programs designed to give effect to such a commitment.

Dr C.O. Miller, an aviation safety expert appearing before the Commission, explained that there are two principal schools of thought regarding the infusion of a corporate commitment to flight safety within an air carrier. Dr Miller pointed out that the classic management approach argues that the application of basic management principles to an air carrier will inherently provide optimized safety. In simple terms, safety is everyone's responsibility, and if everyone does his or her job, then safety will be optimized. It may be apparent to the reader that such principles would indeed apply to any organization, be it a government agency, a manufacturing plant, or an airline.[1]

Dr Miller described a second approach to airline safety, which does not really contradict the classic management approach since it builds upon it. In what he terms the safety program approach, he suggests that, "given the complex technical and sociological nature of aviation today," something more than sound, professional management is required to foster safety adequately in air carriers. Dr Miller states that "a safety program involves specialized accident prevention efforts in addition to safety being part of everyone's job."[2] In keeping with this second approach, one can pose the question as to whether dedicated flight safety organizations ought to be mandatory for large air carriers. In fact, according to Dr Miller, as many as 50 per cent of the airlines in the United States already have identifiable safety departments, although there is no regulatory requirement to have them.

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[1] Exhibit 1251, C.O. Miller, "Investigating Management Factors in an Airline Accident," presented at the Brazilian Congress of Flight Safety, Rio de Janeiro, Brazil, 26 November 1990, p. 5.

[2] Exhibit 1251, pp. 5–6.

To explain what would be expected of a dedicated airline flight safety program, Dr Miller referred to an excerpt from the International Air Transport Association (IATA) Technical Policy Manual wherein four broad categories of flight safety function are identified. For clarity, the excerpt from the IATA publication is reproduced in full:

Flight Safety Functions
per IATA Technical Policy Manual
OPS Amendment No. 37, 1 July 1989

1. Organization of Accident Prevention Programmes

Independent internal investigations of incidents and accidents with provision of appropriate safety recommendations to Management.

An overview function comprising appropriate Safety Assurance and Quality Assurance programmes.

An Airfield Inspection programme.

Comprehensive safety training programmes focused on specific safety objectives.

A flight data recorder exceedance programme.

Developing management objectives to reverse undesirable safety trends.

2. Collection/Analysis/Communication of Safety Information

Maintaining a flight safety data base to record and preserve operational safety incident information.

Participation in industry safety activities.

Internal analysis of incident trends and periodic reviews with senior management, including the CEO.

Communication to crew members of appropriate safety information, including the publication of a Safety magazine, incident summaries, safety bulletins, technical letters and safety articles.

Operation of a confidential crew member incident reporting system.

3. Technical and Training Safety Coordination

Establishment of effective liaison between administration, operations and maintenance and training departments on safety issues.

The overview of all emergency training and emergency procedures for both flight and cabin crews.

Supervision of the evacuation/ditching demonstrations required by the appropriate authorities.

Monitoring the contents of cabin safety information cards and video tapes.

Ensuring aircraft safety equipment meets user requirements.

4. Corporate Emergency Response Procedures

Development and maintenance of a corporate emergency response procedures manual.

Testing and validation of all corporate emergency response procedures.

Participation in airfield emergency exercises.

Liaison with accident investigation authorities.

(Exhibit 1251, pp. III-1–III-2)

The safety program model contemplated by Dr Miller and IATA involves a dedicated program of clearly defined flight safety functions within an air carrier organization. It might be argued that some individuals within air carriers may tend to regard the presence of a well-defined safety organization as providing them with absolution from their own flight safety obligations. It is clear from Dr Miller's comments that this is not what he was describing. Flight safety programs are designed to enhance the accepted premise that safety is everyone's responsibility, rather than to relieve individuals of such responsibility. An effective flight safety program should be regarded as a catalyst for flight safety activity throughout an airline.

It is apparent from the testimony that much of what is described in the IATA model program is already in place at and working well in Air Canada, and has been attempted to some extent by Air Ontario. In this chapter I examine the safety program adopted by Air Ontario to determine whether it was effective in addressing accident prevention in the context of the accident that is the subject of this Inquiry.

An air carrier's professed commitment to flight safety, as reflected in company policy documents and procedures manuals, its actual commitment to flight safety, as reflected in the example set by its senior management, its safety program, and the acts of its employees all make up what I have termed an air carrier's flight safety ethic. What I have found, having considered the evidence before me, is that the single most significant determinant of an air carrier's flight safety ethic is the actual commitment of the air carrier to flight safety as reflected in the example set by senior management. What might be a sound and apparently well-thought-out safety program can be scuttled if senior management support is lacking.

In this chapter I briefly review the legislative requirements regarding flight safety and examine Air Ontario's flight safety organization. Air Ontario's professed corporate commitment to flight safety is reflected in corporate documents and the evidence of senior managers. The development of the Air Ontario flight safety organization is recounted by its one and only flight safety officer. The effectiveness of the Air Ontario flight safety organization is also considered, using as examples the handling of three relevant flight safety incidents and a flight safety survey that was conducted because of the crash of C-FONF. I have also briefly reviewed the flight safety organization of the parent company, Air Canada, with particular emphasis on its involvement – or lack thereof – with the flight safety organization of its subsidiary, Air Ontario.

Legislative Requirements

The traditional and accepted method of regulating aviation safety is through operational and airworthiness legislation. In Canada, this legislation is contained in the *Aeronautics Act*, the Air Regulations, and the Air Navigation Orders. All operational regulations by their nature have a flight safety implication. Regulatory standards regarding pilot proficiency, licensing, maintenance facilities, operational control, and instrument flight rules, for example, are all designed to ensure an acceptable degree of operational integrity within the air transportation system and an acceptable level of safety. Nevertheless, it is the individual air carrier's prerogative to determine how it will meet the operational requirements specified in legislation.

A review of the United States Federal Aviation Regulation (FAR) 121 and Canada's Air Regulations and Air Navigation Order (ANO) Series VII, No. 2, reveals that there are no legislative requirements in Canada or the United States that are specifically directed at flight safety

programs or that require an air carrier to designate an individual to carry out a dedicated flight safety function.

As discussed in earlier chapters, there are required air carrier management personnel identified in both the ANO Series VII, No. 2, and FAR 121.[3] In Canada, ANO Series VII, No. 2, specifies that air carriers must have individuals employed on a full-time basis in the following or equivalent positions:

> (a) Managing Director;
> (b) Director of Flight Operations (or Operations Manager);
> (c) Director of Maintenance and Engineering (or Maintenance Manager);
> (d) Chief Pilot; and
> (e) Chief Inspector.
>
> (ANO Series VII, No. 2, section 5)

However, only the qualifications required of a chief pilot and a chief inspector are outlined in the Canadian legislation. In the case of Air Ontario and most Canadian air carriers, both the flight operations and maintenance manuals also provide a detailed description of the duties and responsibilities of the chief pilot and inspector as well as the other key operational managerial personnel.

The functions of each of the positions set forth in ANO Series VII, No. 2, and the equivalent United States FAR subsection 121.59 are seen by the regulators as being essential to the running of a safe air carrier operation. On the maintenance side of the air carrier's organization, there should be someone responsible for directing the actual maintenance work (director of maintenance) and another ensuring adequate quality control and monitoring of maintenance activities (chief inspector). Similarly, on the flight operations side of the organization, there should be a director of flight operations in charge of the control of operational flights (flight authorization, dispatch) and a chief pilot to ensure that flight training and operating standards for each type of aircraft in the carrier's fleet are properly maintained.

Contrary to the approach taken with maintenance and flight operations personnel, current legislation does not address the need for either a dedicated flight safety program or a flight safety managerial position as essential for the safe operation of Canadian air carriers.

The Canadian Aviation Safety Board (CASB), now the Transportation Safety Board of Canada (TSB), is charged with investigating aviation occurrences and making recommendations to enhance aviation safety.

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[3] The United States FAR 121.59 has air carrier management personnel requirements that are virtually identical to the requirements of ANO Series VII, No. 2.

Transport Canada's Directorate of Aviation Safety Programs also enhances aviation safety by tracking aviation occurrences, educating the industry, and promoting flight safety. Canadian legislation requires that certain types of aviation occurrences be reported to the TSB. Transport Canada publications, such as A.I.P. Canada: Aeronautical Information Publication, list these types of aviation occurrences.

Although not required by legislation, Air Ontario's approved Flight Operations Manual (FOM) contained a description of the carrier's dedicated flight safety officer (FSO),[4] referred to in the FOM as the company aviation safety officer (CASO) position, and included a list of CASO duties and responsibilities.[5] In addition, in the Emergency Procedures section of the Air Ontario FOM there is a description of, among other things, an aviation incident and occurrence reporting system.[6]

Air Ontario's Flight Safety Organization

Background

The Air Ontario business plans for 1987 and 1988 and surrounding board minutes were tendered into evidence. Mission statements contained within the plans included flight safety as part of Air Ontario's corporate objectives. Mr William Rowe, one of Air Canada's representatives on the board of directors of Air Ontario, gave evidence regarding the attitude of Air Ontario management to their professed objective of flight safety and what practical steps were taken to implement this objective.

During testimony, Mr Rowe was asked to address the proposed Air Ontario Inc. corporate mission statement for 1987. He was referred to a minute of the June 23, 1987, meeting of the board of directors where this issue was discussed.[7] Mr Rowe's testimony begins with his reading the minute:

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[4] For the purposes of this chapter, I use the term flight safety officer (FSO) to refer to the position occupied by Air Ontario's CASO and to the position occupied generically by air carriers' aviation safety officers.

[5] Exhibit 146, section 3.19

[6] Exhibit 146, section 8

[7] This was actually a meeting of the joint boards of directors of Air Ontario Limited and Austin Airways Limited. This was the last such meeting because, on August 12, 1987, the first meeting of the board of Air Ontario Inc. was held.

A. " ... The Statement of Mission of the Company contained in Section 5 of the Business Plan should be amended to include the twin objectives of dependability and safety."

Q. ... Do you recall the discussion that centred around the inclusion of dependability and safety in the mission statement?

A. Well, that's a manifestation, Counsel, of our influence on the company and the wording of the business plan itself. That appears in all of our mission statements ... that is, Air Canada's mission statements, and in ... its corporate plans as well, and we wished to ensure that it was highlighted in each of our subsidiaries' plans, and that's where the addition was asked of management.

(Transcript, vol. 121, pp. 103–104)

Mr Rowe testified further as to how these objectives were to be attained:

A. ... It was a statement that the document itself was a guide to management, and the objectives were taken seriously, and that's why they were incorporated in the document itself, and why we wanted specific mention of them.

...

A. ... [I]t is a direction to management that you will, in your normal corporate activities, contemplate those actions and keep that as one of the things uppermost in your mind.

...

A. ... the reputation for safety and concern for safety is paramount in the operation of an airline. There is no permissiveness in that regard. It must be and has to be the prime – one of the prime [guides] of all of management's personnel, management's performance.

(Transcript, vol. 121, pp. 105–109)

A new mission statement, incorporating Air Canada's philosophy, was submitted by the Air Ontario executive committee to the Air Ontario board for approval. The statement, approved by the board on June 17, 1988, reads as follows:

> The creation of a safe and reliable diversified air transportation system serving central Canada and northern United States, whose primary goal is the maximization of profitability and return on its shareholders' investment while optimizing feed traffic to and from the Air Canada network.
>
> (Exhibit 940)

The rationale of the "safe and reliable diversified air transportation system" was further elaborated in the explanatory notes presented by the executive committee to the board:

> Recognition of safety as being the paramount criteria with respect to both current operations and future planning. Recognition of reliability as being the most significant element of product quality. Recognition of Air Ontario's diverse revenue base and of the inherent competitive advantage of maintaining diversity.
>
> (Exhibit 940)

As well as addressing product quality and its diverse revenue base, Air Ontario recognized safety as an important element in the equation. In its mission statement approved by Air Ontario's board of directors, it places safety as "the paramount criteria" for the carrier's operations and planning.

Mr Rowe was reminded that during most of his tenure as Air Canada representative on the board of directors at Air Ontario, including the period when the mission statement was written, there in fact was no company aviation safety officer in place. The position of safety officer at Air Ontario was occupied by Captain Ronald Stewart from late in 1985 until the fall of 1987, but was then vacant until February 1989, when Captain Stewart was again appointed as FSO. When Mr Rowe was asked for his opinion, as the majority shareholder's representative, about this vacancy, he stated that it was understood that Air Ontario's flight safety program "was a much less formal arrangement" than that of Air Canada, but that this did not concern him (Transcript, vol. 121, p. 92). Mr Rowe viewed the issue of on-time performance as an indication of the operational integrity and safety of an air carrier. As there was nothing remarkable about Air Ontario's on-time performance, he stated that he felt that he did not have cause for concern.

Even though there may have been satisfactory on-time performance within Air Ontario, the lack of concern by Air Canada's representative on the Air Ontario board of directors that there was no FSO in Air Ontario is still somewhat incongruous, given the principle of primacy of flight safety espoused by Air Ontario's mission statement for 1988, and in view of the fact that Air Canada itself had a dedicated flight safety organization.

Mr Rowe testified that, on behalf of Air Canada, he retained Mr John McMurtry to look into Air Ontario's facilities at London.[8] When asked what was involved in Mr McMurtry's task, he replied:

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[8] Mr McMurtry was himself an Air Canada nominee on the Air Ontario board. Mr McMurtry was a long-time Air Canada employee who retired in 1985, after 39 years with the company, as its vice-president, central region. The expertise that he gained over the years was primarily in the areas of planning (including maintenance planning), administration, customer service, and operations control. Mr McMurtry was not qualified as a pilot, AME, or professional engineer.

A. Well ... he wouldn't go through, as Transport Canada might in their audits, all the records on an aircraft, for example, all the way back, maintenance records and log books and things of that nature.

But he looked at the delineation of responsibilities, the condition of the facility itself, were there the proper people in place or responsibilities delineated to individuals, because unlike our corporation which might have one individual per responsibility, in a company the size of Air Ontario, one individual might carry three or four responsibilities, and just by virtue of size.

(Transcript, vol. 121, pp. 94–95)

Mr Rowe stated that, to the best of his recollection, Mr McMurtry did not report to him the fact that there was no FSO at Air Ontario, but he did report that "he was satisfied the operation was a safe one" (Transcript, vol. 121, p. 96).

Mr Thomas Syme, as the person in charge of the everyday management of Air Ontario, was asked for his thoughts on the importance, the role, and the reporting relationship of an FSO:

A. His reporting relationship was defined as to myself. Functionally, he was interfacing much more closely with senior flight ops management, and also, he did interface and have direct access to the president of the company.

Q. ... [A]s the then group vice-president of operations, what was your understanding of the role of the flight safety officer?

A. Flight safety officer is performing an audit function and compliance function with respect to the flight safety aspects of the flight operations function.

The reporting stream recognizes the need for independence of action and his ability to access individuals not directly involved in the function that he is auditing.

Q. Now, is the flight safety officer position an important position, as far as you are concerned?

A. Yes.

Q. Was it somehow less important in December of 1987 and following when Mr [Stewart] was not in situ as a flight safety officer.

A. No, it was not.

(Transcript, vol. 97, pp. 163–64)

Mr Syme explained further that it was important for the FSO to report directly to him as the head of operations, "for the purpose of objectivity, that he has access to someone outside of the flight operations group" (Transcript, vol. 97, p. 145).

Mr Syme was questioned about the importance of having an FSO in place during Air Ontario's introduction of its F-28 program. In particular, he was asked about the possible contribution of an FSO with regard to specific flight safety concerns, for example, the installation of a flight attendant seat shoulder harness, during the F-28 implementation. He conceded in his testimony that it would have been desirable to have an FSO "in place all along":

> A. I accept the fact that it would have been desirable to have ... him [the FSO] in place all along. I don't know if that would have – what difference that would have made, but it would have been desirable.
> Q. We'll never know, but it would have been desirable –
> A. Yes.
>
> (Transcript, vol. 99, pp. 74–75)

The Development of Air Ontario's Flight Safety Organization

Captain Ronald Stewart, in his testimony, outlined his experience in the field of flight safety. He served as a Canadian Armed Forces pilot from 1967 to 1974, after which he joined Transport Canada as an accident investigator. He also spent a few years as a regional air safety officer in Edmonton. He joined Great Lakes Airlines in 1979 and soon became the Canadian Air Line Pilots Association's technical chairman for that airline's pilot group. From 1979 to 1985 Captain Stewart was a line pilot with Great Lakes, and, late in 1985, was appointed flight safety officer at Air Ontario Limited.

In a March 1985 memorandum to Captain Robert Murray, director of flight operations at Air Ontario Limited, Captain Stewart, at the request of Captain Murray, outlined his views on how a flight safety organization should fit within the company's flight operation. He emphasized the importance of the FSO reporting directly to the chief executive officer of the company, bypassing intermediary management. He testified as follows:

> A. ... this is a normal reporting relationship in most safety organizations, that the safety officer always has a direct line to the chief executive officer of the company.
>
> I think that the rationale behind it is, should the safety officer have problems say dealing with a vice-president or a problem that he can't resolve, that he can go freely one step beyond that and go to the president with that information.
>
> And I think it makes the flight safety process all that more effective, in that the vice-presidents and other managers in the company realize that the flight safety officer does have that

direct reporting relationship to the president. It keeps them honest, I think.

Q. And does it deal, then, with safety, really, in a bit of an elevated manner, putting it –

A. That's right.

Q. – as a matter of priority?

A. It certainly does, yes.

(Transcript, vol. 95, p. 11)

Captain Stewart testified that he reported not to the president of Air Ontario Limited but to Captain Murray as head of flight operations, because, in the view of Captain Stewart, the president, Mr Plaxton, was apparently uncomfortable with having the FSO reporting to him directly. This was not the ideal situation that Captain Stewart envisaged, but, as he stated, Captain Murray was very safety conscious and the situation proved to be satisfactory. Captain Stewart testified that he did not receive extra compensation, secretarial help, or a budget for his FSO duties at Air Ontario Limited.

Captain Stewart described the activity within the flight safety organization of Air Ontario Limited (and the successor companies) from the beginning of his tenure in 1985 to his resignation in 1987 as consisting of a few ad hoc meetings. Captain Stewart resigned as FSO late in 1987 because of the lack of management support, the lack of direct access to the CEO, and to avoid having to fly as a management pilot during an impending pilot strike (Transcript, vol. 74, p. 90). He was not replaced, and the position remained unfilled until February 1989.

Captain Robert Nyman was the director of flight operations at Air Ontario when Captain Stewart resigned late in the fall of 1987, and Captain Nyman remained in that position until the late summer of 1988, when he was replaced by Captain Clifford Sykes. The director of flight operations at Air Ontario reported to the vice-president of flight operations, a position occupied in December 1987 by Mr Peter Hill, and in June 1988 by Mr James Morrison.

Captain Nyman, who was formerly employed with Austin Airways, described the flight safety organization at Austin. He pointed out that the references to a company aviation safety officer (CASO) in the Air Ontario Inc. Flight Operations Manual were in fact taken from the Austin Airways Manual:

3.19 *Company Aviation Safety Officer (CASO) – Duties, and Responsibilities*

General Responsibilities

Responsible for monitoring and advising on all Company aviation safety and aircraft accident prevention activities.

Reporting Relationship
Reports directly to the area manager as well as to the Vice President of Operations on aviation safety matters

Safety Duties
A. Secretary of Company Aviation safety committee meetings responsible for scheduling, agendas, taking of and distribution of minutes.
B. Coordinates a flow and exchange of aviation safety matters within Company.
C. Maintain liaison with Transport Canada's Aviation Safety Programs Branch.
D. Follows up on any aviation safety occurrences in the interest of accident prevention.
E. Conducts periodic aviation safety surveys of all operational departments.
F. Identifies aviation safety deficiencies and makes collaborative suggestions for corrective action.
G. Solicits and processes aviation safety improvement suggestions.
H. Develops and maintains an aviation safety awareness program.
I. Monitors the F.O.D. Program.
J. Monitors program for the transportation and handling of dangerous goods.

(Exhibit 146, pp. 3-39, 3-40)

Captain Nyman, when questioned about efforts to replace the FSO position vacated by Captain Stewart, revealed that he himself had limited knowledge regarding the duties of a flight safety officer within an air carrier's operation (Transcript, vol. 108, pp. 159–64). He testified that he was unfamiliar with the flight safety structure within Austin, because when he left the company in 1984 it did not have an FSO. Captain Nyman indicated that while he was director of flight operations at Air Ontario, he did not have available any flight safety materials after Captain Stewart resigned from the FSO position, nor was he familiar with Captain Stewart's FSO program.

After Captain Stewart's departure, Captain Nyman advertised for an FSO within the company, attracting a response from Captain James Byers, an Air Ontario line pilot. He provided to Captain Nyman a comprehensive list of FSO duties as he saw them, and such were discussed at a meeting on December 21, 1987. Having received no response to his proposal, Captain Byers in May 1988 withdrew his application for the FSO position. In his letter to Captain Nyman he stated:

> I am unable to accept the position of company Safety Officer until there is a clear written description of the job and associated working

> conditions. Receiving this description will allow me, to make an informed decision about the position.
>
> (Exhibit 863)

During the period from late 1987 until February 1989, Air Ontario had no designated safety officer. Captain Nyman gave two reasons for this situation: his own "ignorance of the value of a good flight safety program" with available computerized information, and the fact that "there were other items that we [flight operations] had to deal with on a daily basis." He conceded that the replacement of Captain Stewart was not his highest priority (Transcript, vol. 108, pp. 169–70).

In November 1988 a fatal accident occurred at Pikangikum, Ontario, involving an Air Ontario DC-3. Captain Stewart agreed to a request by Captain Clifford Sykes, then director of flight operations, to investigate the Pikangikum accident on behalf of Air Ontario. He also conducted a safety survey of the company's northern operations. Captain Stewart carried out the investigation because, in his view, there was a company crisis and he felt duty-bound to help. In the fall of 1988 Mr James Morrison, newly appointed vice-president of flight operations for Air Ontario, expressed his concerns over the lack of an FSO to Mr Hill and to Captain Byers. Mr Morrison, who had come directly from Air Creebec where he had served in an executive capacity, approached Captain Stewart seeking to rehire him for the FSO position. Mr Morrison considered a flight safety department to be a necessity and he wanted Air Ontario to have a "good reliable flight safety officer" (Transcript, vol. 115, p. 137).

Captain Stewart advised Mr Morrison that he was not prepared to accept the position of FSO. Based on his previous experience, Captain Stewart anticipated that the support he would get from the company was "not the type of support that should have been given to a FSO" (Transcript, vol. 95, p. 50). In his testimony, Mr Morrison corroborated Captain Stewart's evidence:

> A. ... Quite frankly, he told me that he left his last position as FSO because he did not have direct access to the president, nor did he have good access to the previous operations manager. He had a number of reasons.
>
> He was not content at all, and he didn't feel that, given the size of Air Ontario at that time, that he would be able to have access to the president or ... have the ability to perform his duties the way he would want to do them.
>
> (Transcript, vol. 115, p. 137)

It is evident that the sources of Captain Stewart's discontent with the FSO position were essentially a lack of support by Air Ontario manage-

ment and a lack of direct access not only to the president but also to the operations manager. Mr Morrison explained:

> A. He did not have access directly to the president, and, that time, it was Jim Plaxton. He didn't have, as he said, direct access to the operations manager. I think it was Captain Murray. He didn't have the vehicle with which to do his job. He was using his own personal computer at home to develop the program that he wanted to have. He didn't have an office ...
>
> (Transcript, vol. 115, p. 140)

Following discussions with Mr Morrison, and after completing his investigation into the company's northern operations, Captain Stewart agreed to accept once again the FSO position at Air Ontario effective February 1, 1989. Captain Stewart drew up a proposal and a job description for the position of CASO that was acceptable to Air Ontario management. A letter of understanding was prepared covering Captain Stewart's primary concerns, namely, the provision of secretarial help, a computer terminal, direct access to all employees, and, most importantly, a direct reporting relationship to the president, Mr William Deluce. Compensation in terms of flight credits was also to be built into his employment contract. In return, Captain Stewart was to carry out the duties as set forth in the "major responsibilities" section of his job description. These included developing an incident reporting system, monitoring worldwide safety data, analysing in-house safety data, developing safety lectures, and monitoring the dangerous goods regulations. While some of these matters reflected what was already in the Air Ontario Flight Operations Manual, others did not. However, the Flight Operations Manual was not updated to reflect this new thrust, even to the time of the hearings.[9]

When specifically asked why the FSO should report directly to the company president, Mr Morrison gave the following reasons:

> A. I think that, quite simply stated, that if a flight safety officer were to report to anybody else in the flight ops group, that there's always a danger that the flight ops personnel he might be reporting to may not take any of his concerns seriously, that if there is any implication that is with financial or economic ramifications, they may try not to access the information.
>
> By going directly to the president, the flight safety officer would have the ability to have the freedom to make the

[9] The issue of the failure by Air Ontario to have in place a flight operations manual that reflected the actual structure of the flight operations of the company is discussed in chapter 19, F-28 Program: *Flight Operations Manuals*.

recommendations. Whether they could be met or not is up to, at that point, the flight safety officer and the president, but it certainly is a good means of doing this job.

Q. So, in a sense, it gives the flight safety officer an independence from the rest of the company structure with direct access to the president?

A. That's correct, and the least amount of influence as well.

(Transcript, vol. 115, p. 149)

At the time of the March 10, 1989, accident, the flight safety organization within Air Ontario had been reactivated for approximately six weeks. Its effectiveness was canvassed during the hearings of this Inquiry, with particular emphasis on its impact on the management of the F-28 program.

Three Case Studies in the Effectiveness of Air Ontario's Flight Safety Organization

The evidence shows that an air carrier flight safety organization must be able to investigate any incident or accident adequately and to follow up that investigation to ensure that occurrences are not repeated.

One of the most valuable tools for an aviation accident prevention program is an effective system of collecting, investigating, evaluating, and circulating occurrence information. This Commission examined how Air Ontario collected and handled occurrence reports in an attempt to evaluate the degree to which the Air Ontario flight safety program, or the lack of it, had an effect on the F-28 operation.

Three incidents involving Austin Airways and Air Ontario Inc. aircraft, two of which occurred prior to the Dryden crash, were examined in some detail during hearings of this Commission in an effort to evaluate the accident prevention program at Air Ontario and to identify any possible links to the F-28 accident. Two of these incidents had common elements with the Dryden crash; both involved adverse winter weather conditions and snow contamination of aircraft surfaces, and all three involved Captain Joseph Deluce. At the time of the Dryden accident Captain Deluce held multiple Air Ontario management positions as the F-28 chief pilot, chief instructor, and check pilot, and as the manager of the Air Ontario F-28 program.

Incident No. 1: November 20, 1986 – HS-748 – Kingston, Ontario

The first incident occurred on November 20, 1986, at Kingston, Ontario. An Austin Airways HS-748 aircraft was parked overnight on the ramp at the Kingston airport. It had snowed during the night and, prior to departure, snow was swept from the wings and the horizontal stabilizer.

The pilots on this flight were Captain Joseph Deluce and his brother, First Officer James Deluce. Captain Deluce testified that, although he could not specifically remember, he assumed a walkaround inspection of the aircraft would have been done because snow had been swept from the aircraft.

Captain Deluce was in the left seat and carried out the takeoff. After liftoff, aircraft vibration was felt that increased as the aircraft's speed increased. The flight was in visual weather conditions and the crew immediately returned to Kingston. After landing, the pilots inspected the aircraft and found ice adhering to the vertical stabilizer.

Captain Joseph Deluce called Captain Larry Raymond, at the time Austin Airways director of flight operations, and explained what had occurred. Captain Deluce testified that he did not recall whether an incident report was filed. He believed there was a company FSO at the time, but he definitely did not talk to him regarding this incident.

Captain Raymond investigated the incident and reported to Mr Robert Deluce, general manager of Austin Airways, in a memorandum that began by indicating some difficulty in obtaining an incident report from James Deluce. Captain Raymond further indicated in the memorandum that he had filed an aviation occurrence report at the time and had concluded that the vibration was caused by wet snow adhering to the vertical stabilizer.

Captain Raymond attached to this report a copy of a bulletin he had drafted, both of which were to be displayed on all Austin Airways pilot bulletin boards. Portions of this bulletin are noteworthy since they apply to future events. Captain Raymond stated in this bulletin:

> There is a vast difference between wet snow on any airframe, any snow on a warm airframe or dry snow on a cold airframe. The first two will probably adhere with potentially catastrophic results, in the last case the snow will probably blow off.
>
> (Exhibit 685, Part 2, tab 9)

In the bulletin, Captain Raymond also directed the pilots to review the applicable ANOs. He concluded by stating that the key word in the ANO is "adhering."

Given Captain Raymond's position at Austin Airways, I take this bulletin to reflect the thinking of the Austin Airways flight operations management on ice and snow contamination in late 1986. The information Captain Raymond provided on aircraft surface contamination is very general and seems to be based on experience rather than definitive testing. He did not mention de-icing methods, and it appears that his investigation did not establish why the de-icing methods used on November 20, 1986, were not effective in ensuring that the aircraft was

clean or why the contamination was not detected by the pilots on a walkaround.

In his bulletin, Captain Raymond expressed the opinion that the personnel involved would not forget the incident. In fact, Captain Joseph Deluce stated in testimony that he did learn from the incident that contamination on the vertical stabilizer posed a serious problem. He testified that at the time of this incident he was aware of the potential problems of contamination on the wings.

Incident No. 2: December 15, 1987 – HS-748 – Toronto, Ontario

The second incident involving an Air Ontario aircraft that was examined during the hearings of the Commission occurred on December 15, 1987, at Toronto's Lester B. Pearson International Airport. The captain involved was Joseph Deluce, the first officer was Scott Jensen, and the in-charge flight attendant Alana Labelle-Hellmann. The aircraft was an HS-748, the same aircraft type as was involved in the Kingston incident.

The flight departed the ramp at approximately 8:30 a.m. for a scheduled flight to Timmins, Ontario. It had been snowing for some time prior to departure, and the aircraft was de-iced at the ramp by Air Canada personnel. Neither Captain Deluce nor First Officer Jensen did an external walkaround following the de-icing.

It continued to snow heavily as the aircraft taxied towards the departure runway. The departure, however, was delayed for approximately 40 minutes, primarily because of the weather conditions. The reported weather at the time was a precipitation ceiling between 100 and 300 feet above ground, the visibility between one-eighth and three-eighths of a mile, in heavy snow, temperature 0°C, and the wind from 090 to 100 degrees at a speed of 28 knots with gusts up to 39 knots. It should be noted that snow which reduces visibility below one-half mile is defined as heavy snow.

In her testimony, Ms Labelle-Hellmann recalled that, about 15 minutes after the aircraft had departed the gate, a number of passengers raised concerns about snow accumulating on the wings as the aircraft waited for takeoff clearance. She stated that during this time several of the passengers expressed the opinion that the aircraft should go back and de-ice again. Ms Labelle-Hellmann attempted to reassure the passengers by expressing confidence in the pilots and by telling such passengers that "it will be fine, don't worry" and that "if it was necessary to go back and de-ice, we would, not to worry."

It is significant that the flight attendants aboard flight 1363 at Dryden on March 10, 1989, made similar expressions of confidence in the pilots of the F-28 in response to passengers' concerns about wing contamination just prior to the ill-fated takeoff. The subject of flight attendants' expressions of confidence in pilots, in the face of passengers' concerns

over observed wing contamination, is discussed in chapter 39 of this Report, Crew Coordination and Passengers' Safety Concerns.

Ms Labelle-Hellmann, who was generally aware of the dangers of ice contamination on aircraft wings, after listening to the passengers' concerns on December 15, 1987, went to the cockpit to inform the flight crew that passengers were asking whether the aircraft should go back and be de-iced. She stated that she spoke to Captain Deluce and described the scene in the cockpit:

> A. I went up there and I said, Joe, a couple of passengers have mentioned that there's snow on the wings and they feel that maybe we should go back and de-ice, what do you think.
> Q. All right, and what was his response to you?
> A. ... I believe he looked out and he said no, we de-iced at the gate and we should be fine.
> ...
> A. He also said that we should be departing shortly and that I should go back and take my seat.
>
> (Transcript, vol. 106, pp. 18–19)

Ms Labelle-Hellmann stated that it was about five minutes between the time she returned to the cabin and took her seat and the beginning of the takeoff roll. During the takeoff roll, she did not specifically recall looking out the window at the wings.

Both Captain Deluce and First Officer Jensen testified that they could not recall Ms Labelle-Hellmann coming into the cockpit with these concerns; however, both stated that under the circumstances it would be normal for the flight attendant to enter the cockpit to inquire about the delay. All three crew members agreed that the total time between de-icing and takeoff was approximately 40 minutes, in conditions of heavy snowfall.

Both Captain Deluce and First Officer Jensen testified that at the time they were unsure as to how long de-icing would provide protection against snow buildup on the wings. First Officer Jensen testified that about halfway through the taxi he had observed some snow on the wing turning to slush. He said that both he and Captain Deluce considered alternatives and decided that the de-icing should provide protection for 30 minutes and they felt the aircraft would be airborne by then.

First Officer Jensen stated that he had looked at the wings just prior to the takeoff roll, and he described what he saw:

> A. You can see the actual wings outside the engines. And there was snow, and there was slush – the snow was falling onto the wings and producing a slush on top of the wings less than a quarter of an inch in depth.
> ...

> ... it was not frozen, it was not freezing, it was liquid. It was slush, pinkish slush.
>
> Q. It was pinkish slush, and what does the colour pink indicate to you?
>
> A. De-icing fluid. The glycol mixed with the snow.
>
> Q. Did you see any white?
>
> A. No, apart from the white falling from the clouds, from the snow.
>
> (Transcript, vol. 106, pp. 139–43)

First Officer Jensen also described the runway at the time as being snow- and slush-covered to a depth of one-half inch. He stated that Captain Deluce checked the runway braking action prior to takeoff and assessed it as fair to poor.

First Officer Jensen testified that the visibility on takeoff was one-quarter mile, the lowest allowable visibility at the time of takeoff provided that a takeoff alternate was available and filed. Both pilots assumed that a takeoff alternate had been filed but neither could recall whether this had been done.[10] In this case, it was fortunate that the weather improved enough after takeoff to allow an immediate landing at the departure airport.

During his testimony First Officer Jensen was asked to compute the crosswind component on the date in question, using the reported wind and the Canada Flight Supplement crosswind component chart. The evidence is that the wind was gusting from 28 to 39 knots, giving a crosswind component by his calculation of between 20 and 27 knots.[11]

Given the directions in the FOM and the described conditions of the runway, First Officer Jensen was asked on the witness stand to apply the "runway surface condition and JBI equivalent."[12] Using these charts, First Officer Jensen, who during testimony calculated the maximum

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[10] A takeoff alternate was required because the ceiling and visibility at takeoff were lower than the captain's weather limits required for landing at the departure airport. However, generally speaking, the takeoff alternate requirement is designed to allow for mechanical malfunctions where the aircraft's redundancy would allow it to be flown to the takeoff alternate, but not for emergencies requiring an immediate landing.

[11] The Air Ontario Flight Operations Manual (FOM) advised pilots not to attempt a takeoff when crosswind components are greater than those demonstrated for the aircraft. In the case of the HS-748, this demonstrated maximum crosswind was 30 knots. The FOM also advises pilots that in a crosswind condition the decision to take off should "take into account associated conditions which might adversely affect the take-off or landing such as turbulence or icy runways, reduced visibility, limited runway length, etc., and will allow what they judge to be an appropriate tolerance above the limitations shown in the Flight Manual"(p. 7-6).

[12] Historically, it has been found that certain runway surface conditions (RSC) will produce a specific JBI (James Brake Index) or coefficient of friction on a runway surface. A chart is provided to convert RSCs to a JBI equivalent. A second chart shows the maximum recommended crosswind at any given JBI reading.

recommended crosswind for the takeoff on that day, found the maximum crosswind limit to be 14 knots. First Officer Jensen acknowledged that the crosswind limit had been exceeded, given the runway surface conditions (Transcript, vol. 106, p. 168).

Notwithstanding their decision to take off, the evidence indicates that Captain Deluce and First Officer Jensen were still concerned about the snow and slush that had accumulated on the wings. Captain Deluce decided they would conduct a visual check of the wings at 80 knots on the takeoff roll, whereby each of them would check the wing on his respective side of the aircraft to verify whether the slush had blown off. This unusual and potentially dangerous procedure was apparently not entirely new to former Austin Airways pilots and had been used on occasion by pilots in northern operations when cold, powdery snow accumulated on the wings. First Officer Jensen testified regarding this so-called "80-knot check" as follows:

> Q. Did either you or Captain Deluce – or did the fact of this substance on the upper surface of your wings give some pause to you or Captain Deluce? Did you take it into consideration for your takeoff?
> A. Yes, we did.
> Q. Okay, could you describe for the Commissioner what considerations you took?
> A. We discussed it amongst ourselves, and we had – actually, Joe decided that through the 80-knot check, we should check the wings to make sure that the snow ... or the slush was running off the wings, much as you would see water pouring off the wings, and at 80 knots, we would make the decision whether to continue the takeoff, and if it wasn't rolling off or running off the wings, then we would abort the takeoff at that point, at 80 *knots, before we got to critical speed.*
>
> (Transcript, vol. 106, p. 144)

The critical speed referred to by First Officer Jensen is the decision speed (V_1) below which the takeoff could be discontinued should anything go wrong. He could not remember exactly, but thought that the decision speed would have been around 88 knots. When asked about his previous knowledge of this "80-knot check," he testified that he had seen it "once or twice before in the north" and in "very cold" weather, involving conditions of a non-adhering "very light dusting of snow on the surface of the wings" (Transcript, vol. 106, pp. 145–46).

First Officer Jensen described the takeoff and the 80-knot check as follows:

> A. Okay, when I called 80 knots, I checked out the right wing to make sure the wing was clear, and I called the wing was clear,

and Joe checked out quickly and he checked the same time that his wing was clear.

Q. Okay, and what differences did you see? Did you see the pink disappear, for example?

A. It was all gone by then. At 80 knots, there was nothing on the wings.

Q. All right. And you have a distinct recollection of –

A. Oh, yeah.

Q. – the wings being clear?

A. The wings were absolutely clean.

Q. What did you think of this procedure, sitting there as first officer? Did you consider it a safe procedure?

A. I didn't consider it unsafe.

(Transcript, vol. 106, pp. 148–49)

Captain Deluce elected to take off, and, just after liftoff, the aircraft began to vibrate in a manner which was later described as severe. First Officer Jensen stated that after they were airborne he could read his aircraft instruments but with some difficulty. He testified that Captain Deluce explained to him what the problem was:

A. ... when I first felt the vibration just after departure, I was taken aback. I wouldn't consider myself frightened, but I was curious and I was wondering what the vibration was.

Joe told me a few minutes thereafter that he knew what it was, that it was snow buildup on the vertical fin or ice buildup on the vertical fin and that it had happened before and there was nothing ... to worry about. Now, whether or not this relaxed me at all, I don't know.

(Transcript, vol. 106, p. 175)

In-charge flight attendant Alana Labelle-Hellmann testified as to vibration after takeoff and the reaction of the passengers aboard the aircraft:

A. ... it just started vibrating all of a sudden, and it didn't start as tense or as bad as it got. And I heard a big crash ... in the back.

Q. And when did you hear this crash? Was that the first thing you heard?

A. No, we started to shake and then I heard a big crash in the back, and I didn't know what was going on.

Q. Okay. Could you describe the state of the passengers when this started to happen?

A. They were pretty scared ... as we were still climbing, we started to shake even more, and the passengers started to hold hands in

> the aisles, and the gentlemen sitting with me were saying, maybe we should have went back to de-ice.
>
> (Transcript, vol. 106, pp. 24–25)

An emergency was declared and the flight returned to the airport, where it landed safely on runway 06 left. A controller at Pearson International Airport made an entry in his log indicating that after takeoff the crew "declared an unspecified emergency" (Exhibit 852). First Officer Jensen testified that while inspecting the aircraft on the ground after landing he observed snow adhering to its vertical fin. He described the snow as "a vertical band a foot to a foot and a half wide, and it was for sure less than an eighth of an inch deep" (Transcript, vol. 106, p. 176). He stated that it was the sort of snow one would see on a car that was sitting with its side facing into the direction in which the wind was blowing. It was his opinion that the snow accumulated while waiting for takeoff.

Following the landing, the three crew members went to an Air Ontario office in Terminal Two, where they each completed incident reports in writing. According to her testimony, Ms Labelle-Hellmann in fact wrote two reports. In her first report she wrote that she had observed snow on the wings prior to the takeoff and that she had gone to the cockpit to relay passenger concerns regarding this snow on the wings. Her evidence was that she included this information in the first version of her incident report because she assumed that the snow on the wings had caused the vibration. She stated that, upon completing her first incident report, she handed it to Captain Deluce, who told her that the problem was not caused by snow on the wings. Ms Labelle-Hellmann testified as follows:

> A. He didn't say that it was snow on the tail, he said that there was a problem with the tail and I just remember that. That it was not caused by snow, is what Joe was telling me.
> Q. Okay. Now, was this the reason; that is to say, was Captain Deluce's explanation to you the reason you wrote the second report?
> A. Yes.
>
> (Transcript, vol. 106, p. 35)

Following her discussion with Captain Deluce, she wrote a second incident report, omitting any mention of snow on the wings prior to takeoff.

Captain Walter Wolfe, who was then the chief pilot of Air Ontario Inc., reported to Captain Nyman that Captain Joseph Deluce called him shortly after the incident to report the details. It is clear from the evidence that Captain Wolfe thereafter conducted only a cursory investigation of this serious incident, though it was his responsibility to

conduct a thorough investigation. In this case, however, he summarized his post-incident actions as simply speaking to Captain Joseph Deluce, sending Captain Deluce's report of the incident to Transport Canada, and instructing maintenance personnel to investigate the condition of the aircraft. He also spoke to Captain Deluce and the Air Ontario maintenance people about the de-icing of the HS-748 aircraft. Captain Wolfe indicated that he was satisfied that the aircraft had been de-iced prior to taxiing and that, in view of the fact that an Air Ontario Dash-8 aircraft had successfully taken off ahead of Captain Deluce in the HS-748, he considered follow-up disciplinary action inappropriate in the circumstances.

The Flight Operations Manual (FOM) for Air Ontario Inc. identifies "reportable" incidents and outlines the follow-up actions that are to be taken. Section 8.3.1(c) of the Air Ontario FOM indicates that, whenever a flight crew has difficulty controlling an aircraft because of vibration, the incident must be reported. Either a member of the flight crew, air traffic control, or someone within the air carrier organization must inform the Canadian Aviation Safety Board (CASB, now the TSB) and provide the board with information describing the incident.

The provisions of section 8.3.5(c) of the Air Ontario FOM require the pilot-in-command of an aircraft involved in a reportable incident to report the incident to the carrier's system operations control (SOC) centre in London. SOC is responsible in turn for contacting one of a list of Air Ontario personnel, including the following:

- the director of flight operations
- the chief pilot
- the vice-president of operations
- the president of the company, or
- the company flight safety officer.

In the Pearson incident of December 15, 1987, Captain Wolfe did not take steps to have the flight data recorder and cockpit voice recorder data analysed. Nor did he investigate the prevailing weather and runway conditions at the time of this incident further, in order to determine if the flight crew had adhered to the "aircraft handling procedures" for crosswind and slush-covered runways contained in the FOM.

Curiously, CASB did not investigate this incident. The Ontario Region CASB occurrence record dated December 21, 1987, includes the following statements under "occurrence description":

> The aircraft was de-iced before leaving the ramp. But had a long taxi prior to takeoff. After takeoff a severe vibration was felt, the crew

> declared an emergency and returned to Toronto without incident. Inspection showed a large build up of ice on the tail plane.
>
> (Exhibit 852)

Under the heading of "investigation activity planned," the CASB record simply states: "case closed/nil." In my view, action should have been taken to determine the circumstances that allowed the ice buildup to occur. CASB should have conducted a thorough investigation, including interviews with the entire crew to verify the information received. CASB should have checked to ascertain if the flight characteristics of the aircraft described by the crew were consistent with a buildup of ice on the tail.

Transport Canada did not follow up to determine the nature of the declared emergency and to ascertain whether in fact any violation of the Air Regulations had occurred. I view this lack of response by Transport Canada and CASB to such a potentially serious incident to be inadequate.

Aviation safety is the express responsibility of both agencies. If the incident was caused by contamination, an opportunity was missed to highlight the hazard to all commercial operators in the early part of a winter season and to take steps to ensure that Austin Airways flight crews had a much greater awareness of the consequences of such conditions.

In summary, it seemed that Ms Labelle-Hellmann's observation that "nobody cared" contained more than a grain of truth (Transcript, vol. 106, p. 71). It is not difficult to understand Ms Labelle-Hellmann's reaction. This was obviously a dangerous and frightening incident. Clearly, positive action should have been taken by both CASB and Transport Canada to identify the source of the problem and to implement measures to prevent a recurrence. Virtually nothing was done by either organization other than to note the incident and close the books on it.

Following the December 15, 1987, incident at Toronto, the director of flight operations for Air Ontario, Captain Robert Nyman, quite appropriately, although belatedly, issued two advisory bulletins relating to these two incidents to Air Ontario pilots. The first advisory bulletin, dated December 23, 1987, signed by the director of flight operations, described the Toronto incident as involving an aircraft that was de-iced prior to taxi, that waited in line for 40 minutes for takeoff clearance, whose wings remained clear of snow and ice, but which, after takeoff, experienced severe vibration. The bulletin called for pilots to be vigilant regarding contamination on airframes prior to takeoff; if they had any doubts, they should de-ice again.

The second advisory bulletin was dated January 20, 1988, and contained advice for company pilots dealing with the effectiveness, or

lack thereof, of de-icing fluid after the de-icing of an aircraft. This bulletin advised pilots to be aware that the heavier the precipitation the faster the dilution rate of the de-icing fluid. It also stated that, in light precipitation at temperatures near or just below the freezing point, a spray of glycol-water de-icing fluid may be effective for periods in excess of 15 minutes. The bulletin also stated that constant vigilance is required on the part of the captain to ensure that no precipitation accumulates on the wings prior to takeoff.

First Officer Jensen testified that, although at the time he considered the decision at Toronto to take off with slush on the wings to be safe, in retrospect he considered the practice unsafe. He testified as follows:

> A. At the time, did I consider it a safe takeoff?
> Q. Right.
> A. Yes, at the time, I –
> Q. Do you consider it a safe takeoff today?
> A. As I look back on it, no.
> Q. Then what should have been done differently?
> A. Simply taxiing back to re-de-ice the aircraft would have been the simplest thing.
>
> (Transcript, vol. 106, p. 202)

For his part, Captain Joseph Deluce conceded during his testimony that he had made an error in judgement in using an "80-knot check" during takeoff that day. He agreed during questioning that he had exposed the passengers to unnecessary risk in the event that he had had to reject the takeoff:

> Q. I mean, if Scott Jensen said, Captain, there is rough ice on the wing, the slush has blown off and there is rough ice there, you would have had to reject and that would have caused the passengers an unnecessary risk, correct?
> A. It would have – the reject would have caused an unnecessary risk, yes, sir.
>
> (Transcript, vol. 149, pp. 144–45)

I might add that if the first icing incident at Kingston, Ontario, involving Captain Deluce had been properly investigated and dealt with, it might have become a valuable source of information for dissemination to all Air Ontario pilots, including Captain Deluce. A proper investigation of the Kingston incident might well have precluded the second incident from occurring.

Incident No. 3: April 4, 1989 – F-28 – Toronto, Ontario

The third incident examined during the hearings of this Commission concerned an alleged unstabilized approach and landing of an F-28

aircraft at Toronto on April 4, 1989, less than a month after the Dryden crash. The captain on this flight was Joseph Deluce, who at the time was giving line indoctrination training to First Officer Steve Burton.

The Commission did not examine this incident to establish whether an unstabilized approach occurred, but rather to review how the investigation of the alleged incident was handled from a flight safety organization perspective. Captain Stewart, the Air Ontario FSO at the time, explained during his testimony how the incident came to his attention and the actions which were taken by him:

> A. Again, it was a rumour. Came to my attention via rumour.
>
> I was able to determine the source of the rumour and contacted the individual that had witnessed the event, and I asked him over the telephone if he would be willing to give me some information on the occurrence.
>
> I suggested to him that we could do it anonymously or confidentially and he agreed to that, whereby I took down the information from him.
>
> (Transcript, vol. 95, pp. 183–84)

Captain Stewart learned that the captain of the aircraft involved was Captain Joseph Deluce. During his testimony, Captain Stewart indicated that he viewed this matter as an "allegation of a fairly serious occurrence." However, he elected to carry out no further investigation personally. Instead he brought the incident to the attention of James Morrison, the Air Ontario vice-president of flight operations. Captain Stewart stated that he felt he had fulfilled his responsibility by bringing this situation to the attention of Air Ontario senior management and he denied that Captain Joseph Deluce's involvement influenced his decision:

> Q. ... The fact that Joe Deluce was involved, was that an influencing factor in not conducting a more thorough investigation?
>
> A. No, I don't think so. You remember what I said was we had this discussion in Jim Morrison's office between myself, Joe Deluce, the chief pilot, and Jim Morrison, the vice-president of flight operations.
>
> And I felt that the fact that Jim was there and was very aware of what was going on, and he being Joe Deluce's supervisor, and the fact also that I had brought to the attention of management, of senior management in fact that there had been an allegation of a fairly serious occurrence, that that was really all I had to do. My responsibility was done.
>
> I told them of the problem. It's not really up to me to tell them how they should fix up that problem.
>
> (Transcript, vol. 95, pp. 189–90)

Mr Morrison subsequently asked Captain Joseph Deluce to explain his perspective on the occurrence in writing. In a written statement, Captain Deluce denied that the approach and landing were in any way unsafe. First Officer Burton was then supplied by Mr Morrison with a copy of Captain Deluce's statement and asked for his comments. He agreed with the statement made by his chief pilot and instructor.

Captain Stewart was questioned on the witness stand regarding the conduct of this investigation:

> Q. Do you think, sir, that giving someone like the First Officer Burton a copy of the Deluce report for comment is a proper way to conduct an investigation?
> A. No, probably not.
> Q. Not probably. I suggest to you, sir, that it is highly improper. Would you agree with me?
> A. I would think that you would ask the first officer for an independent opinion.
>
> (Transcript, vol. 95, p. 192)

Since First Officer Burton was the pilot being trained during the alleged unstabilized approach, one might expect that he would also deny that the approach and landing were unsafe. However, in the interest of ensuring an unbiased and fair process in the investigation of this alleged incident, one would be hard pressed indeed to accept a simple concurrence as to the facts rather than an independent statement.

Captain Joseph Deluce in his testimony stated that, at the time, he felt that he was being "set up" by Captain Stewart:

> A. ... To me, I felt very much like I was being set up. And I was concerned because what can you do?
> Q. Being set up by whom, sir?
> A. ... at the time, I thought it was Ron Stewart. I was concerned, and I filled out a report, and I advised Steve that he better do the same thing.
>
> (Transcript, vol. 112, p. 81)

Captain Deluce's stated perception that Captain Stewart was "setting him up" implies that Captain Stewart was acting maliciously when he made his report to Mr Morrison. This was denied by Captain Stewart on the witness stand. Clearly the investigation of the alleged incident was mishandled. The most obvious inference from the evidence is that everyone involved in Captain Stewart's investigation was sensitive to the fact that the subject of the investigation was Captain Joseph Deluce, Air Ontario chief pilot, check pilot, and company shareholder. This situation illustrates the highly undesirable perception that can result from an individual, however well-motivated, wearing at the same time the many

hats of a significant shareholder, the chief pilot, the training pilot, the company check pilot, and line pilot of an air carrier.

Having reviewed the evidence from these three incidents, I have no doubt that the Air Ontario flight safety organization was, for a substantial period of time prior to the Dryden crash, inactive as a result of there being no designated safety officer and owing to the low priority assigned to this position by Air Ontario management. When active, Captain Stewart's position as FSO was obviously at times made ineffective because of the inconsistent positions taken by management in dealing with certain incidents.

Captain Ronald Stewart's Post-Accident Survey of F-28 Pilots

As the Air Ontario Flight Safety Officer (FSO), Captain Stewart headed up Air Ontario's internal investigation into the F-28 accident at Dryden. As part of his investigation, he drafted an F-28 pilot questionnaire. During his testimony, he explained his rationale for so doing as follows:

> A. Well, a survey is done simply to find out attitudes, opinions, safety deficiencies, perhaps. A survey can be designed for many different reasons. But, basically, you ... suspect that there's a problem, you go out and you survey a group of people and you determine whether or not in fact there is a problem.
>
> (Transcript, vol. 74, p. 94)

Captain Stewart pointed out that other carriers carry out these types of surveys and gave as an example a fairly extensive Air Canada survey conducted in 1984–85 involving a large proportion of its pilot population. Air Canada had questioned its pilots regarding its training standards and training procedures, and looked "for recommendations on the ways that they could improve the training in Air Canada" (p. 94).

Specific to the pilot survey conducted following the Dryden accident, Captain Stewart in his testimony referred to "rumours ... surrounding the F-28 operation." He stated his reasoning for his decision to conduct a survey of the Air Ontario F-28 pilots as follows:

> A. ... After the accident, there was many rumours ... surrounding the F-28 operation and what was wrong with it, and I wanted to get to the bottom of it to see if there was any basis for fact.
>
> Also, I had some specific questions, some concerns that had been raised during the investigation, during the on-site investigation out in Dryden, with respect to ... de-icing on aircraft with an engine running and also with respect to, in quotation marks,

"hot refuelling," and I wanted to learn what the pilot viewpoints were on those two issues as well.

Q. Now, what use was going to be made of this survey by you once you had it completed?

A. Well, what I intended to use this for was simply to assess whether or not the rumours were true and, assuming the worst, make recommendations to the president with respect to the operation.

(Transcript, vol. 74, p. 98)

The evidence is that Captain Stewart began his pilot survey by telephoning F-28 pilots. He stated that it took him "approximately half an hour to an hour to complete each telephone survey." The actual questionnaires were not distributed but rather the questions were read over the telephone, and Captain Stewart recorded in handwritten notes his impression of the conversation with each pilot. He recalls it as a time of very deeply felt emotion and he made the point that the survey was conducted against such a background. Participation in the survey by the F-28 pilots was optional and confidentiality was extended to each of the pilots by Captain Stewart. He explained:

A. ... I told them that the survey was confidential, that what they said to me wouldn't go any further than me, and that they could be free and open ... with their responses to me. And I also told them that their participation was optional, if they didn't want to participate, that was fine.

Q. Now, what did you mean by confidential, sir, when you told them that the survey would be confidential?

A. Right, what I was saying is that, if they had any comments with respect to the operation or perhaps supervisors or management or whatever, that it wouldn't go any further than me, I wouldn't be going to tell the president that Joe Blow said this about you and that about the company, but what I wanted to find out was the pilots' feelings and thoughts on the safety of the F-28 operation.

Q. Now, sir, why did you promise them confidentiality?

A. Because, by promising them confidentiality, I felt that I would get more open and honest responses.

(Transcript, vol. 74, pp. 103–104)

Captain Stewart added that no Air Ontario pilot to his knowledge had ever been disciplined on the basis of information contained in a pilot report filed with the company.

After five pilots had been interviewed by telephone, Captain Stewart had a conversation with his superior, James Morrison, then vice-president of operations. The "quite an emotional discussion" centred around the survey, and certain negative views about the pilot surveys

were expressed by Mr Morrison, whom Captain Stewart described as "very upset." Captain Stewart testified as follows:

> A. ... I remember now that it was quite an emotional discussion ... Jim was very upset that I would be doing something behind his back. I guess maybe he hadn't read my proposal thoroughly enough and didn't realize that perhaps there would be occasions when I would be doing surveys and that sort of a thing, but I guess he felt that I was stepping on his toes and what I was doing was going to cause him a lot of problems. He was very upset.
>
> (Transcript, vol. 74, p. 108)

Although he stated that Mr Morrison did not order him to stop doing the survey, Captain Stewart in fact terminated his pilot survey program after this meeting. He said:

> A. Well, as a result of the conversation, I, well, after I left his office, went to my office, sat down and thought about it again. I thought, you know, this darn survey isn't going all that well, it's got the problems that I previously described to you, I've learned what I want to know about the operation, so ... I stopped.
>
> (Transcript, vol. 74, p. 109)

Based upon the five completed pilot surveys, Captain Stewart formed certain opinions about practices within the Air Ontario F-28 program:

> A. ... They confirmed that there was some practices that were going on in the operation that - that were suspicious, at least. I wouldn't go out and say that they were unsafe, because – I don't know if everybody in this room would understand my viewpoint, but I don't view an operation as safe or unsafe, but at one end, you have a totally accident-risk-free operation. At the other end of the spectrum, there's no question that there's going to be an accident, it's just a matter of time. And where I would place the F-28 operation on that continuum would be very ... close to the top; however, there were some questions and they were legitimate, there were some concerns and they were legitimate concerns.
>
> (Transcript, vol. 74, p. 111)

After visiting the Dryden accident site, Captain Stewart recorded his personal observations about Air Ontario's servicing of the F-28 at Dryden specifically and about its F-28 program generally. He prepared a written memorandum dated April 3, 1989, and addressed to Mr William Deluce, the president of Air Ontario and the person to whom he was to report directly within the company flight safety system. Rather

than sending the memorandum, he subsequently met with Mr William Deluce and discussed with him what he perceived to be the F-28 program difficulties.

During his testimony, Captain Stewart was questioned regarding notes he had prepared to brief Mr William Deluce. These handwritten notes are reproduced in their entirety below:

Arguments

JET PROGRAM

- I believe this was a preventable accident.
- There is lots of info available about ice contamination and how it affects hard wing a/c – some from Fokker
  – Air Canada
  yet there was one of our Capt's out there doing tests to see how much ice the F28 could handle
- When you set up the DHC-8 program an expert "Walter Wolfe" was hired to head up the program.
- In retrospect that was a very wise move
  Now the program is up and running on its own without Walter
- We should have followed the same procedure with F28 program even if we could contract a Piedmont or Air Canada person for a period of time 1.5–2 yrs at which time the position could revert to internal personnel.

Jet Program cont'd.

- initially our experience on Jet OPS & F28 OPS very low
- we could really use outside assistance while our experience is growing
- A tightly written & controlled SOP is required.
- Whatever way you decide to go I recommend closer ties w/ Air Canada to draw on their experience on Jet OPS (DC-9)

Operations

- Some F28 pilots (captains) did not know de-icing was avail at Dryden. We have no way presently of informing the flight crews of the availability of these services - This check list to go in Route Manual
- we often get these fuel load/pax load last minute changes and need a procedure/policy to advise flight crews and how to handle situation
- Experience level very low
- Start up new program.
- need to buy experience
- recommend hiring outside co for Chief Pilot – /VP in charge of flt ops/Chief Training Pilot
- Recommend closer liaison w AC to rely on their experience in Jet Ops
- if we decide to change types
  ie BAC 146 – F100

- Operational Control and Communications
- Load info vs fuel planning believed
- SOC – prepare a list of
  Primarily scheduled but consider expansion to charter.
  √ list of facilities/services/equip avail

(Exhibit 766)

Captain Stewart expanded upon his notes by stating that he had recommended to company president William Deluce that, unless good outside expertise was brought in to get the F-28 program running, the F-28 program should be discontinued:

A. I felt that there was not enough background experience in the program, that the chief pilot needed some advice, some outside help.

Somebody that was very experienced in swept wing jet operations, I felt, should be involved in the program on a day-to-day basis to assist and get the program running. And I felt that if they couldn't provide this sort of an individual or individuals, if they could not recruit these individuals into the program, that they should perhaps considering winding down the program.

Q. All right. Not to muddy the verbal conversation you had with Bill Deluce, did you in fact make a recommendation to him that unless he secure good outside expertise, that the F-28 program should be discontinued?

A. Yes, I did.

(Transcript, vol. 95, pp. 109–10)

Captain Stewart made observations regarding the role that, in his opinion, Air Canada should have played in the F-28 program:

A. Well, just another source of information. Air Canada operated the DC-9 which is also a swept wing jet, tail-mounted engines, no leading edge devices, fairly similar type to the F-28, I thought, and I knew that there must be some vast experience in that operation that we could maybe use.

Q. Which was not solicited by Air Ontario?

A. I don't believe that it was, no.

(Transcript, vol. 95, p. 110)

In testimony, Captain Stewart elaborated on the importance of Captain Wolfe's role in the introduction of the Air Ontario Dash-8 program. Captain Stewart compared the F-28 and Dash-8 programs at Air Ontario and commented upon the serious error which, in his view, was made by Air Ontario in failing to bring in F-28 expertise for the introduction of the F-28 jet program:

A. [Captain Walter Wolfe] ... was one of the original Dash-8 pilots, I believe, working for possibly Air Dale up in Sault Ste Marie, but I'm not positive on that, and then he went from there to, I believe it was Air Atlantic, and flew the Dash-8 for a number of years.

When he came to Air Ontario, he was one of the most experienced Dash-8 pilots available anywhere. He became the chief pilot at Air Ontario and helped to set up the Dash-8 program complete with the training, and all the line indoctrination, training, the basic training, simulator training, the SOP's, and probably some involvement in the MEL, this type of thing.

(Transcript, vol. 95, p. 119)

Captain Stewart believed that Air Ontario's Dash-8 implementation program was excellent, partially attributable to the expertise brought into the company by Captain Walter Wolfe. He maintained that similar expertise should have been brought in in order to improve the F-28 program. He described the discussion with Mr William Deluce as follows:

A. He asked me several questions as we went along and we had good discussion of all the points. And at the end, he didn't commit himself one way or the other while I was there, but he gave me a fair hearing.

(Transcript, vol. 95, p. 131)

Finally, from his investigations Captain Stewart noted that information about the availability of ground equipment at on-line stations and at charter destinations had not been disseminated to flight crews:

Q. ... You recommend essentially that a checklist be prepared of all stations outlining things which are available at those stations, correct?

A. That's correct.

Q. And the example you cite is Dryden, where you have noted fuel, Jet A, DC ground power available, yes. AC ground power, no. De-icing, yes. Laboratory service, no, and commissary, no.

Now, did Air Ontario have an inventory of this type of information for the various places it flew to as at that point in time?

A. I believe that they did in SOC. What I was recommending here is that they disseminate this information to the operating crews.

Q. Why?

A. Otherwise, how would the crew know what services were available when they got into a particular station? We don't carry the government supplement ... the VFR – or the IFR supplement as a matter of course.

Q. The Canadian Supplement, you are talking about?
A. That's correct. And beyond that, we have destinations that are not in Canada, so that –
Q. You are talking of ones like charter?
A. Charter destinations, say Atlantic City where we go there often enough that we should know what's available there.

I felt that this should go in the route manual as a route bulletin listing all of the stations that we regularly visit and what services would be available at those stations so that the flight crews would have a handy reference.

(Transcript, vol. 95, pp. 110–12)

Air Canada's Flight Safety Organization, and Its Involvement with Air Ontario

Background

The evidence indicates that after 1985 there was some contact between the flight safety organizations of Air Ontario, including that of its predecessor airlines, and Air Canada. Captain Stewart testified that he had visited Air Canada's Montreal facility four or five times to consult with Air Canada flight safety personnel, Mr Jack Mitchell and Mr Jack Galliker, regarding matters such as what Captain Stewart was doing with the "computerized incident reporting system [and] other safety problems" (Transcript, vol. 95, pp. 32–33). Captain Stewart testified that their expertise would have been beneficial to Air Ontario. He further testified that the only other contact that he had with Air Canada was when it conducted a post-crash audit on Air Ontario.

Mr Mitchell, who has been director of flight safety for Air Canada since 1983 and who was called as a witness, described the flight safety organization at Air Canada and its relationship to that of Air Ontario. Captain Stewart's position was similar to the position occupied in Air Canada by the manager of flight operations safety, who reports directly to the senior vice-president, flight operations, and functionally to the corporate director of flight safety, Mr Mitchell.

The everyday duties of Air Canada's flight safety organization were summarized by Mr Mitchell as planning, investigation of incidents and accidents, and liaison with government agencies. Part of the planning function was the creation of the Air Canada Flight Safety Board. The board is chaired by the company president and meets quarterly. One of its main functions is to review the incidents and accidents investigated by the flight safety group. Such reviews allow for "trend analysis" and coordinated follow-up action flowing from the incident reports.

At Air Canada, in addition to these quarterly meetings that are attended by senior management personnel, members of the flight safety organization attend the regular morning meetings of the flight operations department. Mr Mitchell described the benefits of such daily sessions as follows:

> A. ... it's a particularly useful source of information from the flight safety point of view, first of all, to establish what incidents have been occurring, which we should have prior knowledge of by other communication means that we have, but sometimes there were items coming up which were of interest to us.
>
> And, particularly, it's useful to us to hear the report from the maintenance personnel when they come on the line to find out what sort of action they've been taking against an incident that may have occurred during the last 24 hours.
>
> (Transcript, vol. 119, pp. 19-20)

In addition to Air Canada's daily flight operations meetings, there are also daily meetings of flight safety personnel. These meetings are mainly to exchange flight safety information and to analyse information gleaned from various departments of the company. Members of the flight safety organization have access to all departments of the Air Canada organization.

Categorization of Aviation Occurrences at Air Canada

Within the Air Canada flight safety system, aviation occurrences are categorized from A to G depending on their severity or importance, category A being a catastrophic crash. This categorization allows for the appropriate allocation of resources for response to and follow-up of safety concerns.

Mr Mitchell, when questioned about what Air Canada's flight safety organization's response would have been to the Air Ontario HS-748 incidents described above, stated that he thought the initial response would have been to "categorize that as a Category C occurrence" (Transcript, vol. 119, p. 34).

He described a category C occurrence by referring to the Air Canada Flight Operations Manual, commonly referred to as the 550 manual:

> *Category C:*
> IN OPERATION ACCIDENTS OR INCIDENTS OF A POTENTIALLY HAZARDOUS NATURE: Accidents or incidents reported from the aircraft indicating any type of emergency condition,

> necessitating assistance or guidance, and that might result in a catastrophic or major accident.
>
> (Exhibit 920)

Mr Mitchell described the steps to be taken by the flight safety personnel in the case of a category C occurrence as follows:

> A. Well, we would obviously discuss it between some of the flight safety personnel and decide what action needs to be taken, and one of the first actions, most likely, would be to ensure that we get the flight data recorder and the information that it contains so that we can investigate the occurrence ... in more detail and with more precise accuracy than maybe a verbal description contained.
>
> (Transcript, vol. 119, p. 34)

He stated that the information from the aircraft flight data recorder is used to test the accuracy of the statements of the crew members, all of whom would be interviewed as a matter of course. Such interviews of crew members are always conducted on an individual basis. These procedures are quite unlike those followed by Air Ontario after the three incidents described earlier in this chapter.

In addition to analysing the flight data recorder and interviewing crew members, the Air Canada flight safety group is able to call upon the maintenance and flight operations departments for input during its investigation of an occurrence. Once the Air Canada flight safety group has completed the investigation, a report is submitted to the Air Canada Flight Safety Board. Appropriate follow-up is then decided upon, and the necessary corrective action taken.

The Air Canada flight safety department does not suggest or determine any disciplinary action to be taken by the company against any employee. Mr Mitchell explained the reasons for the flight safety department's non-involvement in disciplinary matters as follows:

> A. ... it's felt that the two would be of conflicting interest.
>
> It wouldn't be to our benefit, from the flight safety point of view or from the point of view of improving the safety, to get involved in any disciplinary action from the flight safety point of view.
>
> Q. And who takes care of discipline involving pilots?
>
> A. That would be taken care of by the branch concerned, either flight operations, technical operations or in-flight service, if they are involved.
>
> (Transcript, vol. 119, p. 43)

If the applicable policies and procedures of Air Canada's flight safety department had been in place at its majority-owned subsidiary, Air Ontario or its predecessor airline, when the three Air Ontario incidents discussed above occurred, they would probably have been investigated more appropriately.

Air Canada Internal Incident-Reporting Procedures

In the mid-1980s Air Canada introduced an anonymous incident-reporting system. Pilots can use one of two methods: they telephone and have their comments recorded on a dedicated recorder unit, or they can complete a form located on the back of a company monthly publication distributed to pilots and mail it to the Air Canada flight safety department. Mr Mitchell in his evidence described the purpose of the system, to whom it was available, and how it fit into the regulatory scheme. He stated that this system was introduced to "provide an extra source of information ... on potential problems which couldn't be identified in any other way" (Transcript, vol. 119, p. 45).

Interestingly, Mr Mitchell stated that the Air Canada flight safety group does not receive many anonymous reports, and he indicated an Air Canada pilot preference for the CTAISB (Canadian Transportation Accident Investigation and Safety Board, now called Transportation Safety Board or TSB) confidential reporting system:

> A. ... We thought when we first introduced the system, that we would have quite a heavy response to it, and we did get a few initially, but they sort of tapered off. We don't get that many these days.
>
> In fact ... I think it was about two years ago, we opened up the system to include our cabin crews as well in the anonymous reporting system. There again, it started off in a promising manner but has tapered off ... you have to remember that there are other anonymous reporting systems in operation.
>
> There's the one through the CTAISB which some pilots use. Rather than going through the company anonymous reporting system, it's ... always a little bit suspicious about that, so they report it direct to CTAISB and we do get some feedback from CTAISB where they are investigating an incident and trying to get some more information on an incident of that nature, but usually when it's anonymous, there's very little available on it right from the start.
>
> (Transcript, vol. 119, pp. 45–46)

Mr Mitchell went on to discuss some of the difficulties involved in following up anonymous reports. The primary problem is how to confirm the truth of the facts reported by an unknown complainant.

Nevertheless, the anonymous reporting system has merit in that it brings forward operational problems that might not otherwise be discovered and to which competent FSOs can direct their investigative skills. Although the FSO at Air Ontario deserves full credit for setting up a confidential pilot reporting system, his follow-up of the April 4, 1989, incident report was not completed, and most certainly the support he received from the vice-president of operations, Mr Morrison, regarding this incident left much to be desired.

Flight Safety: Relationship between Air Carrier and Regulator

Mr Mitchell, when asked whether flight safety organizations should be a regulatory requirement for air carriers in Canada, stated that "somewhere it should be laid down that there should be a safety officer in all airlines, whether he is a full-time safety officer or part-time, I think there should be someone" (Transcript, vol. 119, pp. 57–58).

Mr Mitchell stressed the fact that, in addition to the relationship with Transport Canada in the area of flight safety, there are flight safety–oriented organizations to which Air Canada FSOs belong and courses they attend. He mentioned specifically the safety courses given by the University of Southern California, the Safety Committee of the Air Transportation Association of Canada, the Flight Safety Foundation, the International Society of Air Safety Investigators, and others.

As well, he outlined the flight safety department's involvement when new aircraft types are introduced into the Air Canada fleet. He described the role as follows:

> A. ... with the introduction of new aircraft, there is an introduction committee that is formed. And these are representatives from various branches which have an interest in ensuring the smooth introduction of an aircraft into service.
>
> And flight safety always has a representative on all of those meetings. One reason is to gather the latest information on the aircraft, which may be of use to flight safety, and also to ensure that any actions which flight safety has to take with the introduction of a new aircraft are part of the program and are completed on schedule.
>
> Q. And so with the introduction of the A320, was there such an introductory committee?
>
> A. Yes, there was, and Mr Galliker was a member of that committee.
>
> (Transcript, vol. 119, pp. 74–75)

Given Air Canada's substantial experience with jet aircraft and the introduction of new aircraft into service, as well as its position as majority shareholder in Air Ontario, it is difficult to understand why it failed to share the benefits of this experience and to ensure that there was an FSO and an appropriate flight safety organization in place at Air Ontario during and following the introduction of the F-28 jet aircraft into its fleet.

Air Canada's Assistance to Air Ontario

Mr Mitchell testified that he first learned of Air Canada's acquisition of feeder airlines in 1987. He stated that, at that time, there was some discussion between himself and Captain Charles Simpson, vice-president of flight operations for Air Canada, about the possibility of offering flight safety assistance to the connectors. He expressed it this way:

> Q. And what ways did you mention that you could assist Air Ontario?
> A. Well, flight operations felt that perhaps they might be able to offer some type of training to Air Ontario, and flight safety was interested in letting Air Ontario know that we had various publications and information which might be of use to them, and also, of course, the seminar which they had already had previous to that date, but there was some interest in discussions which took place between Air Ontario and Air Canada on maybe holding another seminar.
>
> (Transcript, vol. 119, pp. 87–88)

The "previous" seminar mentioned by Mr Mitchell was an Air Canada accident management seminar that had been given to personnel of Air Ontario Limited in 1985. Captain Simpson and Mr Mitchell discussed the advisability of repeating this seminar.

They also considered conducting an "operational review" of Air Ontario at this time. Mr Mitchell stated that an audit of Air Ontario was not discussed. He described what was contemplated as follows:

> Q. ... When you were discussing this with Captain Simpson, did you ever discuss the possibility of doing an audit of Air Ontario or any of the connector carriers?
> A. No, not really an audit. We felt that there was a need for us to have some communication with Air Ontario to establish how they were organized and what they were doing and who did what and how well it was being done.
>
> (Transcript, vol. 119, p. 92)

These discussions culminated in a meeting of Air Canada and its several connector airlines on August 18, 1987. In attendance at this meeting for Air Canada were members of the flight safety, flight operations, and training departments. Mr Mitchell recalled the presence from Air Ontario of Mr Thomas Syme, vice-president of operations, and Captain Robert Nyman, director of flight operations. Mr Mitchell described the meeting as exploratory, its purpose being "to sit down with some of our allied carriers and discuss what sort of things Air Canada had available which may be of use to them, and primarily what we could do for them, and give them the opportunity to maybe tell us what they could do for us as well." Mr Mitchell stated that some kind of commercial arrangement between Air Canada and the connector carriers for certain services was considered at the time, "especially in relation to the more expensive packages. If flight operations were to provide some training, for instance, that would probably be a cost item." With respect to flight safety items, Mr Mitchell testified that "there was never any consideration given at that time to charging them for those services" (Transcript, vol. 119, p. 95). The nature of the flight safety assistance Air Canada thought it might provide to the connectors was described as technical information relating to flight safety, as well as playback facilities for flight data recorders.

Mr Mitchell stated that Air Canada ran an accident-response seminar for Air Ontario personnel at Air Ontario's request in May 1989, following the Dryden crash. Air Canada had previously run an accident-response seminar in 1985 for the predecessor corporation, Air Ontario Limited.

Mr Mitchell was questioned about the relationship between the Air Canada and Air Ontario flight safety departments during the period between the initial meeting of the two departments in August 1987 and the accident-response seminar held in May 1989. He testified that at the time of the 1987 meeting he was under the impression there was an FSO in place at Air Ontario, when in fact there was not. He assumed that appropriate computer recording and trend analysis, similar to that done at Air Canada, was being carried out at Air Ontario. It was not. The only flight safety integration between the companies appears to have been the establishment of an accident-response plan. An accident-response plan cannot be equated to a flight safety organization; one is designed to respond to accidents, the other to prevent accidents.

When asked about the degree of integration between the flight safety organizations of the parent, Air Canada, and its feeder, Air Ontario, Mr Mitchell conceded that there was none. In testimony, he explained that there was no formal reporting relationship between the Air Ontario FSO and himself:

> A. No, that was left up to the flight safety officer in Air Ontario for him to observe what was going on in that area, and they didn't sort of share any of that information with Air Canada. Neither was it requested by ourselves. Only in the event of a larger or major catastrophe that might require our assistance.
>
> (Transcript, vol. 119, p. 106)

Mr Mitchell's explanation for the lack of a more comprehensive and formalized flight safety reporting relationship between Air Canada and Air Ontario was that "it was in the formative stages, so it was a matter of developing the systems in the time that it was available. And these things were progressing." He stated that except in the event of a major accident, there was no exchange of flight safety information or occurrence reports between the two entities.

Mr Mitchell advanced the reason for Air Canada not pursuing the flight safety organization issue at Air Ontario as follows:

> A. ... there seemed to be a safety organization in place, and their handling of the data within their own organization where the action needs to be taking place in the event that there is something that requires some action ... seemed to be well under way, and it didn't require Air Canada to get involved in it at that stage.
>
> (Transcript, vol. 119, p. 107)

Mr Mitchell's view of the Air Ontario flight safety organization was erroneous, inasmuch as the evidence clearly indicates that Air Ontario had no effective flight safety organization in place during the critical period of the introduction of the F-28 jet aircraft into its fleet. The evidence also demonstrates that Air Canada had little involvement in the flight safety aspects of its subsidiary, Air Ontario, and that Air Ontario's management did not adequately support its existing flight safety organization. Furthermore, Air Canada did not impress upon Air Ontario its own more developed flight safety ethic.

Air Canada's Operational Review of Air Ontario (Autumn 1989)

An operational review of Air Ontario was conducted by its parent, Air Canada, in the fall of 1989, six months after the Dryden crash. This review was not specific to Air Ontario and was part of a similar review of all Air Canada feeder airlines.

As already stated, Captain Stewart returned to the position of Air Ontario FSO in February 1989, approximately one month before the accident. Air Canada's post-Dryden operational review of Air Ontario,

which was conducted in the fall of 1989, included a review of the then existing flight safety organization. Mr Mitchell was asked about the findings of Air Canada; the Air Canada report, which was read into the record, stated:

> Air Ontario employs a Flight Safety Officer who reports direct to the President. This is an ICAO recommended reporting relationship and is the most favoured in the industry. A Pilots to Flight Safety Officer Incident/Accident Reporting System is in place. Judging by recently published statistics, this system is functional.
>
> Air Ontario maintains an Aircraft Accident Alarm Plan. The plan is of good standard with check lists for Management and the Control Centre (SOC).
>
> (Transcript, vol. 119, pp. 153–54)

Mr Mitchell testified that in September 1989 Air Canada found the flight safety organization of Air Ontario to be "quite commendable" (Transcript, vol. 119, p. 153).

General Conclusions

The evidence before me demonstrated that the lack of continuity in the position of a flight safety officer, the lack of adequate support of the FSO position by senior management, and the lack of a flight safety organization within Air Ontario over the material time span was a managerial omission. That the majority owner Air Canada did not know of this situation indicates, at worst, a lack of concern on the part of parent corporation, or, at best, a lack of proper supervision on its part.

It appears from the evidence that the establishment of a company flight safety organization has the potential to enhance flight safety. With the advent of inexpensive information management systems, it cannot be considered an extraordinary burden on a carrier to set up at least an occurrence-reporting and investigating system and an information dissemination system. Considering the safety implications, it cannot be considered overly burdensome for an air carrier to appoint a flight safety officer with appropriate compensation for the work performed to oversee whatever flight safety organization is put in place.

Many air carriers have flight safety departments within their organization with detailed job descriptions for the flight safety officers. Transport Canada has, at headquarters and in its regions, flight safety officers ready and anxious to provide any assistance a carrier may require to set up an air carrier flight safety department.

Certain fundamental aspects of a successful flight safety organization were brought to light during testimony, the principal one being the

independence of the flight safety officer in carrying out his or her duties. This independence includes access to all departments within the corporation. Another fundamental aspect of a successful flight safety organization is direct and unfettered access to senior corporate management, including the president. This direct access means direct action at an effective management level with respect to the oversights and failings of managers and supervisors at all levels.

Findings

- The single most significant determinant of an air carrier's flight safety ethic is the actual commitment of the air carrier to flight safety as reflected in the example set by senior management of the air carrier.

- An effective flight safety organization with a dedicated flight safety program and dedicated flight safety personnel is vital to the safe operation of an air carrier.

- Captain Stewart, the flight safety officer (FSO) for Air Ontario prior to the fall of 1987, resigned at that time from the FSO position primarily because of the lack of direct access to and support from the company president.

- The management of Air Ontario assigned a low priority to the importance of filling the vacant position of flight safety officer.

- The management of Air Ontario failed to have in place a flight safety officer and a flight safety organization between the fall of 1987 and February 1, 1989, a period that included the critical phase of the introduction of the F-28 jet aircraft into its fleet, and its scheduled operations with the F-28 aircraft from June 1988 to February 1989.

- The total absence of a flight safety officer and flight safety organization within Air Ontario, from the date the F-28 jet program was introduced until shortly before the crash of C-FONF, must be regarded as a serious omission on the part of Air Ontario management.

- The merger of Austin Airways and Air Ontario Limited, which resulted in a long period of instability for the new entity, Air Ontario Inc., was, among other things, marked by frequent changes in senior management personnel, continuous management restructuring, problems associated with the integration of the seniority lists, displacement of personnel, and the integration of operations and

training programs. This period of instability carried over into the introduction of the F-28 program and had an impact on flight safety.

- The two HS-748 takeoff incidents with contaminated aircraft, which occurred on November 29, 1986, and December 15, 1987, involving Captain Joseph Deluce and Captain James Deluce (flying as first officer) and First Officer Scott Jensen, respectively, were not properly investigated by the responsible Air Ontario officials who undertook such investigations.

- As the pilot-in-command of an Air Ontario HS-748 aircraft on December 15, 1987, at Pearson International Airport in Toronto, Ontario, Captain Joseph Deluce committed an error in judgement in commencing a takeoff in the circumstances.

- The Canadian Aviation Safety Board did not investigate the December 15, 1987, Air Ontario HS-748 incident, although it was reported to it. The lack of response by CASB was inappropriate in the circumstances.

- Transport Canada regulatory authorities did not take any action in the December 15, 1987, Air Ontario HS-748 incident and did not implement measures to prevent a recurrence. Such lack of response was inappropriate in the circumstances.

- It is probable that had the November 1986 incident at Kingston Airport involving Captain Joseph Deluce been properly investigated and had Captain Deluce been appropriately sanctioned and properly instructed with regard to the dangers of takeoff with contaminated aircraft surfaces, the December 15, 1987, incident at Pearson International Airport may not have occurred.

- Had both HS-748 incidents been properly investigated and information with respect to the dangers of takeoff with contaminated aircraft surfaces been disseminated to Air Ontario operational personnel, including its pilots, there would have been a heightened awareness among Air Ontario pilots of the very serious problems associated with aircraft surface contamination.

- The third alleged incident involving Captain Joseph Deluce, as pilot-in-command of an Air Ontario F-28 aircraft, was anonymously reported to have occurred at Pearson International Airport in Toronto on April 4, 1989, and was referred by Captain Stewart, the Air Ontario flight safety officer, to the vice-president of flight operations, Mr Morrison. I infer from the evidence that both Captain Stewart and

Mr Morrison were highly sensitive to the fact that the pilot-in-command involved in this alleged incident was Captain Joseph Deluce, and that this sensitivity militated against their conducting a thorough investigation.

- When a person has significant shareholdings in an air carrier and, at the same time, occupies managerial positions such as chief pilot, training pilot, company check pilot, as well as being a line pilot of the carrier, there is the potential for conflict of interest and the possibility of creating an atmosphere of intimidation among other personnel. In such circumstances, air carrier management must be especially vigilant to safeguard against the occurrence of such conflicts.

- Current Canadian legislation does not address the need for either a dedicated air carrier flight safety program or a flight safety managerial position as an essential element for the safe operation of Canadian air carriers.

RECOMMENDATIONS

It is recommended:

MCR 100 That Transport Canada proffer for enactment legislation to amend Air Navigation Order Series VII, No. 2, section 5, to include the position of flight safety officer as a required air carrier managerial position.

MCR 101 That Transport Canada proffer for enactment legislation to amend Air Navigation Order Series VII, No. 2, section 5, to require the appointment by an air carrier of a person to the position of flight safety officer for the carrier, the qualifications of such person and the description of the duties and responsibilities of such position to be determined by Transport Canada after consultation with the air carrier industry, and to provide that the flight safety officer shall have direct access on a continuing basis to the chief executive officer of the air carrier in flight safety–related matters.

MCR 102 That Transport Canada initiate a program of consultation with Canadian air carriers and the Transportation Safety Board of Canada with a view to having air carriers institute,

staff, and operate, on a continuing basis, an effective flight safety program that is based upon the "Flight Safety Functions," identified in the International Air Transport Association Technical Policy Manual, OPS Amendment No. 37, July 1989, referred to in chapter 24 of my Final Report, Flight Safety.

MCR 103 That Transport Canada institute a program for the monitoring of the flight safety programs of Canadian air carriers, with a view to ensuring that each air carrier has in place an effective flight safety program that is appropriate for the size and scope of the carrier's operations.

25 MANAGEMENT PERFORMANCE

During this Inquiry, management effectiveness was reviewed in the context of Air Ontario's introduction of the F-28 aircraft into commercial service. By analysing Air Ontario's planning and implementation of the F-28 program, and the certification and inspection of the F-28 program by Transport Canada, deficiencies in the air transportation system became apparent.

Owners and managers of air carriers must operate within the bounds of the Air Regulations and the authority delegated to them as licence holders. The regulator and the air carrier functionally meet at three principal stages:

- at the approval or certification stage of the air carrier's proposed operation;
- during the inspection or monitoring of an air carrier operation; and
- when the regulator pursues an enforcement action against any air carrier or air carrier employee who has breached the *Aeronautics Act*, the Air Regulations, or the Air Navigation Orders (ANOs).

The evidence before me disclosed that there were weaknesses in each of these three functional stages – certification, inspection, and enforcement – as they applied to the Air Ontario F-28 program. Irregularities in the F-28 program, which could have led to enforcement action but were undetected during routine regulatory inspection, could have been avoided entirely if proper care had been taken by Air Ontario and Transport Canada in the planning, implementation, and certification stages of that program.

An example of this can be seen in the irregular maintenance deferral practices discussed previously. The practice by some Air Ontario F-28 maintenance personnel of deferring the maintenance of essential aircraft equipment without an approved MEL, and the practice by some Air Ontario F-28 pilots of noting maintenance defects on loose pieces of paper, instead of promptly recording them in the aircraft journey log, would both appear to violate ANOs and could have given rise to enforcement action. Neither of these practices was detected during routine Transport Canada inspections, yet the inspectors involved knew or ought to have known that, for a period of six months, Air Ontario F-28 C-FONF was operated without either an approved MEL or an

adequate store of spare parts. Further, the inspectors knew or ought to have known that, under such circumstances, aircraft serviceability would have been a serious problem.

What is most significant is that Air Ontario was allowed by Transport Canada to operate the F-28 aircraft in commercial service without an approved F-28 MEL or adequate supporting spare parts. It is true that there is no regulatory requirement for an MEL in Canadian commercial air carriage, and I have already questioned the wisdom of this situation. Air Ontario had planned to have an F-28 MEL developed and approved by February 28, 1988 – weeks before F-28 commercial service was to have started – yet that goal was not achieved until December 1988, months after commercial service began. Adequate supporting spare parts are required by regulation, and Air Ontario had planned to have them prior to commencing commercial F-28 service; this goal was also not achieved.

Had Air Ontario taken steps to implement its F-28 Project Plan in accordance with the schedule presented to Transport Canada and had Transport Canada monitored the progress of the Project Plan properly, withholding the necessary regulatory approval until all operational prerequisites were in place, the problems that were later manifested – for example, the irregular maintenance deferrals – could have been avoided.

Other deficiencies in the Air Ontario F-28 program that were discussed at length above include:

- the failure to make operational accommodation for the lack of F-28 ground-start facilities at Dryden;
- the untimely production, lack of coordination, and insufficiency of key operational manuals;
- the failure to develop and methodically disseminate operational guidance on refuelling and de-icing with main engines running;
- the failure to install a flight attendant shoulder harness on the F-28 aircraft; and
- the inadequacy of training and procedures within SOC.

All should have been addressed by Transport Canada and corrected by Air Ontario prior to the regulatory approval of Air Ontario's commercial F-28 service.

For this reason, I will conclude my examination of Air Ontario and its F-28 program by concentrating on the actions of the air carrier and the regulator during the planning, implementation, and certification stages.

Certainly, it may be argued that the Air Ontario F-28 program was not the only matter of concern to either Air Ontario management or Transport Canada inspectors. Air Ontario had hundreds of employees, operating many aircraft and aircraft types, and serving many cities. The

F-28 program was a relatively small, though significant, part of Air Ontario's overall operation. Transport Canada inspectors were similarly responsible for many air carriers operating hundreds of aircraft. Nevertheless, these facts in no way mitigate the responsibility that Air Ontario and Transport Canada had to ensure that the Air Ontario F-28 program was properly carried out.

It must also be noted that the findings of this Commission regarding the inadequacies of the Canadian air transportation system are the chance product of the tragic crash of Air Ontario flight 1363 on March 10, 1989.

Certification

The regulatory scheme in Canada is designed to give Transport Canada the ultimate authority over the licensing of commercial air carriers. The criteria and procedures for licensing air carriers operating large aircraft are set out in ANO Series VII, No. 2, and in Transport Canada internal policy and procedures manuals. The approval process requires that the operational soundness of a prospective air carrier operation be assessed by both the Air Carrier and the Airworthiness branches of Transport Canada's Aviation Regulation Directorate. The process is described in the Air Carrier Certification Manual of Transport Canada – Aviation Regulation Directorate (both the 1987 and 1990 editions):

> The applicant's ability to conduct the proposed operation safely, involves a determination as to whether or not his Company facilities and organizational structure, including properly licensed and qualified personnel, meet the applicable statutory and DOT policy requirements. This determination necessitates that DOT inspectors, as the first step, make themselves thoroughly familiar with all aspects of the proposed operation; identify all applicable requirements and then, measure the applicant's facilities and organizational structure (including properly licensed and qualified personnel in sufficient numbers) against the requirements.
>
> ...
>
> The tests of adequacy and capability apply not only in the case of an applicant for an Operating Certificate but also to any incumbent holder of such certificate. The basic intent of all inspection relative to certification is an on-going process of determining whether or not the Company meets and continues to satisfy the requirements.
>
> (Exhibits 1026, pp. 6–7; 1031, pp. 7–8)

An air carrier begins the certification process by filing with Transport Canada a written application for an operating certificate or an amendment to an operating certificate. As I have described earlier, this written

application would typically detail the specifications of the aircraft to be operated, the airports into which the aircraft is to be operated, the operations personnel involved with the program, and the maintenance facilities that will service the aircraft. Further, the proposed operation may also be described in narrative form. When Transport Canada receives the air carrier's application, regulatory personnel verify the contents of the application and assess the suitability of what is described. In this regard, the Air Carrier Certification Manual states:

> It is essential that inspectors ensure that the applicants' forms are properly completed and so verified by inspecting his aircraft facilities and by reviewing the applicants supervisory personnel.
>
> The importance of properly investigating the facilities to be provided and the operational feasibility of the proposed operation cannot be over emphasized.
>
> (*Exhibits 1026, p. 7; 1031, p. 8*)

Regulatory personnel are therefore charged with the responsibility of deciding whether the carrier has qualified management personnel and a training, operational, and maintenance infrastructure that will support adequately the safe conduct of the prospective operation. In short, the air carrier must be able to demonstrate to Transport Canada that it is able to operate the service safely, properly, and in accordance with the prescribed standards and procedures.

After what should be a very rigorous appraisal process, an operating certificate may be granted for the proposed air carrier operation. In addition, Transport Canada may impose special operating limitations upon a carrier; these are included on the face of the operating certificate or within the air carrier's approved operating specifications.

Once issued, the operating certificate can be rescinded or suspended for cause, as detailed in section 704 of the Air Regulations:

> 704. The Minister may cancel or suspend an operating certificate where
>
> (a) the holder of the operating certificate has failed to conduct the commercial air service in a safe and proper manner or to maintain adequately the equipment required in connection therewith;
>
> (b) the operation in respect of which the operating certificate was issued is discontinued; or
>
> (c) the Minister, on reasonable grounds, believes the holder of the operating certificate has contravened
>
> (i) any operations specifications,
>
> (ii) any provision of these Regulations, or
>
> (iii) any order or direction made pursuant to these Regulations.

This certification process should be considered as a very important regulatory function.[1] If the capability of a carrier to perform a given operation is assessed properly at the approval stage, many downstream safety problems can in all probability be avoided.

In pragmatic terms, an air carrier is much more amenable to the suggestions or requirements of the regulator while it is waiting for approval of its operating certificate than after that certificate is granted. Without the operating certificate, the air carrier cannot operate; therefore, there is a large incentive for the carrier to satisfy any and all regulatory requirements imposed upon it. The evidence revealed that the withdrawal or suspension of the operating certificate is considered to be a drastic enforcement tool which the regulator is loath to use. Therefore, while the regulator has the undivided attention of the carrier during the approval stage, the regulator should be extremely vigorous in reviewing the request for an operating certificate or amendment to an operating certificate, and insist that all operational prerequisites be in place before any such licence is granted.

Approval of the Air Ontario F-28 Program

Transport Canada was responsible for assessing Air Ontario's management and operational infrastructure prior to granting it a licence to operate the F-28 aircraft. Transport Canada failed to carry out this responsibility.

Air Ontario made a number of representations and undertakings about the operational infrastructure that was to support the proposed F-28 program in its January 24, 1988, application to amend its operating certificate. Certain facilities and personnel were represented to be in place prior to the commencement of F-28 commercial service. In particular, I note the following:

- There were to be 11 flight operations officers (dispatchers) who would be trained to be familiar with the F-28 aircraft and its systems, with special emphasis on flight planning, performance, and MEL procedures.
- By emphasizing that operations officers would be trained on MEL procedures, it is implied that there would be an MEL in place for use in the operation of the F-28 aircraft.

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[1] The three regulatory functions being certification (approval), inspection (monitoring), and enforcement.

- Air Ontario nominated Captain Claude Castonguay as an air carrier check pilot and described him as the company check pilot to be involved in the first revenue flight of aircraft C-FONF, implying that Captain Castonguay would have an ongoing role in the F-28 program.
- An "adequate spares package" was to be provided as part of the aircraft lease agreement.

Had Transport Canada officials carefully inspected the facilities and personnel in place at Air Ontario prior to the licensing of the F-28 service, using Air Ontario's application as a checklist, they would have discovered that:

- There was no meaningful training of dispatchers in Air Ontario system operations control (SOC) regarding F-28 flight planning, performance, and MEL procedures.
- There was no approved F-28 MEL in place.
- Captain Castonguay had resigned from Air Ontario as of February 29, 1988, less than six weeks after commencing his employment as the F-28 company check pilot, citing that he was not given adequate company support.
- The spares package in place at Air Ontario could not have adequately supported the aircraft C-FONF, particularly given that there was no approved MEL in place.

These and other operational deficiencies should have been remedied prior to the licensing of Air Ontario's F-28 service.

The evidence revealed several flaws in the selection and monitoring, by both Air Ontario and Transport Canada, of the Air Ontario management personnel responsible for the F-28 program. Certainly, it is a fact that management personnel who are unqualified or otherwise unable to perform their delegated tasks will diminish the overall effectiveness of any corporation. The selection of qualified and competent management personnel is particularly important in the aviation industry, in part because of the potential severity of the consequences of mismanagement, and also because of the extensive delegation of flight safety responsibility by Transport Canada to individual air carriers.

For the air transportation system to work, initiatives like the Air Ontario F-28 program must be managed by individuals with sufficient training, experience, and ability. Further, there must be management checks or safeguards within the corporate organization to ensure that if there is a failing on the part of any one manager, other individuals – in particular, more senior managers – will intervene to correct any problems.

The remainder of this chapter will examine the performance of Air Ontario management personnel with direct responsibility over the F-28 program.

The Planning and Implementation of the F-28 Program

The primary responsibility for the day-to-day coordination and implementation of the F-28 Project Plan was that of the project manager, Captain Joseph Deluce. Although the role of the project manager was never formally defined, Captain Deluce was described by Mr Syme, as the prime coordinator of the plan. Mr Syme further stated:

> A. ... In flight operations matters relating to the plan, he would have reported to Bob Nyman. In his coordinating role and facilitating role with respect to the plan outside of flight operations, he interfaced directly with myself.
>
> (Transcript, vol. 98, p. 53)

Mr Syme went on to describe the project manager as a "cross-departmental" facilitator (p. 175), and further:

> A. ... Joe was responsible for communicating to me, from his perspective, when the plan was getting off the rails or when the implementation date – you know, the assessment of the likelihood of the implementation date of the aircraft.
>
> (Transcript, vol. 98, p. 176)

When Captain Deluce became the F-28 chief pilot, he was charged with the additional responsibilities set out as follows in the Air Ontario Flight Operations Manual:

> 3.4 CHIEF PILOT - DUTIES, RESPONSIBILITIES AND AUTHORITY
>
> 1. The Chief Pilot is responsible to the Director of Flight Operations for the safe and efficient operation of Company aircraft, the administration of matters concerning pilots, pilot training, examinations, competency tests, enroute operations and operating limitations of aircraft and crew members.
>
> 2. He will set up such controls and checks to assure that D.O.T. and Company regulations, policies and standards are adhered to and to administer such disciplinary or other action as may be required for any infractions of Company policy or regulations or for failure to meet Company standards.

More specifically he will:

3. Establish such courses of ground school (in cooperation with the Training Manager), aeroplane simulator and flight training as are required to maintain pilot competency, to promote pilots from First Officer to Captain's rank, to convert pilots from one aircraft type to another and to check pilots out on appropriate routes.

4. Establish examinations (in cooperation with the Training Manager, Check Pilots and Training Pilots) that are acceptable to the D.O.T. to serve as tests of knowledge of pilot personnel.

5. Ensure compliance with ANO VII No.'s 2 and 3 in regards to the requirements for pilot proficiency checks, instrument checks, initial and recurrent ground and flight training and examinations.

6. In cooperation with Training and Check Pilots, write and update Standard Operating Procedures Manuals for each aircraft type.

7. Ensure that licensed personnel hold valid licenses, ratings and certificates.

8. Ensure the maintenance of current records on Company pilots, including:
   - personal file
     - employment history with the Company
     - garment purchase summary
     - vacation/L.O.A./sick leave history
     - loan card
     - pay and promotion memo's
     - photocopies of pilot licence, LVC, PPC card, radio licence, immunization record, first aid training etc.
     - warning reports
     - etc.
   - training file
     - training sessions, ground and air
     - etc.
   - training sessions, ground and air
   - check flights
   - examination results
   - flight times
   - information updates (biannually)
   - etc.

9. Ensure that D.O.T. approved CCP authorizations are kept valid.

10. Perform normal line pilot duties; and line checks, PPC's and instrument rides if so authorized.

11. Train and check pilots to assure retention of proficiency for the duties assigned, including:

    - line pilots
    - training pilots
    - check pilots

12. Be responsible for the overall supervision of crew scheduling and routing to assure that work available is equitably assigned to pilots in a manner which will enhance safety, permit planning as far in advance as is possible and which will not exceed D.O.T. or Company limitations of pilot time.

13. Check and approve flight crew expense claims as required.

14. Formulate and distribute information memos as required pertaining to Flight Operations.

15. Be responsible for the supervision of all pilots regarding working conditions, granting of vacation requests, and personnel problems.

16. Conduct initial survey flights of new routes and to establish such enroute limitations, procedures and checks as may be required to conduct safe operations over such routes.

17. Conduct such initial flights on new equipment as to become competent to serve as check pilot on such equipment and to establish procedures and regulations as are required to operate such equipment in service and to train and check out other pilots as may be required to operate such equipment.

18. Maintain a library of appropriate manuals as required by Transport Canada and Company policy, ensuring that amendments are inserted:

    - Flight Operations Manual
    - Crew Member Training Manual
    - Standard Operating Procedures Manuals
    - Aeronautics Act and Air Regulations
    - ANO VII No. 2 and ANO VII No. 3
    - AIP
    - Designated Airspace Handbook
    - Canada Air Pilot
    - L.E. Charts

> 19. While some of these duties may be delegated to other company personnel, ie., (Chief Training Pilot) the Chief Pilot will maintain overall responsibility.
>
> (Exhibit 146, s. 3.4)

From this lengthy list of duties and responsibilities I note in particular the chief pilot's responsibility for "the safe and efficient operation" of the aircraft, including the writing and updating of standard operating procedures manuals for the F-28 and the formulation and distribution of information pertaining to F-28 flight operations.

The specific shortcomings in the F-28 program that should have been but were not addressed and remedied by Captain Joseph Deluce - as the F-28 project manager and F-28 chief pilot – include:

- the operation of the F-28 aircraft without an approved minimum equipment list;
- the deferral of the maintenance of essential aircraft equipment absent an approved minimum equipment list;
- the operation of the F-28 aircraft without a single standardized aircraft operating manual, with an appropriate amendment service;
- the operation of the F-28 aircraft without standardized operational procedures, disseminated to all relevant operational personnel, regarding the de-icing of F-28 aircraft with a main engine running;
- the operation of the F-28 aircraft without standardized operational procedures, disseminated to all relevant operational personnel, regarding the refuelling of F-28 aircraft with a main engine running;
- the operation of the F-28 aircraft without standardized procedures, disseminated to all relevant operational personnel, to accommodate for the lack of ground-start facilities in Dryden and aircraft operations with an unserviceable auxiliary power unit;
- the operational control of F-28 aircraft by flight operations officers who were inadequately trained generally, and who were inadequately trained specifically with regard to F-28 operating procedures; and
- the operation of the F-28 aircraft without standardized operational procedures, disseminated to all relevant operational personnel, regarding takeoffs from slush-covered runways.

The fact that Captain Deluce did not fulfil certain aspects of his management duties and responsibilities represents a failure in the air transportation system. While a finding of pilot error should only be the starting point in the analysis of an aircraft accident, it is equally true that the identification of the management failings of one air carrier manager should only be the starting point in an examination of the management organization within which that individual worked. In analysing the

failure of Air Ontario management, the following issues were explored in evidence:

- **The Performance of the F-28 Project Manager and F-28 Chief Pilot** What were the duties and responsibilities of this individual who was immediately responsible for the day-to-day operation of the F-28 program? How did he fail to fulfil these duties?

- **The Role of Supervisors** What management safeguards were in place to recognize the difficulty that the F-28 project manager and F-28 chief pilot was experiencing? Why did the supervisors not intervene?

- **The Management Selection Process** To the extent that the individual was not able or qualified to perform his required duties as F-28 project manager and F-28 chief pilot, how and why was he selected for the management position?

The Performance of Captain Joseph Deluce, F-28 Project Manager and Chief Pilot

Captain Joseph Deluce was given a great deal of responsibility in the period from October 1987 until June 1989. On the recommendation of his brother, CEO William Deluce, Captain Joseph Deluce, then a line pilot on the HS-748 aircraft, was selected as the F-28 project manager. He initially assisted chief operating officer Thomas Syme in formulating the first F-28 Project Plan and then, in consultation with managers from the maintenance, flight operations, and marketing departments, he produced the revised F-28 Project Plan of December 28, 1987. He was formally appointed F-28 project manager in early January 1988. As project manager it was his responsibility to coordinate and facilitate the completion of the various tasks on the Project Plan.

While Captain Deluce was coordinating the implementation of the F-28 program, he was also training on the aircraft. To increase his experience on the F-28, he flew 59.2 hours with TimeAir in western Canada. Because of the Air Ontario pilot strike in the spring of 1988, he interrupted his flying with TimeAir to fly Air Ontario HS-748 aircraft in Northern Ontario. Following the pilot strike he became involved in importing from France the first F-28, C-FONF. Many items on the F-28 implementation plan were still outstanding when Air Ontario commenced F-28 commercial service in June 1988. Instead of concentrating his managerial efforts on completing the tasks necessary for the safe and efficient operation of the F-28 – tasks that should have been completed before commercial service began – Captain Deluce was flying the line and training and checking the F-28 pilots. In fact, during the period from

June until September 1988, Captain Deluce logged over 220 hours on the F-28, a normal full-time flying schedule for most commercial pilots.

The most critical period in the F-28 program, in my view, occurred in late 1988. In November 1988, the second F-28, C-FONG, was imported from France. In December 1988 Mr James Morrison reorganized the flight operations department so that Captain Joseph Deluce formally became the F-28 chief pilot. At about the same time, Air Ontario lost its access to the Piedmont/USAir F-28 flight simulator, and Captain Deluce commenced the flight training of Air Ontario crews on the F-28 aircraft in Winnipeg at night. Captain Deluce at this time was wearing many hats, too many in my view. He was the F-28 chief pilot, an F-28 training pilot, an F-28 company check pilot, and the Convair 580 chief pilot. In addition, there were still critical items outstanding from the F-28 implementation plan, and as the F-28 project manager it was still his responsibility to see that they were completed.

The fact that Captain Joseph Deluce was overburdened did not go undetected by his fellow pilots. Captain Erik Hansen, one of Air Ontario's most senior pilots, testified that, in his opinion, Captain Deluce was wearing "too many hats" and that he was spreading himself too thin (Transcript, vol. 94, pp. 118–19). Further, Captain Hansen testified that he spoke with Captain Deluce about these concerns, advising him "you need help" (Transcript, vol. 94, p. 158). Captain Deluce, when asked about his workload during the critical period and about Captain Hansen's comments, admitted that he had "a lot on my plate." He testified as follows:

> A. I can't deny the fact that I was very busy. What can I say? I ... worked very hard. I tried to deal with ... the operation in the best way that I could, and –
> Q. Were you overworked, sir, at that time? Did you have too much on your plate?
> A. Well, that's a difficult question to answer. I guess, if I had to describe it, I would have to talk about the whole process, and –
> Q. In hindsight, do you think that you had too much on your plate, Captain Deluce?
> A. Maybe I should describe how I viewed being taken onto projects .... [I]n taking on any new project or new job, one anticipates having to do a lot of work.
> ...
> Myself, I usually, when I have taken on a new job, I kind of put in my mind a year's time frame where you're really going to have to put a lot of extra effort into things, and at about that time, you would feel like it would ... you know, you've gone through the learning curves and ... you would be getting on top of things and things would settle down. And that happened with the project itself, and ... at the end of that year, there were

> a few items outstanding before I took the chief pilot's job, but ... they were items that could have been addressed by a new chief pilot or a combination of check pilots.
>
> I took a considerable amount of time off at that point to, you know, re-energize myself ... and to start into the new year with renewed energy, and with the circumstances as they fell ... losing the simulator slot and having to reorganize an airborne training program and to do the training myself and that running through into the end of February and then the accident happening ... and then everything that happened after that, I had a lot on my plate. I admit that.
>
> (Transcript, vol. 114, pp. 30–31)

While the loss of access to the Piedmont/USAir simulator did represent a critical juncture in the Air Ontario F-28 program, the evidence revealed that there were operational problems with the program from the commencement of commercial service in June 1988.

The evidence clearly shows that, throughout the period from early 1988 up to and including March 10, 1989, Captain Joseph Deluce was overburdened by his multiple duties and responsibilities. I make no assessment of Captain Deluce's ability to perform adequately in any one of the multiple positions that he held if unencumbered by other duties. However, it was his clear responsibility to advise his superiors, at an early stage, that he was unable to carry out all of his tasks. This he did not do.

The Role of Senior Flight Operations Managers

Captain Joseph Deluce, as a relatively young, inexperienced manager, took on more responsibility than he could reasonably handle. It is surprising that senior operational managers at Air Ontario did not recognize that Captain Deluce was in some difficulty, that the F-28 program was suffering as a result, and that immediate steps had to be taken to remedy the situation.

I am of the view that a reason for the lax supervision of Captain Joseph Deluce was the fact that the company as a whole was undergoing great change. Managers who should have been scrutinizing the F-28 program were occupied by the management of the newly merged company. As described in the early chapters of this part of the Report, Air Ontario's managerial resources were greatly taxed during the functional merger of the two regional carriers. The divestment of northern operations, the depletion of up to one-third of its employee group, the consolidation of its operation in London, Ontario, the merger of two disparate pilot groups, a lengthy pilot strike, the cultivation of a new relationship with the new controlling shareholder, Air Canada, the

rationalization of its aircraft fleet, and the introduction of a new aircraft type all represented significant challenges to Air Ontario management in the 18 months following the merger.

While management distraction is a partial explanation for the lack of scrutiny of the F-28 program, it appears from the evidence that Captain Deluce was as disinclined to be supervised and to take advice from any source as some of his superiors were disinclined to give advice to him. There were a number of examples of this state of affairs.

When Captain Nyman learned that there were two different aircraft operating manuals, the Piedmont manual and the USAir manual, being used by Air Ontario F-28 pilots, he immediately asked Captain Deluce to place a copy of the Piedmont manual in both F-28s (Transcript, vol. 109, pp. 67–68). This measure could have served as an interim solution – though an inadequate one – pending the completion of the Air Ontario F-28 aircraft operations manual. Neither Captain Nyman nor Captain Deluce did anything to follow up this request.

Captain Robert Perkins, a senior Air Ontario pilot, an F-28 captain, and a F-28 company check pilot,[2] testified that in December 1988 he advised Captain Joseph Deluce that they should either develop their own Air Ontario F-28 operations manual or subscribe to an amendment service for the Piedmont F-28 operations manual (Transcript, vol. 44, p. 94). In fact, Captain Perkins and another Air Ontario pilot, Steven Burton, were enlisted to assist in the production of the F-28 aircraft operating manual. However, no amendment service to the Piedmont manual was ever obtained by Air Ontario, and the Air Ontario F-28 operating procedures manual was not submitted to Transport Canada for approval until June 7, 1989, the same month that Air Ontario discontinued its F-28 service and three months after the crash of C-FONF.

Interestingly, when the Air Ontario director of flight operations, Captain Clifford Sykes, attempted to intervene in the F-28 operations, Captain Deluce responded with vigour. The following excerpt from a post-crash memorandum (dated March 31, 1989) from Captain Deluce to Captain Sykes, his superior, provides a revealing glimpse into their working relationship:

> The second comment I would like to make relates to your comments to other pilots on the operation of the FK28. As Chief Pilot it is very clear to me that I am responsible to the Director of Flight Operations for many things. A large list is contained in the Flight Operations Manual. I'm responsible for setting up standards and monitoring

[2] Captain Perkins was granted "B" authority CCP status on January 30, 1989 (see chapter 20, F-28 Program: Flight Operations Training).

> standard operating procedures with the assistance of the check pilots. These standards can only be maintained if changes warranted come out directly from me. Interference from you and direct communications with crews on SOP type items or systems will ensure a brake [sic] down of the system and lead to many different procedures. I am very interested in any comments you have about what you see on the line but I would appreciate these comments coming directly to me. I will research these items and correct any that need correction and advise you. You are not an experienced F-28 pilot, nor a check pilot, nor a training pilot on that aircraft. Don't be drawn into the trap if [sic] thinking you are and passing on incorrect information. Besides I'm responsible to you to do a job. Help me do it but don't do it for me.
>
> (Exhibit 897)

Captain Deluce properly identified in this memorandum the importance of flight standards and some his duties and responsibilities as chief pilot. However, he failed to mention that, at the date of his memorandum, March 31, 1989, although he was responsible for them, there were still no Air Ontario standard operating procedures in place for the F-28 aircraft. What I find most revealing is the tone Captain Deluce took with his superior. The working relationship reflected in this memorandum does not, in my view, reflect the usual subordinate/superior relationship that one would expect to find in any organization.

It would appear that Captain Joseph Deluce had more influence within Air Ontario than his position on the organization chart would indicate. His direct line supervisors, Captain Nyman, Captain Sykes, and Mr Morrison, seemed unwilling or unable to exert any influence over Captain Joseph Deluce. Indeed, when Captain Deluce was involved in a number of flight safety–related incidents as a line pilot, he appears to have been immune from criticism by his superiors.

Captain Nyman's handling of Captain Deluce's December 15, 1987, HS-748 icing incident is telling (see chapter 24, Flight Safety). After what was a very serious incident, one which could easily have resulted in a serious accident and which was similar to an equally serious icing incident involving Captain Deluce the previous year, Captain Nyman, as the director of flight operations, did nothing to criticize or discipline Captain Deluce.

Captain Nyman's treatment of an incident involving pilot Keith Mills presents an interesting contrast to his treatment of Captain Deluce's incidents. Following an HS-748 aircraft runway-overrun incident at Marathon, Ontario, on May 15, 1988, in which Keith Mills was the captain, Captain Nyman ordered Captain Mills to undergo 50 hours of line indoctrination. In meting out this discipline, Captain Nyman advised Captain Mills that, had it not been for his previously good

record, the discipline would have been even more severe, including a period of suspension without pay. In his testimony Captain Nyman acknowledged that, as director of flight operations, his disciplinary response to an incident includes a consideration of the pilot's safety record. Given that testimony by Captain Nyman, it is indeed curious that Captain Deluce's two virtually identical icing incidents, involving potential loss of life, failed to attract any discipline at all.

Not only was Captain Deluce not disciplined for his second icing incident, but, when he was considered for and granted the position of F-28 chief pilot, his incident/accident record was not even taken into account. These incidents should have alerted the company's senior managers that Captain Deluce, at the very least, may not have been capable, as the F-28 chief pilot, of commanding the respect of F-28 flight crews on questions of flight safety.

Some months following his appointment as F-28 chief pilot, Captain Deluce was implicated in an anonymous incident report involving a destabilized approach of an F-28 aircraft. The alleged incident, which was reported to have occurred at Pearson International Airport on April 4, 1989, 25 days after the Dryden crash, was brought to the attention of the vice-president of flight operations, James Morrison. Mr Morrison, in examining the alleged incident, simply accepted Captain Deluce's denials thereof without further investigation. Given Captain Deluce's previous history, Mr Morrison should have investigated the matter thoroughly. When questioned on his own handling of this anonymous incident report, Mr Morrison criticized flight safety officer Ronald Stewart for performing an inadequate investigation. However, it is not the role of a flight safety officer to investigate incidents for the purposes of discipline. Such investigations are more appropriately conducted by flight operations management personnel, like the chief pilot or the director of flight operations. Mr Morrison was certainly able to direct an investigation into this matter, yet he chose not to.

In spite of frequent assertions by Captain Nyman and other members of Air Ontario senior management that Captain Joseph Deluce was treated like any other pilot, the preponderance of evidence suggests otherwise. I am of the view that, given Captain Deluce's flying record, had he not been a member of the family that owned and operated Air Ontario, it is unlikely that he would have been selected as the F-28 chief pilot and F-28 project manager – two critical management positions.

Air Ontario Management Selection: "Best Man for the Job"

It is the responsibility of any chief executive officer to determine the needs of his company and to take appropriate steps to meet these needs.

Senior management selection is one of the most important responsibilities of the CEO.

Although the Air Ontario president and CEO, Mr William Deluce, delegated more authority to others in the management of Air Ontario Inc. than he had in the earlier history of his company, he testified that he was still active in selecting his managers. When asked about the basis of his selection of his senior managers, Mr William Deluce testified that his sole criterion was to appoint "the best man for the job" (Transcript, vol. 151, p. 175). If this criterion was in fact followed, then Mr William Deluce was doing what chief executive officers are expected to do: exercise his judgement in the selection of his managers.

There was much testimony regarding the criteria for the selection of managers at Air Ontario. In particular, questioning centred on the selection of Deluce family members and former Austin Airways personnel to key management positions.

Mr William Deluce rarely went outside the sphere of his family companies in search of new management candidates, preferring instead to promote managers from within his company. In his selection of operational managers, I find from the evidence that there was, in the merged company, Air Ontario Inc., a definite preference for former Austin Airways personnel – individuals with whom Mr Deluce had a long familiarity – as opposed to former Air Ontario Limited personnel. In my view there is nothing inherently wrong with this approach to the selection of managers, as long as the selected individuals perform effectively as managers.

Mr Syme and Mr William Rowe both described their own concerns regarding the possibility of nepotism – "undue favour from holder of patronage to relatives" and "favouritism shown to relatives in conferring offices or privileges" (Concise Oxford Dictionary) – being the basis of some management selections. Mr Rowe, the Air Canada representative on the Air Ontario board of directors, stated that he did not want there to be a perception that Air Canada supported nepotism in management selection. Further, he expressed Air Canada's concern that the long-term senior management at Air Ontario be secured and not be merely dependent on the Deluce family. Mr Syme, though denying any nepotism in management selection, testified that he was aware of resentment among junior managers and employees who felt nepotism was a basis for management selection at Air Ontario.

Nepotism is often viewed as a pejorative term, and questioning of Air Ontario management witnesses in this regard may have implied that there was something inherently wrong in Mr William Deluce sponsoring the appointment of his brothers Bruce and Joseph to key management positions. Again, I am of the view that there is nothing inherently wrong in the selection of family members to significant management positions,

as long as those selected are the best individuals available to fill the position and have not been shown undue favour. Certainly a chief executive officer must be given discretion to manage his company in the manner that he sees fit. A CEO is accountable to his shareholders by way of his board of directors. If a board of directors is unhappy with the performance of the CEO, it can, at least in theory, take appropriate action, including the CEO's removal. Such removal may in actual practice be difficult to accomplish where the CEO holds a substantial interest in or is in a position to exercise control of a company.

What is more important than the issue of nepotism is the effectiveness of Air Ontario management as it relates to the crash of flight 1363. After an extensive review of the evidence, I find that the deficiencies in the F-28 program were ultimately attributable to bad management. There can be no doubt that those managers responsible for the Air Ontario F-28 program were not discharging their duties and responsibilities effectively.

Captain Joseph Deluce was the manager principally responsible for the implementation of the F-28 program and the ongoing F-28 operation. The question to be answered, therefore, is whether Captain Deluce was the best man for the job of F-28 project manager and chief pilot. To answer the question, the circumstances surrounding his selection should be considered.

In the autumn of 1987, when the F-28 program was in its earliest planning stages, CEO William Deluce suggested to group vice-president Thomas Syme that Joseph Deluce be made the project manager of the F-28 program. Having regard to the evidence surrounding this management selection, I am satisfied that Joseph Deluce was appointed project manager without Air Ontario management having considered other candidates or critically discussing the appointment.

With the reorganization of the flight operations department in 1988, there was a formal posting of the position of F-28 chief pilot. Initially, Captain Joseph Deluce was the only applicant for the position. Somewhat surprisingly, he encouraged Captain Erik Hansen, a former Air Ontario Limited pilot with far more experience than Captain Deluce, also to apply for the position. Interviews were conducted of the two candidates by the vice-president of flight operations, James Morrison, the director of flight operations, Robert Nyman, and the vice-president of human resources and corporate affairs, Jack McCann. Captain Joseph Deluce was selected as the chief pilot for the F-28. It is significant that while Joseph Deluce was performing the function of F-28 chief pilot from as early as July 1988,[3] there was no formal posting for the position until August 1988.

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[3] Thomas Syme in Transcript vol. 99 at p. 148

As the F-28 project manager, Captain Deluce was to coordinate operational and commercial aspects of the plan. In an undated status report written by him in late June or early July 1988 – after approximately one month of F-28 commercial service – Captain Deluce identified a number of F-28 program requirements that had not yet been completed (Exhibit 807). Included among these outstanding items were:

- Air Ontario F-28 training syllabus
- F-28 training manual
- F-28 standard operating procedures manual (SOPs)
- Securing appropriate F-28 spares

As has been noted elsewhere, two of these four items (completing the F-28 SOPs manual and securing appropriate spares), in addition to many others, were in fact still outstanding at the time that Air Ontario discontinued F-28 service, approximately one year later.

In the same status report, the F-28 project manager, Captain Joseph Deluce, pointed to scheduling reliability as the single most important problem with the F-28 program at that early stage. Inexperienced flight crews, low levels of expertise among maintenance personnel, and insufficient spares were identified as causing the reliability problems. To overcome the problems of inexperience and lack of expertise, Captain Deluce suggested that aircraft utilization, which he described as "poor," be significantly increased. He wrote:

> The second important problem with the F-28 is its poor utilization. The F-28 is presently only being scheduled for 1300 hours air time and there are approximately 200 additional hours of air time developed in the charter side of the operation. I can appreciate being reluctant to increase utilization until reliability improves but there should be some definite plans to increase it. The more experience we have operating the aircraft, the faster our learning curve and the more reliable our F-28 operation will become.
>
> Another factor of importance is that our economic analysis was based on much higher utilization and will be severely hampered by lower utilization.
>
> ...
>
> Increased utilization with adequate backup is also an important recommendation. It will speed up both flight crew and maintenance learning process. It will spread our lease costs over more flying and thereby decrease our cost of operations/hour.
>
> (Exhibit 807)

Captain Deluce was suggesting that, if they did not fly the F-28 more, their profit projections would not be realized. Further, he was suggesting that, because there was a lack of experience and expertise on the F-28,

they should fly the plane more to gain experience. I find these two suggestions to be very troublesome. One would expect that any financial pressure would come from the commercial side of Air Ontario management, not the operational side. I find it curious that an individual who should have been concentrating on the operational deficiencies in the program, which were numerous, should be so concerned with meeting the company's profit projections for the aircraft. In the normal course one would expect, and rely upon, operational management to advocate conservative operational practice in the face of pressures from the financial side of the organization. In this case, in fact, the roles were reversed: the more conservative judgement of Mr Thomas Syme carried the day and the more restrictive F-28 utilization continued.

I find it ironic that Mr Syme, who had no real operational experience and who personally generated the financial projections for the F-28 acquisition, was directing Captain Joseph Deluce, described as the de facto chief pilot at this point, to take a more cautious and conservative approach to F-28 operations.

It has been demonstrated throughout this part of the Report that, when Captain Deluce was unchecked in his supervision of the F-28 program, pilots were left to determine their own standards and operational practices, and prudence and conservatism were often lost in the pilots' collective enthusiasm to see their first jet operation succeed.

Regulatory Requirements

ANO Series VII, No. 2, section 5, requires that air carriers have qualified managerial personnel employed on a full-time basis in the positions of managing director, director of flight operations, director of maintenance and engineering, chief pilot, and chief maintenance inspector or their equivalent. The ANO does not detail any qualifications for the director of flight operations or the director of maintenance and engineering. Instead, there is simply a statement that the individuals filling these management positions must have qualifications, background, and experience which "are satisfactory to the Director [of Civil Aviation]."[4] There is no further elaboration as to what is a "satisfactory" standard. The role of the director of flight operations is similarly undefined.[5]

Only marginally more helpful are the criteria for chief pilots and chief inspectors of maintenance. These criteria require, in essence, that chief pilots and chief inspectors be licensed to operate or maintain large aircraft, that they have knowledge of the operation of their air carrier,

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[4] ANO Series VII, No. 2, s. 6(1)

[5] Passing reference is made to the director of flight operations position in ANO Series VII, No. 2, section 15, in the context of operational control and flight watch.

and that they have knowledge of their regulatory obligations "necessary for the proper performance of [their] duties." Neither the Air Regulations nor the ANOs specify the role or duties of the chief pilot and chief inspector.

Of the named mandatory managerial positions, the most enigmatic is that of the managing director. This position is undefined, but, given the structure of section 5 of ANO Series VII, No. 2, it can be inferred that the managing director is to perform some sort of senior management supervision of both the maintenance and the flight operations departments. Curiously, the reference in section 5(1)(a) is the only reference in the entire ANO Series VII, No. 2, to the managing director position. There is no definition of the role of the managing director, nor is there a statement of required qualifications. If the regulator is of the view that such a position is to be required of all Canadian air carriers, then the position should be defined in a meaningful way.[6]

Alternatively, if no function or qualification is to be specified for the managing director position, the reference in the ANO to the position should be eliminated. This criticism, though directed at only one example of vagueness in the ANO, is applicable to the entire aviation regulatory regime. Time and again I heard evidence of vague and imprecise regulation which defied meaningful interpretation. Such regulation serves no useful purpose: it provides no assistance to the good faith operator who seeks to understand what the regulator expects of it; and it is similarly unhelpful to the front-line Transport Canada inspector who seeks to monitor air carrier operations and to enforce minimum standards.

I am of the view that the ANO, in its present form, has no meaningful standard by which air carrier management is to be scrutinized and approved. This problem with the ANO was acknowledged by some of the Transport Canada witnesses who appeared before me, including Mr Neale MacGregor, Transport Canada regional manager air carrier operations in Pacific Region. Mr MacGregor testified that, in the absence of precise regulation or direction from Transport Canada headquarters, his group, on its own initiative, began interviewing chief pilot candidates before approving them:

> A. ... I think we need to be tougher with management ... We implemented a system whereby we do reject chief pilots, even though the order doesn't say we can. We do.
> Q. Which order are you referring to?

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[6] The Canadian regulatory regime will be discussed at length in chapter 34, Operating Rules and Legislation.

A. The Air Nav Orders, 2, 3 and 6, that lay out the requirements for chief pilots.

...

A. ... We do have the candidate for chief pilot and operations manager come in. At least two inspectors interview the individual. If I'm present, I also take part. And we also give them an exam and we've rejected quite a few. And I think we have to be tougher in that area.

Q. What characteristics are you –

A. Get responsible people in those positions.

Q. ... What characteristics are you looking for when you interview for chief pilots?

A. Well, I think it has to be a very sound individual, someone who has a good knowledge of aviation and sound practices. Somebody has a backbone not to knuckle under to management in every instance.

We do spell out that it's a job that we are approving. If you foul up, don't ever look for that authority again, no matter what carrier you are with.

We look for a good solid background in aviation and in the individual himself. If he has had violations against him, I don't believe that person should wear a collar forever, but he has to be accounted for. He is accountable.

(*Transcript*, vol. 141, pp. 78–79)

While Mr MacGregor is to be commended for his initiative in identifying a deficiency in the ANO and attempting to rectify the deficiency by way of internal regional policy, I am of the view that this ad hoc type of solution to the problem of imprecise regulations is altogether undesirable and unacceptable. It is the responsibility of Transport Canada senior management at headquarters, not individual regional managers, to establish regulatory standards of universal application. Without leadership from Transport Canada senior headquarters management, an air carrier operating in good faith would be vulnerable to an unfair application of idiosyncratic standards at the regional level. The acceptability of an individual candidate for chief pilot could, for example, vary greatly from region to region or inspector to inspector.

Transport Canada's standards for the selection of air carrier management are clearly deficient; the method by which Transport Canada applies these standards is equally lacking. Regardless of the deficiencies of ANO Series VII, No. 2, the requirement that the qualifications, background, and experience of management candidates be satisfactory to the director must nevertheless be applied.

Air Ontario described the structure of its flight operations management, and the positions involved, in its Flight Operations Manual, which

was submitted for regulatory approval in September 1987, and finally approved in February 1988.[7] In the manual, the duties and responsibilities for the director of flight operations, the chief pilot, and indeed all operational positions – except the vice-president of operations – are defined as per the requirement of the ANO. Presumably, the qualifications of the individuals performing the flight operations management functions were appropriately reviewed by Transport Canada and found to be satisfactory.

Further evidence of a regulatory review of the Air Ontario management is seen in the Air Ontario application to add the F-28 to its operating certificate. The application, dated January 24, 1988, lists four supervisory managers with a notation that their résumés were on file with Transport Canada. Again, because the Air Ontario operating certificate was amended to include the F-28 aircraft in June 1988, presumably the qualifications of the named supervisory managers were scrutinized and found to be acceptable.

Similarly, in November 1988, when Captain Joseph Deluce formally became the F-28 chief pilot, his qualifications were submitted to Transport Canada for review. In this résumé, which was signed by Captain Joseph Deluce and Mr James Morrison, Air Ontario vice-president of flight operations, there is a statement that the chief pilot nominee, Captain Joseph Deluce, is suitable for the duties of chief pilot as laid out in the Air Ontario operations manual and that he meets the requirements set out in schedule A to ANO Series VII, No. 2.

These were the only examples cited at this Inquiry of a Transport Canada review of the management personnel requirements of Part I of ANO Series VII, No. 2.

On the basis of the evidence, I would have to say that there are deficiencies in both the substance of the ANO criteria for management and the method of review and enforcement of the criteria. To reiterate my earlier comments, the ANO Series VII, No. 2, management criteria are deficient because the ANO does not adequately define, in function and qualification, the required management positions.

It is the responsibility of Transport Canada headquarters to promulgate comprehensive, well-defined operational standards, including standards for operational managers.

Mr Syme testified that his principal indicator of the F-28 program being on track was the successful amendment of Air Ontario's operating certificate. Mr Syme's evidence suggests that, for him, the approval of the regulator was the external check he relied upon. Having reviewed the Air Ontario F-28 program and the role of Transport Canada in

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[7] See chapter 32, Audit Program, for a description of the circumstances surrounding the delay in manual approval.

licensing the F-28 operation, notwithstanding several material deficiencies, I am of the opinion that the reliance of Mr Syme, and indeed the reliance of the travelling public, on Transport Canada to provide an external check and assure a level of safety and integrity of air carrier operation was misplaced.

Findings

Transport Canada's Review of the Air Ontario F-28 Program

- The air carrier certification process is a very important Transport Canada regulatory function which, if properly performed, provides the opportunity for the regulator to interdict, at the approval stage, potential safety problems.

- Transport Canada should have withheld the necessary regulatory approval of the Air Ontario application for amendment of its operating certificate to include the F-28 aircraft until all operational prerequisites were in place at Air Ontario.

- The review by Transport Canada of Air Ontario's application for an amendment of its operating certificate to include the F-28 aircraft was wholly inadequate.

- Some of the material representations made in Air Ontario's application in January 1988 for an amendment to its operating certificate to include the F-28 aircraft were no longer valid in June 1988 when F-28 commercial service commenced. This fact went undetected by Transport Canada.

- The regular inspection and audit functions of Transport Canada should have detected the material discrepancies between what was represented in Air Ontario's application for the operating certificate amendment and that which was actually in place at the air carrier when commercial F-28 service commenced in June 1988 and thereafter.

- Air Navigation Order Series VII, No. 2, does not adequately describe the qualifications, duties, and responsibilities of the mandatory air carrier management positions of managing director, director of flight operations, director of maintenance, chief pilot, and chief inspector.

The treatment of these positions in ANO Series VII, No. 2, is so ill-defined and vague as to provide little meaningful assistance or guidance to either the regulator or the air carrier.

Air Ontario Management Supervision of the F-28 Program

- It was the duty of the Air Ontario senior management to ensure that the implementation and operation of the F-28 program under the direction of Captain Joseph Deluce, as the F-28 project manager, was properly monitored and supervised.

- The senior management of Air Ontario failed to supervise properly and effectively the implementation and operation of the Air Ontario F-28 program under the direction of the F-28 project manager, Captain Joseph Deluce, as it was their duty to do.

- The lack of proper monitoring and supervision of the F-28 program by senior Air Ontario management contributed to the deterioration of that program's operational standards to unacceptable levels.

- Of the senior Air Ontario management personnel who testified, Mr William Deluce, Mr Thomas Syme, Mr James Morrison, Mr Kenneth Bittle, Captain Robert Nyman, and Captain Joseph Deluce were the Air Ontario senior managers principally responsible for the Air Ontario operation in general and the F-28 program specifically.

- As the F-28 project manager and F-28 chief pilot, Captain Joseph Deluce was the manager having direct day-to-day responsibility for the implementation and operation of the F-28 program. The deficiencies noted in the F-28 program reflect poorly upon his performance as the responsible manager.

- The demonstrated deficiencies in the Air Ontario F-28 operation were, at least in part, attributable to the lack of a program manager possessing substantial experience on the F-28 aircraft and to ineffective management of the program.

- The senior management of Air Ontario did not exercise good judgement in allowing the obvious overburdening of its F-28 program manager, Captain Joseph Deluce, with several other onerous and concurrent responsibilities, including those of F-28 chief pilot, F-28 training pilot, F-28 company check pilot, Convair 580 chief pilot, and F-28 line pilot.

- The merit principle was not always the primary criterion for management selection at Air Ontario. It is a compelling inference from the evidence that Mr Bruce Deluce and Mr Joseph Deluce were selected for key Air Ontario management positions, in part because they were members of the family which had a significant ownership interest in the company. Certainly an ownership interest should not disqualify an individual from management positions within an airline; however, the merit principle should be one of the primary hiring criteria.

- The dislocation among both the employee and management groups at Air Ontario, in the period following the merger of Air Ontario Limited and Austin Airways Limited, and the demands upon senior management created by the merging of the two disparate air carrier operations contributed to the poor management and supervision of the F-28 program.

- The lack of senior management supervision of the F-28 program was partially attributable to senior management involvement with other pressing concerns, and partially to an apparent unwillingness or inability on the part of senior Air Ontario management to scrutinize the performance of its F-28 program manager.

- Captain Joseph Deluce, as the F-28 program manager, was as unwilling to accept advice from his management supervisors as they were unwilling or unable to exert any influence over him.

- The F-28 project manager, Captain Joseph Deluce, although clearly a well-intentioned individual, ought to have recognized his own human limitations and not allowed himself to become so overburdened with multiple responsibilities that he became overwhelmed by them, as indeed occurred.

- Air Ontario was not ready in June 1988 to put the F-28 aircraft into service as a public carrier.

RECOMMENDATIONS

It is recommended:

MCR 104 That Transport Canada ensure that Air Navigation Order Series VII, No. 2, section 5, be amended to provide a clear statement of the duties, responsibilities, and qualifications for all air carrier management positions set out therein.

MCR 105 That Transport Canada develop standard criteria for the qualifications of all air carrier management positions set out in Air Navigation Order Series VII, No. 2, section 5. Such criteria should include consideration of the following attributes of the respective management candidates:

- aviation and management experience;
- flying experience;
- professional licences, such as aircraft maintenance engineer or airline transport rating;
- incident and occurrence record;
- knowledge of the *Aeronautics Act*, Air Regulations, and Air Navigation Orders, including air carrier certification requirements and procedures; and
- knowledge of the appropriate air carrier manuals necessary for proper performance of duties and responsibilities.

MCR 106 That Transport Canada ensure that, once standard criteria referred to in MCR 105 are established and published, all air carrier management candidate approvals be subject to such criteria being fully satisfied.

MCR 107 That Transport Canada ensure the ongoing and adequate surveillance and monitoring of new aircraft implementation programs by Canadian air carriers.

MCR 108 That Transport Canada proffer for enactment legislation imposing upon an air carrier concurrent responsibility with the pilot-in-command for the safe and proper crewing, dispatch, and conduct of a flight over which the air carrier exercises any degree of operational control. (The adoption of the United States Federal Aviation Regulation 121 would address this area of concern.)

MCR 109 That Transport Canada ensure that the investigation of any violation of the Air Regulations or Air Navigation Orders committed by an air carrier pilot or an aircraft maintenance engineer include an examination of the air carrier's contribution to the circumstances or environment that may have led to such violation. Where such an investigation reveals that the air carrier's contribution was significant, appropriate and parallel enforcement action should be taken against the air carrier as well as against the individual.

26 THE ROLE OF AIR CANADA: PARENT/SUBSIDIARY IMPLICATIONS

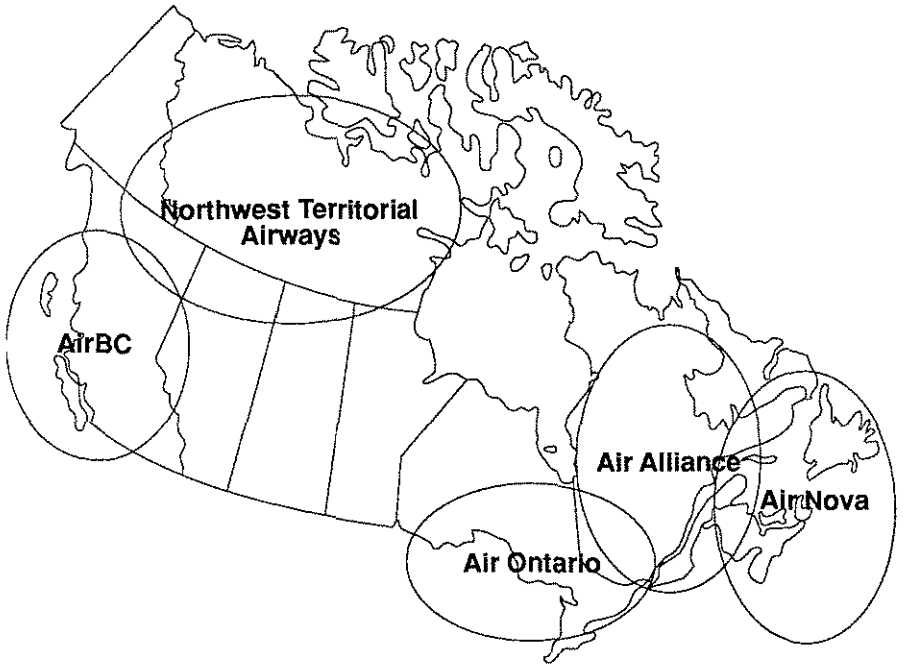
One of the focal points of aviation accident investigative scrutiny is the management of the air carrier under whose operational control the aircraft was being flown at the time of the accident. A proper assessment of the operational environment surrounding the Dryden accident required that the investigation go beyond the management of Air Ontario Inc., the operator immediately involved. A controlling interest in Air Ontario is, and was on March 10, 1989, owned by Air Canada. More significantly, Air Ontario's corporate vision, in large measure, was to serve the competitive requirements of Air Canada which were heightened and refocused by the deregulation of the Canadian airline industry. Further, Air Ontario was marketed as part of Air Canada's transportation network. For these reasons, I felt it necessary to review the respective roles of Air Canada and Air Ontario management as part of a system-failure investigation of the Dryden accident.

Air Canada is Canada's largest airline. According to its 1990 Annual Report, Air Canada's passenger route network offers scheduled service to 24 North American cities. Through its domestic connector carriers, another 57 Canadian communities and 12 cities in the United States are linked to the Air Canada network. Further, 26 cities in Europe and the Caribbean are served by Air Canada. Air Canada holds equity interest, directly or indirectly, in five Canadian regional airlines: AirBC, Northwest Territorial Airways, Air Ontario, Air Alliance, and Air Nova (figure 26-1).

A great deal of evidence was heard about the commercial rationale behind the new Air Canada/Air Ontario parent/subsidiary relationship and how Air Canada management set about marketing Air Ontario as being part of Air Canada's transportation network. The evidence also revealed that these initiatives were not in any way directed towards verifying and monitoring the operational procedures and flight safety standards of its new subsidiary. On the contrary, Air Canada deliberately maintained its corporate distance from the operational end of Air Ontario.

Air Canada's lack of involvement in the operational end of Air Ontario allowed Air Ontario to operate, in some instances, to lower

Figure 26-1 Air Canada Connector Carriers



levels of flight safety than those existing within Air Canada, notwithstanding the significant amount of marketing energy expended to convince the travelling public otherwise. The evidence regarding these different safety levels therefore raises the question whether Air Canada, as a licensed air carrier having a majority interest in and effective control of a feeder airline, and marketing the feeder airline as part of its own system, had any obligation to take a more active role with Air Ontario operations.

I would stress that my reference to the term "obligation" is not to any specific regulatory or legal obligation on the part of Air Canada to assume responsibility for Air Ontario's operational procedures. Despite Air Canada's majority interest, the fact is that Air Ontario operated as a distinct legal entity under its own operating certificate. Similarly, Air Ontario's relationship with the regulator was direct and independent of Air Canada. My reference is, rather, to an obligation based on common sense and corporate integrity. I must say I found it neither sensible nor forthright that Air Canada expended virtually none of its operational

expertise on Air Ontario's operations while portraying that operation to the public as part of its own.

Particularly offensive to this sense of obligation, and specifically related to this Inquiry, was the lack of application of Air Canada's extensive expertise in scheduled jet transport operations to the fledgling Air Ontario F-28 program. The evidence disclosed that Air Ontario's management had virtually no experience in this type of operation, a fact of which Air Canada was or should have been aware.

Air Canada management witnesses offered explanations for this lack of operational involvement that were founded on a variety of internal corporate concerns. I have no reason to question either the sincerity of the explanations or the legitimacy of the concerns. However, I did find them at odds with Air Canada's professed commitment to the primacy of flight safety, as expressed in the following excerpt from the evidence of Mr William Rowe, an Air Canada vice-president and representative on Air Ontario's board of directors:

> A. ... You must understand, Counsel, and I'm sure you do, that the reputation for safety and concern for safety is paramount in the operation of an airline. There is no permissiveness in that regard.
>
> (Transcript, vol. 121, p. 108)

How the professed concern for flight safety appears to have become inappropriately subordinated to other corporate ends is addressed in this chapter. A full understanding requires a review of the options that were open to the management of Air Canada at the time of the deregulation of the airline industry and of the choices that were taken. The testimony surrounding the corporate decisions taken by Air Canada vis-à-vis Air Ontario also contains, in my view, an interesting chapter of Canadian aviation history.

The Coming of Deregulation

By the early 1980s it was becoming clear to the management of Air Canada and other carriers that the Canadian government was contemplating the adoption of a policy that would largely deregulate the Canadian airline industry. As a result of observation of the prior United States experience with deregulation it was also clear that, once implemented, any such policy would significantly affect the industry's commercial and operational parameters and, in turn, the competitive position of Air Canada and other carriers.

While endorsed by Air Canada, deregulation, introduced by the Canadian government in 1985, would require hard management

decisions to maintain and perhaps enhance the corporation's share of the Canadian market in competition with this country's other major carriers. As stated, my present concern is with the effect of these management decisions, made to satisfy new competitive demands, on operational aspects of the commercial air transportation system.

An important point to note at the outset is that the policy of deregulation was to apply only to the commercial or "marketplace" side of the industry and not to the operational side. Transport Canada was to maintain its regulatory responsibility over the safety of air transportation. That is, the licensing of pilots and aircraft maintenance engineers, the granting of operating certificates, the certification of aircraft types, and all of the traditional safety-related functions of the regulators were to remain the responsibility of Transport Canada. It was, in short, the government's intention that safety obligations were not to be compromised under the new policy (see chapter 29, Economic Deregulation and Deficit Reduction).

To what degree was this non-compromise of safety possible within the new regime? More precisely, was it realistic to expect that when the commercial side of a heavily regulated industry was detached from the overall regulatory framework, the still-regulated operational side would remain unaffected? To put this question into context, a brief description of the operation of the old commercially regulated regime and the forces acting for change follows.

The Regulated versus the Deregulated Aviation Industry

In the commercially regulated regime that existed prior to 1985, it was generally felt that, along with the application of operational regulations and constraints on carriers, the regulators should grant to the carriers a degree of monopoly protection to ensure a more stable marketplace within the airline industry. The principal method by which this protection could be assured was by granting a measure of exclusivity of operation over licensed routes or markets. In turn, the principal method of assuring exclusivity was by putting strictures on access to these markets by would-be competitors.

Prior to deregulation in Canada, carriers wishing to compete with an existing licence holder for the right to provide a commercial air service on a particular route could apply to the regulator for a licence to do so. However, the applicant would be under an onus to prove to the commercial regulators that its proposed service met the test of "public convenience and necessity" in order to be granted a licence. Needless to say, any existing licence holder for the same service could oppose such applications, which, in turn, often meant lengthy and expensive regula-

tory hearings. The vigour of the opposition to new licence applications was generally commensurate with the profitability of the service in question. Indeed, a more expeditious method of establishing or expanding a commercial air service was simply to purchase the carrier already holding the desired licences.[1]

Mr Rowe described how a route came to be serviced under the old system:

> A. Well, under a regulated environment, one has to apply for a licence to fly a particular route, that is, between pairs of cities or multiple pairs, as the case might be.
>
> That was regulated by a transport commission in Ottawa, to which one applied. One had to show the need for, demonstrate the need for, the service itself and your ability to actually take the service on.
>
> Often, this took quite a political-type role, because the communities themselves had a vested interest in the service. If there was no service previously, obviously, there would be quite strong pressures by those communities to get a service and, hence, a very strong support. If there was existing service there, there might be some opposition because of worries of diminishing the existing carriers' service, if it was deemed to be satisfactory by the communities themselves.
>
> So there was quite a play – interplay, both on the commercial side, that is, looking at the viability of the routes themselves, as well as considerable political pressure by both community – by the communities involved.
>
> (Transcript, vol. 121, pp. 15–16)

In a regulated environment an objective of carriers is to ensure marketplace stability on the economically attractive routes. An objective of the regulator is to provide adequate routes for smaller communities.

Smaller communities, even in a regime of regulated fares, often did not provide adequate "load factors" to make them economically attractive to larger carriers like Air Canada. This load-factor problem intensified proportionately as larger jet aircraft were forced to compete with smaller commuter aircraft. To the political leaders in these smaller communities, however, adequate air transportation service was viewed as essential to economic growth and, consequently, they would apply pressure to achieve it. As might by expected, adequate service became

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[1] As can be seen in chapter 13, Corporate History, this was the method chosen by the Deluce family to transform their original holdings in White River Air Services to the largest air transportation network in Northern Ontario.

synonymous with jet service – and, ideally, from the community point of view, Air Canada jet service. Mr Rowe explained the problem:

> A. It became apparent about this time that there was increasing pressure by a number of communities for service ... airline service, for economic development. It became almost a tenet of economic development that airline service was an absolute essential ingredient.
>
> Simultaneous with that, the ... use of larger aircraft precluded frequency of service to an area, because you were using a large aircraft on a very small population base, and, hence, at one time when we may have had seven services to a particular spot with a smaller aircraft, as that aircraft was phased out and larger ones phased in, the service frequency fell quite markedly.
>
> It also became, of course, more expensive on shorter-haul routes to use larger aircraft and jet aircraft, in particular. And, simultaneously, there was this ... pressure for economic development, with the airline being the ingredient itself.
>
> (Transcript, vol. 121, pp. 24–25)

This sensitivity to the jet bias of smaller communities carried over after the inception of deregulation and became a competitive factor, as in the marketing considerations behind the choice by Air Ontario of the F-28. Mr Thomas Syme, chief operating officer of Air Ontario, was asked to expand on the considerations contained in the F-28 acquisition proposal:

> Q. "In addition, acquisition of F-28 aircraft by Air Ontario presents certain longer-term benefits to Air Canada in its route rationalization efforts. Air Canada's reduction in frequency or even eventual withdrawal from certain markets in Ontario would be far more palatable in both a commercial and political sense if Air Ontario could offer a mixed jet/turboprop replacement service."
>
> Could you elaborate upon that particular aspect of the acquisition proposal for us?
>
> A. I guess the underlying issue there is that at that time, there existed a ... a fairly strong bias in the market-place for jet equipment over turboprop equipment. And ... the statement just reflects that.
>
> Q. In particular, what is meant by political sense? What are the political considerations?
>
> A. The airline industry seems to be one that attracts a lot of political attention. And as Air Canada pulled out of markets in northern Ontario, that was of great interest to the local politicians.

> And one of the issues that they raised was the loss of jet service, and what is being suggested here, that if we are able to offer alternate jet service, that that will thereby reduce the political sensitivity.
>
> (Transcript, vol. 98, pp. 135–36)

In the regulated environment, when the servicing of marginal markets with existing equipment proved to be an economic strain on Air Canada, a process of "cross-subsidization" was employed. Mr Rowe explained:

> Q. ... Was there any kind of subsidy given to Air Canada under the old regulated environment if indeed the politicians deemed that a flight from Sudbury to Toronto was necessary?
>
> A. No, not that I'm aware of, Counsel. There was a formula – or I shouldn't use the word "formula." There was a methodology of cross-subsidization. In other words, carriers, trunk carriers, such as ourselves, were granted either exclusivity or rights with some limitations to rather lucrative routes, and it was generally expected that we would use ... the proceeds from those routes to cross-subsidize less economic routes.
>
> And it was a principle, I suppose, which the airline industry grew up in a regulated environment. It was one of the principles of regulated environment, cross-subsidization.
>
> (Transcript, vol. 121, pp. 19–20)

By the decade of the 1980s this degree of commercial regulation was widely viewed as being economically counter-productive and archaic in a mature industry. By adopting the policy of deregulation, the government hoped to achieve an efficient allocation of resources within the airline industry through the mechanism of a more unfettered marketplace. The expectation was that increased competition would result in lower fares for the travelling public. One of the principal means employed to achieve this end was to reduce the regulatory constraints on carriers that wanted to establish a commercial air service.

Under the new policy, instead of the former requirement to establish "public convenience and necessity," an applicant seeking to operate a commercial air service had only to show that the carrier was "fit, willing and able" to service a particular market. In essence, a carrier was now to establish to the satisfaction of Transport Canada that it was properly insured and could operate safely. From a number of perspectives, deregulation was going to represent a substantial change in the airline industry.

The Impact of Deregulation

Existing airlines, large and small, were faced with the prospect of

altering their operating and marketing strategies significantly in order to accommodate the change from a regulated to a deregulated marketplace.

Two features of the new commercial environment had an impact on Air Canada. First, its relatively large equipment and high unit labour costs would result in some of its already marginally economic routes to smaller communities becoming even less tenable. With open access and unregulated fares now available on the economically attractive routes, Air Canada's ability to maintain the level of profitability it had enjoyed under the protection of a regulated environment was in doubt. Without these protected proceeds from the more lucrative routes, the ability to provide cross-subsidization to less profitable routes would similarly be gone. These routes would be lost to smaller carriers, which could now compete openly and, with smaller equipment, could accommodate the lower, now unsubsidized, load factors.

At the heart of this competitive advantage enjoyed by the newer carriers was their ability to offer more frequent service to less populous markets through the use of smaller equipment. With fewer seats, the smaller aircraft could operate closer to capacity more often than the larger Air Canada jets.

In the world of airline marketing, according to Mr Rowe, "frequency always wins." His evidence on the topic was helpful in understanding the trunk airline's dilemma:

> A. ... Certainly the advent of additional competition on prime routes, the ... larger and more expensive aircraft entering the fleet, made it quite evident that frequency of service to smaller communities simply could not be provided by carriers the size of Air Canada and would be probably ... even less so in the future. So we had to start laying the groundwork for what we perceived to be and the industry perceived to be an evolving picture, and in a very drastically changing environment.
>
> ...
>
> ... the prime ingredient of commercial viability in the airline business is frequency of flights and frequency has to be a function of size of population, things of that nature, and size of aircraft, and it was apparent that to serve smaller centres with any decent frequency, one had to have smaller aircraft.
>
> (Transcript, vol. 121, pp. 37–38)

The loss of these smaller markets may have been acceptable to Air Canada had they represented intraregional traffic only. However, many of the passengers on these smaller or "spoke" routes were potential connecting or "feed" traffic to Air Canada's trunk routes out of "hub" airports such as Toronto's Lester B. Pearson International Airport.

This connecting traffic was considered essential to the economic health of Air Canada. The incorporation of regional feed traffic into Air

Canada's overall route structure represented the second and by far the most significant area of management concern resulting from deregulation. Accordingly, management set about devising the means to ensure that the feed came Air Canada's way and not to competing trunk carriers (see figure 26-2).

Control of the Feed

Air Canada's dilemma at the advent of deregulation can be described as follows. On the one hand it could not economically operate its relatively large jet equipment in the smaller, low load-factor routes with sufficient frequency to remain competitive with carriers using smaller, usually turboprop, aircraft. On the other hand, if it left these routes to the smaller operators, there was the distinct possibility that in the now deregulated environment it would lose essential connecting traffic from these markets to another trunk carrier.

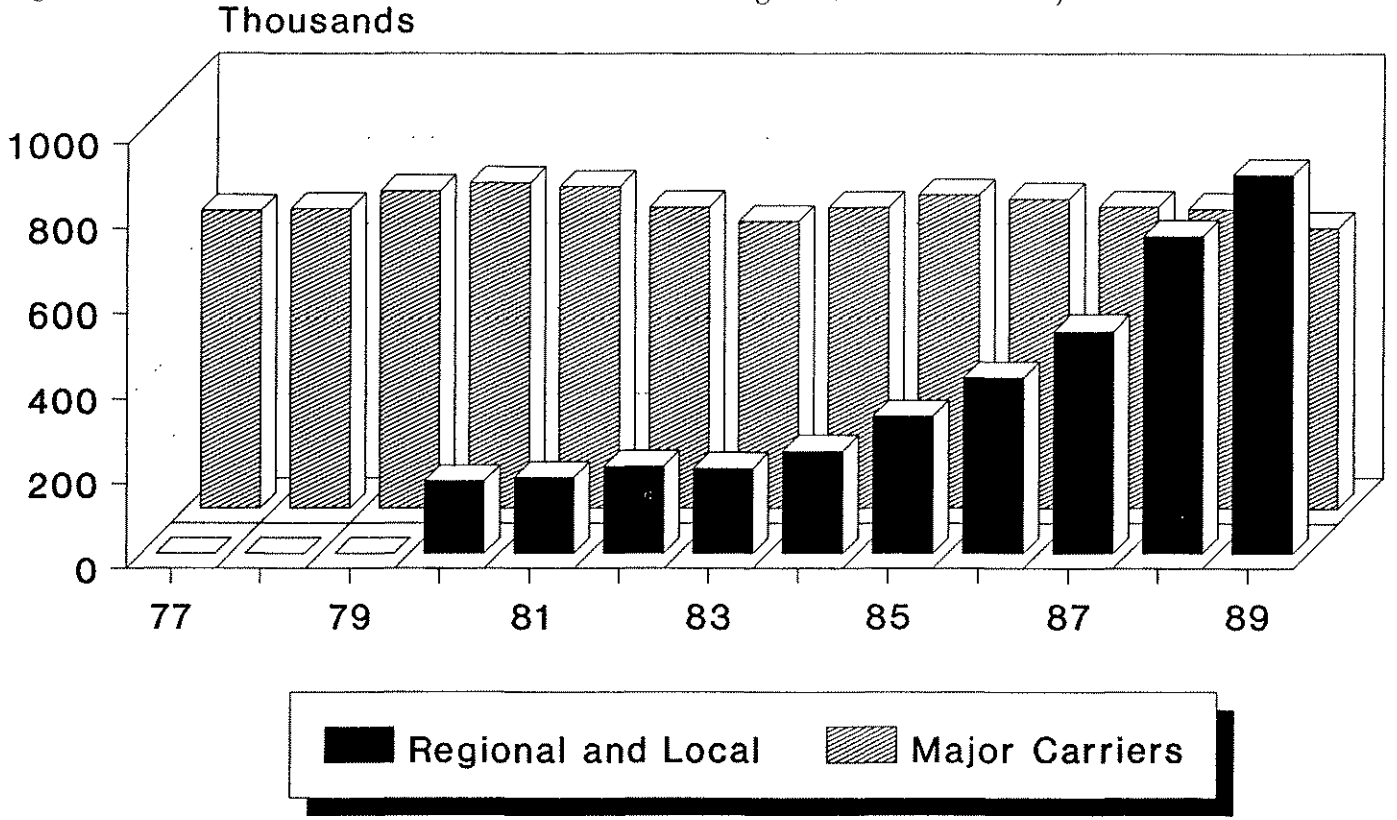
With the advent of a deregulated commercial marketplace, both trunk and regional carriers were free to enter and compete on all routes with relative ease. Further, extended possibilities for commercial arrangements between the two types of carriers became available. In the context of regional markets, the abandonment of regulation meant that a trunk carrier could capture the feed traffic of a particular region either by operating its own aircraft on less travelled routes or, more likely, by gaining control of a regional carrier already serving these markets.

Given the necessity of feed control, Air Canada could not allow regional carriers to fall under the control of rival trunk airlines. By one means or another, sufficient regional connecting traffic across the country would have to come under Air Canada's control. The Ontario Region, given its large population base, would naturally become the object of considerable interest in this regard.

The problem of controlling the flow of feed traffic from marginally economic markets did not suddenly arise for Air Canada because of deregulation. It existed in the regulated environment, but was then capable of easier resolution. Air Canada had previously dealt with feed control in southern Ontario, for example, by entering into a commercial agreement, in 1975, with Great Lakes Airlines, a predecessor corporation to Air Ontario (see chapter 13, Corporate History).

Great Lakes Airlines was a regional carrier that had licences to serve regional markets out of its base in London. One of Great Lakes's main

Figure 26-2 Historical Air Carrier Aircraft Movements, Regional/Local versus Major Carriers



Source: Transport Canada: Aviation Forecasts 1990–2003

routes was London, Ontario, to Toronto, a route flown by many connecting passengers to Toronto, but one that Air Canada could not economically serve with its larger equipment. As the evidence disclosed, the objective of Air Canada's commercial agreement with Great Lakes Airlines was the same as that which followed deregulation: to ensure by means of through-ticketing, coordinated connections, and ease of transfer that connecting passengers from Great Lakes were carried onwards from Toronto by Air Canada. The commitment of the trunk carrier, however, was quite different from that required after deregulation.

The 1975 arrangement between Air Canada and Great Lakes Airlines consisted of a straightforward interline agreement between the parties with no equity participation. The limited flexibility of regional carriers within a regulated environment meant that their "loyalty" to the trunk could in large measure be secured through a simple interline agreement, without the necessity of actual equity involvement. Given the degree of route monopoly prevalent in the regulated environment, there was little fear of overbidding or concern that one party would rescind the agreement. This being the case, the trunk carriers would naturally opt for a commercial arrangement with the regional carrier that allowed the trunk carrier to secure the commercial objective of feed control without requiring any financial outlay to secure an equity position.

This method of feed control by trunk airlines, employing simple contractual or non-equity relationships with regional carriers, became more precarious after deregulation. The pre-deregulation absence of equity involvement on the part of the trunk carriers is the essential difference between the trunk/regional arrangements entered into before deregulation and those consummated after. As Mr Rowe explained:

> A. ... we followed common practice in the United States or that had evolved in the United States earlier, and that was entering into contractual agreements with carriers that were very, very much tighter and more definitive than heretofore, and covering a wider variety of services. As a matter of fact, covering, for example, all ground handling services, things of that nature, trying to tie the smaller carrier very closely in with us.
>
> Also following experience in the United States, exploring the possibility of equity investment in the carriers, again to exert commercial control.
>
> (Transcript, vol. 121, pp. 36–37)

Mr Rowe summarized the rationale for equity participation by the trunk carriers as follows:

> A. For control of the company and to ensure that a company didn't change its allegiance, as happened numerous times in the United

> States. That's how the equity program evolved in the industry in total, not just in Canada.
>
> (Transcript, vol. 121, p. 41)

Air Canada faced a dilemma with respect to feed control at the advent of deregulation. Because the simple interline agreement had become too problematic a device, there were two possible options. First, Air Canada could purchase its own smaller commuter aircraft to service the low volume routes instead of using its existing fleet of large aircraft. Second, it could purchase an equity interest in an existing regional carrier already providing service with appropriate equipment on feeder routes.

Mr Rowe expanded on the relative merits of these two options. While Air Canada could have bought and operated its own feeder aircraft, there were "pros and cons" to such a decision:

> A. The pros and cons were firstly, the cost of the capital involved to do that. It's always nicer to share that cost with someone else, and that was one of the prime reasons.
>
> A second reason was that we would have absolutely imposed our own style and hierarchy and bureaucracy of a very large company upon a smaller situation, and would virtually have reverted to what we had seen previously, an era we had to withdraw from when we simply couldn't afford to operate some routes because of our own cost and operating style.
>
> So it was deemed to be much more efficient to go to a different scale. It's a scale thing, I think.
>
> (Transcript, vol. 121, p. 43)

With the "cons" thus outweighing the "pros" with regard to the first option, Air Canada was left with the second option of securing equity interests in existing regional carriers, and it set about to purchase those interests where available. Such purchases within the heavily populated regions of Ontario loomed as an absolutely essential aspect of Air Canada's feed control program.

In Ontario, at the inception of deregulation, the bulk of the potential connecting traffic within the province was carried by the two predecessor corporations of Air Ontario Inc., Austin Airways and Air Ontario Limited. This fact made control of these two regional carriers vitally important to the competitive positions of the Canadian trunk carriers. It also put the owners of Austin Airways and Air Ontario Limited in an extremely favourable bargaining position.

Air Canada, having settled on the strategy of gaining equity participation in existing regional carriers, was faced with an additional issue that required further Air Canada management consideration: whether to acquire a non-controlling or minority shareholding position in the

targeted regional carriers or to purchase a majority interest.[2] Eventually, through some intermediate steps detailed in chapter 13, Corporate History, Air Canada came to own a controlling 75 per cent interest in voting stock of Air Ontario, with the Deluce family owning the minority 25 per cent interest. In addition, Air Canada obtained a substantial number of non-voting Air Ontario preference shares, which resulted in the trunk carrier owning more than 90 per cent of the total equity of its feeder.

The rationale behind Air Canada's decision to purchase a majority interest in Air Ontario eventually determined the commercial and operational relationship in the new parent/subsidiary arrangement. More particularly, it influenced the degree of involvement by Air Canada in the affairs of Air Ontario.

As the evidence disclosed, there was significant involvement by Air Canada on the commercial side of its new regional subsidiary, Air Ontario, and virtually none on the operational side. The evidence also disclosed that this lack of operational involvement by Air Canada, combined with the increased demands of the new trunk/feed relationship, may have had a detrimental effect on the safety of Air Ontario operations. Air Canada's rationale for its non-involvement in the operational aspects of its subsidiary was grounded in concerns related to its now majority ownership of Air Ontario. These concerns were explored during the course of the hearings of this Inquiry.

Minority versus Majority Equity Interest

To the major carriers, there were pitfalls in having either a majority or a minority ownership stake in regional carriers. Mr Rowe offered the following explanation of the negative aspects of a minority position and why Air Canada opted for a majority position in Air Ontario:

> Q. ... Could you tell the Commissioner why this change in thinking between a minority and a majority interest, equity interest?
> A. With a minority interest, one is always subject, of course, to the whim of the majority holder. Over time, this proved to be less satisfactory to the larger carrier, simply because in the deregulated environment, there was this freedom to move, freedom to do whatever one wished to do.

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[2] As explained in chapter 13, Corporate History, early in 1986 Air Canada and Pacific Western Airlines, had each purchased a minority interest of 24.5 per cent in Air Ontario Limited. This gave the two major carriers a 49 per cent interest in Air Ontario Limited, with the remaining 51 per cent under the control of Delplax Holdings, a corporation in turn owned equally between some Deluce family members and Mr James Plaxton.

> In many cases, the larger carrier would want the smaller carrier to operate within a defined area for economic reasons more than anything else, and also, for the reasons that expansion required capital, increasing amounts of capital, because the newer aircraft, even though they were small, were getting increasingly expensive.
>
> (Transcript, vol. 121, pp. 41–42)

In short, Air Canada wanted to have a strong influence upon the growth ambitions of its feeder in order to protect its own interest.

Despite the seemingly overriding advantages to majority control in a deregulated marketplace, there was one significant potential drawback, which, if realized, could put the trunk carrier back into a similarly untenable economic position with regard to smaller routes than it had faced prior to deregulation. This drawback lay in the area of employment law and the prospect of having Air Canada's unionized, high-unit labour costs and working conditions imposed on Air Ontario because of the new ownership structure. It was referred to throughout the evidence as the "common employer" issue and centred around an application, by the unions involved, to the Canada Labour Relations Board for a common employer declaration. Mr Rowe verified that this issue was a concern for Air Canada:

> Q. Mr Syme [chief operating officer for Air Ontario Inc.], in his testimony, mentioned that there were advantages to a minority relationship in that it was a method whereby a common employment application may not be successful in that there was only a minority interest.
>
> Do you recall that being a concern or a consideration on the minority versus majority aspect?
>
> A. Yes, it was.
>
> (Transcript, vol. 121, pp. 47–48)

Once Air Canada's majority ownership of Air Ontario became a fact, however, the common employer issue had to be faced by Air Canada, and strategies were developed to deal with it.

Implications of Common Employment

Collective bargaining agents dealing with employers with shared ownership (typically parent/subsidiary relationships), who believe the employers to be under "common control or direction," can apply to a labour relations tribunal having jurisdiction for a declaration that they constitute a single employer for the purposes of collective bargaining. The essential test to establish common employment is common direction and control of the employers. The appropriate tribunal in the case of Air

Ontario and Air Canada, both being federal works, undertakings, or businesses, was the Canada Labour Relations Board (CLRB).

Such applications can be launched by any trade union representing employees within the corporations and, if successful, the decision may apply to all other bargaining units. In fact, such an application was launched by one of the certified bargaining units, the International Association of Machinists and Aerospace Workers (IAM), in September 1987, shortly after the merger of Austin Airways and Air Ontario Limited to form Air Ontario Inc. as "controlled" by Air Canada.[3]

After IAM launched the application, "one of the paramount considerations" of Air Canada management, to quote Mr Rowe, was the possibility that the CLRB might make a single-employer declaration if there was sufficient evidence of day-to-day control and direction over the operations of Air Ontario by Air Canada (Transcript, vol. 118, p. 50). In proceedings before the CLRB, Air Ontario argued in opposition to the IAM application that, despite its majority ownership, Air Canada had no day-to-day involvement at Air Ontario.[4]

It appears that the single-employer problem was also a consideration behind the seeming reluctance of Air Canada's flight operations department to do an operational review of Air Ontario after the 1987 purchase and merger. This operational review by Air Canada did not occur until well after the Dryden crash, in the fall of 1989. Captain Charles Simpson, vice-president of Air Canada flight operations, was questioned on this delay:

> Q. ... Sir, would you comment on one point: Was the apprehension of having a common employer application before the Canada Labour Relations Board a factor which gravitated against an early flight operations review being conducted?
>
> A. I would give a qualified "yes" to that. Certainly, in the very beginning, when we were very new in the connector business and there ... was talk of the common employer status case, we were proceeding slowly ... it wasn't so much we couldn't do an operational review as ... we did not want to become involved in their work. They were an independent airline, they were operat-

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[3] The application in fact did not succeed: CLRB decision no. 771, December 29, 1989. The board in essence held that the tests for common employer were made out; however, it did not exercise its discretion to issue the common employer declaration. It so held on the grounds that bargaining rights had not been, nor were they likely to be, affected by the status quo.

[4] CLRB decision no. 771, p. 26: counsel for Air Ontario, to quote from the board's decision, argued that "Potential control should not be viewed as actual control and that, in fact, there was no working relationship between Air Canada and Air Ontario except for the commercial agreements."

> ing independent of Air Canada, and we did not want to confuse that issue.
>
> But, certainly, in the first few months, we were not gearing up to do a review, one of the reasons being the common employer status case was being pursued.
>
> (Transcript, vol. 118, p. 168)

Mr Rowe offered an additional explanation for this managerial distance – to give the management of the newly created Air Ontario Inc. more flexibility to make decisions, unfettered by what he described as the Air Canada bureaucracy. I found this explanation, although plausible, to be somewhat disingenuous and obviously secondary to the "paramount" concern about common employment.

Air Canada's common employment concern was in fact well grounded in light of the economics of a deregulated airline industry. As already stated, Air Canada was faced, under deregulation, with the necessity of operating its feeder routes at a lower-unit labour cost in order for these routes to be economically viable. The fear was that this would not be possible should Air Canada's wage structure and working conditions be imposed on Air Ontario, since this would simply reintroduce marginal economics to these routes, much as was the case on the eve of deregulation.

Mr Rowe explained that feeder routes such as Sudbury–Toronto, if made less viable economically because of extra costs, would fall prey to the new "deregulation" competitors. Thus, Air Canada would not only face the same dilemma as at the outset of deregulation – namely, losing the "Sudbury" feed – it would now have no method of regaining it economically.

The competitive position of carriers under deregulation was affected beyond the direct imposition of higher wages through collective bargaining. The unit labour cost was also being affected by the concomitant imposition of more narrowly defined working conditions on employee groups. This problem manifested itself in the Northern Ontario (Austin Airways) operations that became incorporated into the merged Air Ontario Inc. route network and eventually led to the divestment of these operations (see chapter 13, Corporate History). In that case, both Air Canada and Air Ontario management perceived that once the working conditions of the Air Ontario collective agreement were imposed on the old Austin route structure, those routes could no longer be operated economically. They saw, for example, that once the loading and unloading of aircraft and other "bush" activities fell outside of the pilot's new scope of employment, the cost of supplementing the labour force to do that work would render the operation unviable. This diminished profitability would in turn result in these routes falling prey to the now unimpeded competition. As Mr Rowe put it:

> A. ... At the time of the organizing, a delineation of duties took place, and the multiple duties that the pilots once had were not carried forward any further. They had refused to continue in that line.
>
> ... that whole cost structure was now going to be eroded by virtue of the union contract and the ... results of the merger, and be attacked from a competitive position of much less expensive operators and smaller entities.
>
> We then decided that it would be best to divest ourselves of the routes of Austin as much as possible, while they ... still had value, and while there was a buyer available for them.
>
> (Transcript, vol. 121, p. 149)

A fascinating sidelight involving the economics of deregulation is the process by which the traffic from these former, now uneconomic, Austin routes came to be regarded as potential feed to Air Ontario. As was the case with the original Air Canada/Great Lakes arrangement in 1975, commercial agreements were entered into between Air Ontario and the purchasers of these northern routes, with the same lack of equity involvement. This cascading method of feed control was described by Mr Rowe, using the example of the sale in late 1988 by Air Ontario to Bearskin Airlines, a Northern Ontario operator, of the Pickle Lake to Thunder Bay route:

> A. It was hoped under this scheme or the plan that Air Ontario would enter into agreements with some of the successor carriers that would guarantee the continuance of feed to Air Canada, which incidentally was quite minimal from many of these areas, and where opportunity existed, for continuance of feed from these areas to Air Ontario.
>
> Q. And how was this Pickle Lake to Thunder Bay feed captured or ... what was the thrust?
>
> A. Oh, eventually, it worked out for the instance you mention that there was a formal commercial agreement between Air Ontario and Bearskin Airlines.
>
> Q. I see, and was there ever any equity interest taken by Air Ontario in Bearskin?
>
> A. No.
>
> (Transcript, vol. 121, p. 153)

Air Canada's lack of operational commitment to the Air Ontario operation resulted in a lower level of flight safety being available to Air Ontario passengers than that available to Air Canada passengers. On the commercial side, however, full advantage was taken by Air Canada of the new parent/subsidiary relationship to increase its market share. The evidence before me shows that Air Canada operates at a significantly

higher level of safety than that required by Transport Canada; Transport Canada regulatory standards represent the threshold level of operational safety. Air Canada management, while imposing on Air Ontario its own high marketing standards, required Air Ontario only to comply with Transport Canada's threshold operational safety standards. The evidence is overwhelming that the joint Air Ontario/Air Canada initiatives in the marketing of Air Ontario service to the public were designed to create the public impression that the Air Ontario operation was in fact an Air Canada operation. The average air traveller would be completely unaware of the double standard applied by Air Canada in the area of operational safety. These factual circumstances raise the question of what obligation, if any, does a licensed air carrier, holding a majority interest in a regional feeder airline, have to the air travelling public? This question and the Air Canada/Air Ontario relationship are addressed in greater detail later in this chapter. This double standard of safety arose, I find, in part from Air Canada's concern with common employment. I shall now deal with Air Canada's inappropriate lack of operational involvement with Air Ontario, given its emphasis on and attention to common marketing.

The Commercial Relationship

Under deregulation, marketing strategies became not merely a matter of maintaining control over potential connecting passengers but of competing for them. To this end, Air Canada engaged in a marketing strategy to portray to passengers a close identity between itself and its new subsidiary airlines: in essence, that to fly Air Ontario was to fly Air Canada.

This intention is set out clearly in the recitals to the commercial agreement, entered into in January 1987, governing the relationship between Air Canada and Air Ontario.[5] The recital in question was put to Mr Rowe:

> Q. ... "AND WHEREAS Air Canada and Austin (being Air Ontario) wish to establish a consistent image for Air Canada connectors

[5] Exhibit 783. As explained in chapter 13, Corporate History, Air Canada purchased Austin Airways in late 1986 and was by that time a minority owner of Air Ontario Limited. Austin and Air Ontario Limited were merged to form Air Ontario Inc. in June 1987. The commercial agreement of January 1987 was originally entered into between Air Canada and Austin Airways. The agreement survived the merger of Air Ontario Limited and Austin, and governed the commercial relationship between Air Canada and Air Ontario Inc. from the merger onwards. Accordingly, references to Austin Airways have been substituted by Air Ontario.

> in order that a homogeneous products can be delivered to air travel customers in Canada."
>
> Could you describe for the Commissioner what you took to be the meaning of homogeneous product?
>
> A. We wished the product, Your Honour, to be as similar to that experienced on Air Canada as possible, given the limitations of the aircraft involved and the communities being served.
>
> (Transcript, vol. 121, pp. 161–62)

This expression of intent was given force throughout the commercial agreement and resulted in a far deeper integration between the companies than in any previous arrangement.

The lengths to which the two parties went to indicate to the travelling public this degree of integration can be seen throughout the agreement. Several items were directly related to the public perception of the two carriers.

Common Livery

The colour scheme of Air Ontario was to match that of Air Canada and the term "Air Ontario–Air Canada Connector" was to be displayed along with an agreed-on logo.

Interiors

Seat material and carpeting were to be provided by Air Canada and were to be "similar to Air Canada hospitality class."

Use of Air Canada's AC Designator

Air Ontario was granted the right to use the AC designator beside its flight numbers. Mr Rowe explained the significance of this practice, known as "code-sharing," particularly in the connector airline area:

> Q. Now, I take it the AC or the company's designator is a rather important proprietary item?
>
> A. That's correct.
>
> Q. And could you explain for the Commissioner the significance of giving this over to the connector, Air Ontario?
>
> A. Your Honour, in the airline industry, there developed a ... marketing practice of the use of the company's designator on carriers other than its own, from a marketing point of view, to simply enhance the reach of the marketing of that carrier into areas it did not serve.
>
> ...
>
> In the connector area, it identifies that carrier closely with Air Canada. And since we are providing services, customer services such as check-in, telephone numbers for reservations, et cetera,

> it becomes a ready identification for the public to know where to go.
>
> (Transcript, vol. 121, pp. 170–71)

Standards of Service

Air Canada was obliged to develop minimum standards for inflight service, customer service, and passenger and baggage handling for Air Ontario.

Timetables

Air Ontario flights were to be included in Air Canada's published timetable, both those connecting to Air Canada and those served by the two carriers. The importance to Air Ontario of this practice was expressed by Mr Rowe as being "absolutely vital":

> A. It's vital, absolutely vital, to them.
> Q. Just explain that, please.
> A. Well ... you must have your product distributed as widely as possible, and this is to be associated with a major carrier who has a wide distribution network. It's absolutely essential to be included in his network.
>
> (Transcript, vol. 121, p. 176)

Needless to say, once Air Ontario's flights were included in the Air Canada timetable there was heightened concern about Air Ontario's on-time performance. If this was poor it would have reflected badly not only on the parent corporation but on the entire parent/feeder network as well, and the evidence disclosed that there were daily conferences between the operational control centres of the two corporations regarding scheduling and on-time performance.

Computer Services

Air Canada's computer reservation services were to be shared by Air Ontario, and the complete Air Ontario schedule was to be included. Air Ontario flights were to be treated as equivalent to those of Air Canada for purposes of display on all computer reservation terminal (CRT) screens. Mr Rowe described the commercial importance of this arrangement:

> A. Well, Your Honour, it's all part of the electronic distribution network that is so essential for the airline industry in the sale of its products. To be listed in the carrier's electronic distribution system allows access by all travel agents and other sellers of the product to know of your product and be able to access the inventory.

> Also, the sets provide other ancillary services that may be useful to the carrier in the managing of its entity.
>
> (Transcript, vol. 121, pp. 176–77)

As to the importance of equivalency of CRT display, Mr Rowe stated:

> A. Your Honour, I would ask you to recall my earlier mentioning of services to smaller communities wherein we might provide two flights a day and the connector carrier provide many others.
>
> This would allow a proper sequencing of flights so that the customer would get a display by hour of day instead of by carrier and, hence, be of better service to that customer in selecting the type of service they need.
>
> (Transcript, vol. 121, pp. 177–78)

Telephone Answering

Air Canada was to provide Air Ontario customers with the same telephone answering services as for its own customers. The phone was to be answered "Air Ontario – Air Canada Connector" for the purposes of flight bookings. In fact this answering method never came to pass and the telephone calls to Air Ontario were answered simply with "Air Canada."

Ticketing

Air Canada was to provide ticketing services for Air Ontario customers and the tickets were to be issued on Air Canada stock. Mr Rowe testified that the intention of this provision at the time of the writing of the contract was identification between the carriers. The relevance of the provision lessened with the introduction of standardized International Airline Transport Association ticket stock, which came to replace the old Air Canada stock.

Ground Handling

At points served by both carriers, ground handling was to be done by Air Canada. Air Canada agreed it would endeavour to ensure that Air Ontario's passengers, cargo, crews, and baggage received the same treatment as Air Canada's.

Aircraft Services

Under the commercial agreement, Air Canada, in keeping with the spirit of providing to Air Ontario passengers equivalency of service, agreed to provide a number of ground-handling services at stations where Air Canada had facilities. This extended to items such as allowing Air Ontario to park its aircraft "as close as reasonably possible" to its terminal building slots to minimize the exposure of Air Ontario

passengers to inclement weather. Air Canada was also bound, at stations of mutual use, to de-ice Air Ontario aircraft on Air Ontario's request.

Advertising

The terms of the commercial agreement also called for Air Canada's *Enroute* magazine to feature Air Ontario, its new relationship with Air Canada, and its new route system.[6] Mr Rowe was shown the following section of the agreement and was asked to comment on its commercial significance:

> Air Canada will use its best efforts to feature Austin in its inflight magazine including, in particular:
> (a) Austin's [Air Ontario's] scheduled air services on the Air Canada route map and illustrating the various types of aircraft operated by Austin in support of its scheduled passenger service.
> (b) Austin's name on the cover of the magazine.
> (c) A feature article on Austin, its services and its relationship with Air Canada to be included in the first edition published after start-up.
>
> (Exhibit 783, tab E, pp. 5–6)

> A. Your Honour, it would be relevant to the promotion of Austin's [Air Ontario's] services and the identification of Air Canada with Austin Airways, similar to that which we would have with any affiliated group with our company. It's strictly a commercial identification and advertising mechanism.
> Q. Identification between the connector and the parent, you're talking about?
> A. Yes, that's correct.
>
> (Transcript, vol. 121, p. 185)

Aeroplan

Air Ontario passengers would receive equivalent Aeroplan points. The competitive advantage offered by these in the context of a parent/subsidiary relationship was explained by Mr Rowe as follows:

> A. ... Your Honour, they are primarily a brand name loyalty device, that is, adhering the loyalty of customers to the use of the Air Canada product in its many forms. And Austin [Air Ontario], of course, would benefit immensely by that.

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[6] *Enroute* is Air Canada's onboard publication, a copy of which is available free of charge to Air Canada passengers. Passengers can find a copy in the seat pouch on every Air Canada and Air Ontario flight.

Q. When you say benefit, are you talking about a competitive advantage to other carriers on routes?
A. Yes, that's correct. Austin [Air Ontario] would have a competitive advantage, we believe, at any rate.
Q. Well, that's the point of the exercise, I take it?
A. That's right.

(Transcript, vol. 121, p. 186)

The object of this marketing exercise was clearly to convince the travelling public that the choice of Air Ontario as a carrier was the same as choosing Air Canada. Given the record of years of familiarity and trust between Air Canada and the Canadian air-travelling public, this marketing technique was of no small significance. That the strategy worked is evidenced by the testimony of some passengers on flight 1363 who thought they were in fact travelling on Air Canada, right up to the point when they were about to board the aircraft at Dryden. Passenger Michael Ferguson stated the following:

A. We arranged the flight through a local travel agent in Thunder Bay.
Q. Can you tell me who you arranged it through?
A. It was Go-Rite Travel.
Q. All right. Now, what airline did you believe that you were flying on?
A. Air Canada.
Q. And when did you first learn that you were flying on Air Ontario flight?
A. After we cleared the security area and we were walking on to the tarmac towards the plane.

(Transcript, vol. 13, p. 3)

Mrs Susan Ferguson, who was accompanying her husband, gave similar evidence. This testimony was not surprising since, on the face of the passenger tickets, the flight was described as "AC 1363."

I cannot but conclude that Air Canada was holding out to the public that Air Ontario was de facto an Air Canada operation or an extension of Air Canada. Obviously, there were good business reasons for doing so. Yet it strikes me that, if Air Canada was seeking to improve its competitive position in the deregulated environment by marketing Air Ontario as an extension of itself, then there was a concomitant responsibility to ensure that Air Canada operational standards, and not just its colour schemes, were being matched by its regional feeder.

The Operational Relationship

At the time of purchase of its controlling interest in Air Ontario, Air Canada had years of experience in scheduled jet operations and a worldwide reputation in the safe operation and maintenance of jet transport aircraft. The management of Air Ontario had neither. Yet, when Air Ontario commenced its scheduled jet operations, carrying the very passengers Air Canada wanted in its network, Air Canada management consciously and deliberately avoided any involvement in the operations of Air Ontario. This position was based on real concerns created by deregulation regarding profitability. When weighed against Air Canada's own espousal of the primacy of flight safety and the legitimate expectations of Air Ontario passengers, I find this non-involvement inappropriate.

The effect of this non-involvement in the functioning of the air transportation system was evident in the differences in operational standards acceptable to Air Canada and to Air Ontario.

The principal Air Canada witness called on the subject of operational differences between Air Canada and Air Ontario was Captain Charles Simpson, vice-president of flight operations for Air Canada. In the areas of maintenance and operational control it was readily apparent from his and other evidence that Air Canada operates to standards that are higher than the threshold minimums required by Transport Canada.[7] Captain Simpson confirmed this interpretation in his evidence:

> Q. In your evidence, and you probably have stated this already, sir, but you would agree with me that the standards set by Transport Canada for the industry, for the aviation industry, are minimum standards?
> A. That's correct.
> Q. And I think you would also agree with me that Air Canada's standards are higher than Transport Canada's standards?
> A. We believe so.
>
> (Transcript, vol. 123, p. 97)

As already mentioned, some passengers on Air Ontario flight 1363 believed they were in fact flying with Air Canada. This misconception was clearly the result of the marketing effort of Air Canada and Air Ontario and is proof of its effectiveness. The marketing of the Air Canada image to its new feed passengers included not simply efficient

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[7] The requirements for all aspects of a commercial air carrier operation using aircraft weighing more than 12,500 pounds are set forth in Air Navigation Order, Series VII, No. 2. The adequacy and other aspects of these obligations are dealt with in chapter 34, Operating Rules and Legislation.

point-to-point and connecting travel but also the Air Canada reputation for safe travel. When this proposition was put to Captain Simpson he testified as follows:

> Q. And if I buy an Air Canada ticket, part of the product that I buy is that very high standard that Air Canada keeps, is that not correct?
> A. We believe so.
> Q. And that's a selling point for Air Canada, is it not?
> A. I think so.
> Q. Passengers can have confidence in Air Canada?
> A. Yes.
> Q. But if I buy an Air Canada ticket, I might end up on one of the feeder carriers, and I might only find out that I am on one of the feeder carriers when I get my boarding pass, is that not correct?
> A. Yes that's correct.
> ...
> Q. And you would agree with me that as far as a lot of passengers are concerned, they consider themselves Air Canada passengers?
> A. Correct.
> Q. And I take it, and my friend Mr Knutsen covered this, but I would like to make it clear because I think it's important, that you believe, Air Canada believes, that Air Canada passengers that fly on Air Canada connectors are entitled to the same standards of safety as Air Canada passengers that fly on a DC-9 or a 767 on Air Canada?
> A. That's correct.
>
> (Transcript, vol. 123, pp. 98–99)

To get an understanding as to the quality of operational differences between the parent and subsidiary airlines, Captain Simpson was first presented with a number of examples brought out in evidence and then asked for comment.

Auxiliary Power Unit

In light of the evidence surrounding the inability of C-FONF to restart its engines in the event of a shutdown in Dryden because of its unserviceable APU and the lack of ground-start capability, I heard with considerable chagrin that Air Canada would not itself have dispatched the aircraft into Dryden under similar circumstances. Captain Simpson stated this to be Air Canada policy:

> Q. All right. And under the Air Canada dispatch system, is it not a fact that you would not dispatch an aircraft with an inoperative APU to a station that has no ground support in order to start the aircraft?

A. That's right. It's a policy.

(Transcript, vol. 123, pp. 116–17)

The Introduction of Jet Service

Specific to the introduction of the F-28, Captain Simpson was asked about certain shortcomings in the program. Prior to testifying, he was unaware of any difficulties in the program. He was not familiar with the evidence before the Commission.

Minimum Equipment List

Captain Simpson was made aware of the fact that Air Ontario operated C-FONF for the first six months of revenue service with no approved Minimum Equipment List (MEL). His evidence was that Air Canada would not commence revenue service with an aircraft in the absence of an approved MEL, and it certainly would not tolerate use of an aircraft without one. When asked about the importance of having a workable MEL prior to the commencement of revenue service, Captain Simpson offered the following rationale and example, which I felt put the issue into useful context:

Q. Sir, why is it important for an airline to have an MEL at the time an aircraft is put into operation? Why is that important?

A. Well, in order to be able to operate the airplane, you from time to time will have some minor deviations on it where you may want to move the airplane back to a main station to get it fixed. It may be something of an insignificant nature, but without any document that allows you to do it, you're not allowed to operate the airplane.

So it's a straight case of – and, as far as the pilot is concerned, both pilots and maintenance personnel need some guidance, so this is the document by which they can look at their airplane and decide if it can be dispatched in that condition.

For example ... you might have a problem with the reverse mechanism on an engine. It's not required, it's not part of the certification, but to operate the airplane, there are certain things that have to be checked.

So you go to the MEL list. It says what maintenance have to do. It says what operations have to do. And then the airplane may be moved.

Q. To the best of your knowledge, sir, has Air Canada ever operated an aircraft in revenue service without an approved MEL?

A. Not to the best of my knowledge.

(Transcript, vol. 118, pp. 112-13)

Captain Simpson, in addition, provided his views on the operation of an aircraft in revenue service in the absence of an MEL:

> Q. Captain, with your background and knowledge and experience, how would you view the operation of a new aircraft for six months with no MEL?
> A. Well –
> Q. When I say the operation, I'm talking revenue operation.
> A. Yeah. Well, I would be surprised that Transport Canada would allow that to go on, as the regulatory authority.
> Q. Would you permit that as a senior officer –
> A. No.
> Q. – of your airline?
> A. No. We would not accept that, as an airline.
>
> (Transcript, vol. 118, pp. 116–17)

Manuals

The evidence before this Commission is that Air Ontario did not have in place its own F-28 operating manual prior to the commencement of revenue service with the F-28; in fact, although an operating manual for the F-28 was drafted, it was not submitted to Transport Canada for approval until June 1989, the same month Air Ontario discontinued F-28 operations. In addition, some of the Air Ontario pilots were using the Piedmont Airlines F-28 Operations Manual and others were using the USAir F-28 Operations Manual, a fact that could lead to operational mistakes or confusion.[8]

Captain Simpson stated that Air Canada would not have allowed an aircraft into revenue service without developing its own aircraft operating manuals or standard operating procedures. Air Canada, for example, has its engineering department calculate slush-correction factors for each aircraft type adapted to Air Canada's own operation. All such work is completed and inserted into the aircraft operating manuals prior to the entry of the aircraft into revenue service. As I did in the preceding section, I found Captain Simpson's testimony regarding these matters particularly telling, having in mind his vast experience and the practices of Air Canada:

> Q. How would you view, sir, crews operating for approximately 12 months on new equipment without an approved AOM?

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[8] This problem stemmed from the takeover of Piedmont Airlines by USAir during the course of the Air Ontario F-28 training program. The first groups of Air Ontario pilots were trained to the Piedmont manual, the latter groups to the USAir manual. See chapter 19, F-28 Program: Flight Operations Manuals.

A. I would be quite surprised that the regulatory authority would allow that to happen.
Q. Would you view that as highly abnormal?
A. Yes.
Q. ... How would you view, sir, having crews operate a new aircraft in a fleet with an unapproved AOM from another carrier, with no amendment service being provided?
A. Highly abnormal.

(Transcript, vol. 118, p. 119)

The evidence is that Air Ontario crews operated the F-28 aircraft for approximately 12 months without an approved aircraft operating manual, using an aircraft operating manual from another carrier, with no amendment service.

Aircraft Defects (Snags)

The evidence on aircraft defects revealed that a practice developed within Air Ontario of some F-28 flight crews recording aircraft defects or snags on pieces of paper and passing them on to subsequent crews rather than entering the defects in the aircraft journey logbook as required by the Air Regulations (see chapter 16, F-28 Program: APU, MEL, and Dilemma Facing the Crew). The object of this practice was to prevent the grounding of an aircraft during a day's operation, away from the maintenance base. This practice arose in part from the absence of an approved minimum equipment list.

It is clear that Air Canada would not tolerate the passing of snags on pieces of paper between pilots; it would expect its pilot to enter a defect in the journey log of the aircraft as soon as the defect was discovered. As Captain Simpson explained:

Q. Again, from your experience and background, sir, would you – how would you view the practice of crews passing snags on pieces of paper and not noting them in the journey logbook at the time they arise?
A. I don't know what kind of a snag they would pass on a piece of paper. I would like to think if there's something wrong with the airplane, they would put it in the logbook.

I would hate to think that my own crew members would do such a thing.
Q. Would that kind of a practice be condoned by Air Canada?
A. No, because I think you are putting a liability on the next pilot.

(Transcript, vol. 118, p. 117)

Refuelling

While flight 1363 was at the Dryden station stop it was refuelled with an engine running, a procedure referred to as "hot refuelling." During the

procedure the passengers remained on board. Leaving passengers on board during "hot refuelling" was regarded as unsafe by Air Canada and was not a permitted practice. Captain Simpson's attention was directed to Air Canada aircraft flight manuals, and he was asked to describe both the Air Canada hot refuelling procedures and the circumstances under which they were to be used:

> Q. And could you tell us generally, what is the policy, for example, on the L-1011, and then you can tell us what the policy is for Air Canada.
>
> A. Well, I included it as an example that while we don't refuel with an engine running, it is possible to do that. And we have very specific instructions laid out on how it has to be done.
>
> For example, the procedures to be used when it is necessary to refuel, obviously if you have to refuel and you don't have the capability of starting the engine because of no APU or no ground power, number 2 engine is left running. It must be noted this is a special procedure and must only be used when the aircraft APU is unserviceable, so it lays down the conditions. It's not a frivolous procedure. In fact, it's one that's very rarely ever used.
>
> And at the very bottom of that section, we must ensure that prior to refuelling, apologize for the inconvenience and deplane all passengers and cabin crew. And they can't be reboarded until the refuelling is complete.
>
> (Transcript, vol. 118, pp. 125–26)

Passengers remained on board during the hot refuelling of flight 1363 in Dryden on March 10, 1989 (see chapter 5, Events and Circumstances Preceding Takeoff).

De-icing

Air Canada's de-icing procedures, as attested to by Mr Paul Lefebvre, an Air Canada station attendant, allowed for either or both the maintenance personnel and the aircraft captain to make the decision regarding the need for de-icing. As well, subsequent to spraying, it is Air Canada policy that an independent check be carried out on its aircraft to ensure that the de-icing was effective.

Air Canada de-ices other carriers' aircraft under ground-handling contracts, including those of Air Ontario, pursuant to the procedures of those carriers. Mr Lefebvre testified that Air Canada does not carry out an independent check of the aircraft surfaces after such contract de-icing, nor is such a check carried out by Air Ontario or any other carrier, either by ground personnel or flight crews. Mr Lefebvre recalled occasions when an independent check of his own work disclosed an incomplete

job, and he was of the firm opinion that the check was a worthwhile safety feature.

Mr William Deluce, president and chief executive officer of Air Ontario, acknowledged during the course of his evidence that he had become aware of the lack of an independent checker in his corporation's de-icing procedures only as a result of the evidence before this Commission. He assured the Commission that a suitable arrangement would be sought with Air Canada for the checking procedure to be included as part of Air Ontario's de-icing procedures.

Operational Control and Flight Planning: Air Canada versus Air Ontario

It was the opinion of Captain Simpson, after examining the Air Ontario flight release issued to Captain Morwood on the day of the accident, that the information contained in it was minimal compared with that issued to Air Canada flight crews (see chapter 23, Operational Control). The lack of sufficient information in the Air Ontario flight releases was noted during the Operational Review of Air Ontario carried out by Air Canada in the fall of 1989, some months after the Dryden accident. The lack of information concerning such matters as fuel burns, flight levels, and wind components was targeted for correction subsequent to this review.

It was obvious from Captain Simpson's description of the Air Canada information package (AFPAC) given to its pilots prior to flight departure that Air Ontario's flight release paled in comparison.[9] Air Canada's AFPAC was described by Captain Simpson as a combination flight release and flight plan, containing all information relevant to weather, altitude, fuel consumption at various points, headwind and shear component, taxi fuel, landing weight, NOTAMs (notices to airmen), as well as all the relevant alternate, terminal, and passenger information required to minimize the workload of the flight crew.

Air Canada exercises its delegated responsibility of operational control over its flights through a full co-authority dispatch system that closely integrates the role of flight crews and dispatchers. The operational flight plan is generated and signed by both the dispatcher and the flight crew members. Flight planning is considered a joint responsibility, and, in the case of a dispute, the most conservative approach prevails. This was by no means the case at Air Ontario, which fulfilled its operational control

[9] AFPAC is the designator for Automatic Flight Planning, Air Canada. Captain Simpson described in great detail how the information for the flight crews comes to be generated and how it is distributed to flight crews (Transcript, vol. 118). An Air Canada AFPAC was entered as Exhibit 899.

obligations pursuant to the less sophisticated "pilot self-dispatch" system, a system sanctioned by Transport Canada.[10]

The Air Canada co-authority system of operational control would obviously have been better for Air Ontario. Such a co-authority system, however, requires dispatchers who are very well qualified.

The essence of the testimony of Mr Daniel Lavery, the Air Ontario dispatcher responsible for flight 1363 on March 10, 1989, and his superiors was that his training could only be described as rudimentary. Along with the errors contained in the flight release for flight 1363, the aircraft was dispatched into Dryden with an unserviceable APU at a time when the latest Dryden terminal forecast called for freezing precipitation. A senior Air Canada dispatcher gave evidence that an experienced Air Canada dispatcher would have had flight 1363 overfly Dryden on the day of the accident.

Somewhat ironically, Captain Simpson had occasion to meet with a group of Air Ontario pilots in November 1988 during an Canadian Air Line Pilots Association (CALPA) annual meeting. Captain Simpson described the meeting as informal, but the pilots expressed an interest in Air Canada's intention towards Air Ontario with regard to, among other things, training and dispatch. The Air Ontario pilots had been introduced to Air Canada's system of operational control as a result of being in the Air Canada system and they enquired whether it was to become available to them.

As might be expected, the pilots were impressed with the amount of information Air Canada's flight planning facility made available to flight crews as compared with their own. They were interested in knowing whether it was the intention of Air Canada, as Air Ontario's parent corporation, to make its superior flight planning facilities available to Air Ontario crews. As Captain Simpson described it:

> A. ... The whole thrust of their argument was that it would be nice to have the Air Canada system, because they flight planned in our area in Toronto where they had access toall the information, and you know, after you have seen Paree, it's hard to get you back on the farm.
> Q. Very true.
> A. They had seen a much nicer system.
> Q. They had seen Air Canada.
> A. That's right.

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[10] The Air Ontario dispatch system was described as a "hybrid" between a pilot self-dispatch and a full co-authority dispatch system by Mr Robert Nyman, Air Ontario director of flight operations (Transcript, vol. 108). The complete description of the difficulties with Air Ontario dispatch is contained in chapter 23, Operational Control.

Q. And they asked you for the Air Canada system?
A. They did.

(Transcript, vol. 123, p. 116)

Captain Simpson did not assign a high priority to the meeting and did not raise the concerns addressed by the pilots to anyone at Air Canada, to the Air Canada representatives on the Air Ontario board of directors, or to Mr Larry Raymond of Air Ontario, as had been suggested by the pilots prior to the accident. Captain Simpson was questioned on the lack of follow-up to this meeting:

Q. Would it be fair to say that you just didn't follow up on the meeting?
A. No, I gave consideration to it, and, in due course, we would talk about it. That meeting with the pilots was not to identify a serious safety problem. There was no urgency to the matter. And, to some degree, sir, it was a bitching session on their part to get the Deluces to spring for more money.

(Transcript, vol. 123, p. 126)

The Air Ontario pilots were in fact raising problem areas that later manifested themselves as legitimate safety concerns. However, the informality of the meeting must be kept in perspective. As Air Ontario captain Monty Allan explained, "he made us no promises, and we had no firm expectations. It was an informal meeting" (Transcript, vol. 91, p. 156).

Dispatcher Training

Air Canada's dispatch and flight-following departments are of genuine assistance to its pilots, a result in large part of the superior training Air Canada's dispatchers receive and the superior operational flight release information provided to its flight crews.

Compared with Air Ontario, Air Canada dispatchers receive extensive training, both on the job and through courses. There can be no doubt from the evidence that Mr Lavery did not meet the minimum dispatch standards set forth in ANO Series VII, No. 2. Indeed, it was the opinion of Mr Adrian Sandziuk, an experienced Air Canada dispatcher, that flight 1363 would have been better off with no dispatcher being involved at all; at least in that scenario the pilot would have been forced to do his own calculations. He considered it "unbelievable" that Air Canada would allow Air Ontario to permit a dispatcher with two weeks' training to have flight watch over a transport category jet operation. Mr Sandziuk also stated that Air Canada had the resources and expertise to bring Air

Ontario's "terribly inadequate" flight watch up to an acceptable standard (see chapter 23, Operational Control).

These examples of operational discrepancies show undeniably that Air Ontario operated to lower operational standards than Air Canada, although for the most part within standards set and authorized by Transport Canada. This conclusion was put to Captain Simpson and he agreed:

> Q. ... Would you not agree with me from the series of examples I have given you, and there are others, that Air Ontario, at that time, was not meeting Air Canada standards?
> A. That is correct.
>
> (Transcript, vol. 123, p. 108)

Flight Safety Overview

There were other areas besides direct operational involvement in which Air Canada could have exercised some influence over the safety of operations at Air Ontario. It could, for example, have conducted a timely operational review of Air Ontario, particularly at the commencement of jet operations, and it could have ensured the presence of a properly functioning flight safety department.

It is regrettable that Air Canada did neither.

Operational Review

The evidence shows that Air Canada had decided to do an operational review of Air Ontario shortly after its purchase of the 75 per cent interest in January 1987. Such a review, however, did not occur until the fall of 1989.

Captain Simpson agreed that it would have been desirable for Air Canada to have done an assessment of Air Ontario at the time of the purchase of Air Canada's controlling interest in order to ascertain any operational deficiencies:

> Q. Would it not have been desirable for you to do an assessment at the time you purchased it in order to determine whether or not there were deficiencies?
> A. That's right, and shortly after the purchase, we had made that decision to do an assessment.
>
> It appears to have been a long time from the time we made the decision till the time we did it. It involved some of the personnel problems in our own airline. We didn't have the personnel available. So while it appeared to be a long period of time before we completed our own operational review, from

> time of purchase, I had personally recommended that we examine that aspect.
>
> (Transcript, vol. 123, pp. 108–109)

Aside from the labour relations or "common employer" concerns discussed above, an additional reason given by Captain Simpson for the delay in conducting Air Canada's operational review of Air Ontario was the fact that Transport Canada was doing its own audit of Air Ontario in the fall of 1988 and he did not want an overlap. Captain Simpson was under the misapprehension that Transport Canada had performed "quite a decent audit" of Air Ontario:

> A. ... In the fall of '88, the – Transport Canada were doing an audit on Air Ontario, and I had suggested to all our people that we shouldn't become involved until the audit was over.
> Q. That is, the Transport Canada one?
> A. The Transport Canada audit, which, incidentally, was quite a decent audit, gave the airline reasonably good marks. So, of course, then the – in the early winter, the accident occurred and personnel from Air Ontario were deeply involved in that, so our audit didn't take place until the summer of '89.
>
> (Transcript, vol. 118, pp. 167–68)

In fact the evidence irrefutably disclosed that the Transport Canada audit of Air Ontario was anything but a "decent" audit; to the contrary, that audit can only be described as a travesty, both in its execution and in its long-delayed delivery. The audit, incredibly, did not assess Air Ontario's new F-28 jet program (see chapter 33, Audit of Air Ontario Inc., 1988).

Air Canada's reliance on an audit that did not even assess the F-28 program, the very operation where Air Canada's assistance was most urgently needed, represents yet another of the ironies underlying the tragedy at Dryden. It is illustrative of a degree of corporate inattentiveness unbecoming to Air Canada's otherwise hard-won worldwide reputation for safety.

As has already been pointed out, Air Canada finally did conduct an operational review on Air Ontario in the fall of 1989. By that time the remaining F-28 C-FONG had left the fleet, and the F-28 service had ceased.

I found Captain Simpson's very frank and unequivocal answers as the head of flight operations for this country's largest carrier illuminating as to his perception of both the regulator's and the operator's function in this area.

Flight Safety Organization

The evidence describing the operation of the Air Canada Flight Safety Department and its role within the organization is discussed in chapter 24, Flight Safety. Most revealing was the fact that neither Mr Rowe, the Air Canada representative on the board of directors of Air Ontario, nor Mr Jack Mitchell, Air Canada's director of flight safety, appeared to have been aware that, for well over a year, and, more importantly, during the introduction of the F-28, there was no flight safety officer or flight safety organization in place at Air Ontario.

As outlined in chapter 24, the only meaningful contact between Air Canada and Air Ontario in the area of flight safety consisted of two accident response courses: one in 1985, in fact given to a predecessor corporation, Air Ontario Limited, and one in May 1989, after the Dryden accident. The latter course was at the request of Air Ontario.

The evidence indicates that it was only in the event of a major accident that there were to be any intercorporate dealings between the respective flight safety departments of Air Ontario and Air Canada. Participation in post-accident response courses, however, can hardly be equated to participation in operational flight safety programs.

Having listened to the evidence of Mr Mitchell, I was most impressed by Air Canada's flight safety organization and the corporation's dedication to flight safety. I therefore have had a great deal of difficulty understanding Air Canada's failure to assure itself that there was in place at Air Ontario a functioning flight safety department. The only explanation appears to be that Air Canada's management was so determined to avoid a single employer declaration under the Canada Labour Code that flight safety and operational monitoring of Air Ontario were relegated to the bottom of the priority bin.

Parent-Feeder Operational Standards

The role and obligations of a parent carrier with respect to its operating feeder carriers has been a difficult issue to address. Intuitively, one is drawn towards the position that it should be mandatory for a parent carrier, whose operational standards are higher than those required by Transport Canada regulations, to impose its own operational standards on its feeders, notwithstanding the economic implications. This is particularly so where the parent is holding out the feeder operation to the public as being its own operation, as is the case with Air Canada and Air Ontario. Upon reflection, however, it becomes clear that to impose such a requirement without any reservations would be tantamount to establishing one operational standard for both the parent and the feeder;

that is, the higher parent-carrier-generated standard in place of the Transport Canada threshold standard now followed by the feeders. Within the aviation industry, feeders would obviously operate to one of these standards, but most likely to the Transport Canada threshold standards, depending on ownership considerations, as indeed was the case with Air Ontario. Given the attendant cost differences associated with the two operational standards, a requirement that the feeder carrier operate to the parent carrier's operational standards would be seen as clearly discriminatory if it is not confined to those parent-feeder relationships in which the feeder is held out to the public as being part of the parent carrier's operation. Even within that relationship, the imposition of the parent carrier's higher operational standards upon the feeder must be tempered by the tests of relevance and reasonableness. Having made these observations, I strongly encourage a dialogue between Transport Canada and the Canadian air carriers on this subject.

Conclusions

Subsequent to the Dryden accident, Air Canada proceeded to take a long look at its connector carrier network, as evidenced by the series of operational reviews commenced in 1989. The latest information available to the Commission is to the effect that Air Canada was, in June 1991, in the process of purchasing all equity interests in its connector carriers not already owned by it, including the minority equity interest of the Deluce family. In addition, with its corporate reorganization of April 17, 1991, Air Canada announced its creation of a single corporate entity within Air Canada to manage the company's connector carrier interests. Whether these initiatives will result in a more appropriate level of corporate overview of Air Ontario by Air Canada remains to be seen. It is to be hoped that this will be the case and that the lessons from the Dryden tragedy will be not be lost on Air Canada's management.

Those lessons, as clearly demonstrated from the evidence outlined in this and other chapters, can be distilled into one overriding theme. Simply stated, in the pursuit of its corporate objectives, management must remain true to the primacy of safety considerations. The corporate mission statements of Air Canada and Air Ontario both contain words to this effect. The evidence disclosed that other corporate concerns, important in their own right, were allowed to intervene and subordinate safety. The difference between the attention and resources expended by Air Canada and Air Ontario on marketing, as compared with safety of operations, must, when held up to their respective mission statements, be described as inadequate and short-sighted.

Aviation safety should not be looked on as merely a selling point or marketing device, nor should it be viewed as some abstract goal by which to satisfy the minimum standards required by the regulator in order to maintain an operating certificate. Rather, to maintain its place of primacy within an organization, aviation safety must be viewed, from management on down, as an obligation of trust to the travelling public; and management must set the example. Here management fell short of the mark.

FINAL REPORT

TECHNICAL APPENDICES

1 Occurrence No. 825-89-C0048: Structures/Site Survey Group Report LP 38/89: Accident: Fokker F28, Mk 1000, Registration C-FONF, 10 March 1989
Canadian Aviation Safety Board Investigation Team

2 Fokker Aircraft B.V. Amsterdam, Fokker Aerodynamics, Report No. L-28-222: Note on the Aircraft Characteristics as Affected by Frost, Ice or Freezing Rain Deposits on Snow

3 Fokker Aircraft B.V. Amsterdam, Report No. VS-28-25: Flight Simulator Investigation into the Take-off Performance Effects of Slush on the Runway and Ice on the Wings of a Fokker 100

4 A Report on the Flight Dynamics of the Fokker Mk 1000 as They Pertain to the Accident at Dryden, Ontario, March 1989
J.M. Morgan, G.A. Wagner, R.H. Wickens

5 Wind Tunnel Investigation of a Wing-Propeller Model Performance Degradation due to Distributed Upper-Surface Roughness and Leading Edge Shape Modification
R.H. Wickens and V.D. Nguyen

6 Freezing Precipitation on Lifting Surfaces
Myron M. Oleskiw

7 Human Factors Aspects of the Air Ontario Crash at Dryden, Ontario: Analysis and Recommendations to the Commission of Inquiry
Robert L. Helmreich

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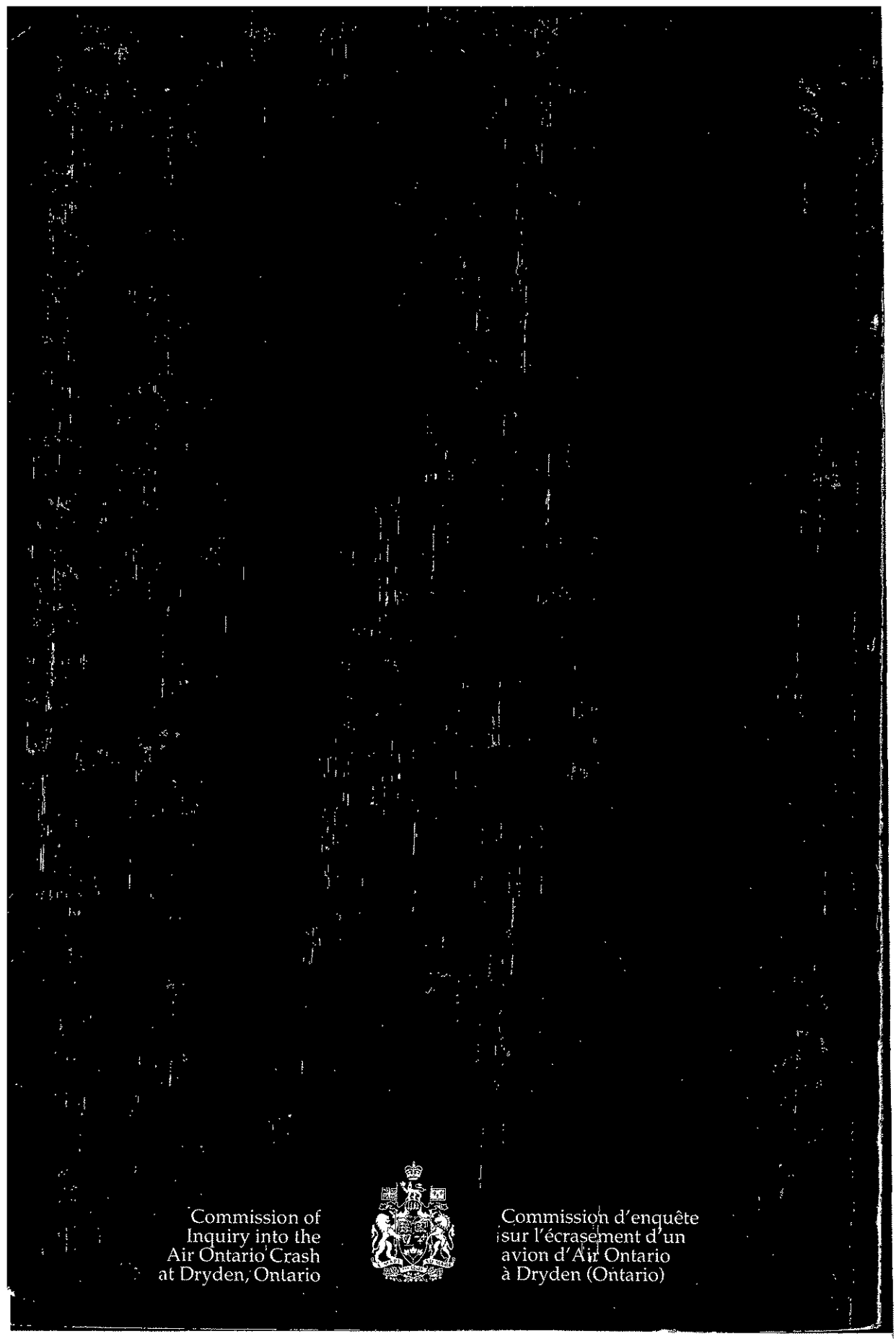

Commission of
Inquiry into the
Air Ontario Crash
at Dryden, Ontario

Commission d'enquête
sur l'écrasement d'un
avion d'Air Ontario
à Dryden (Ontario)