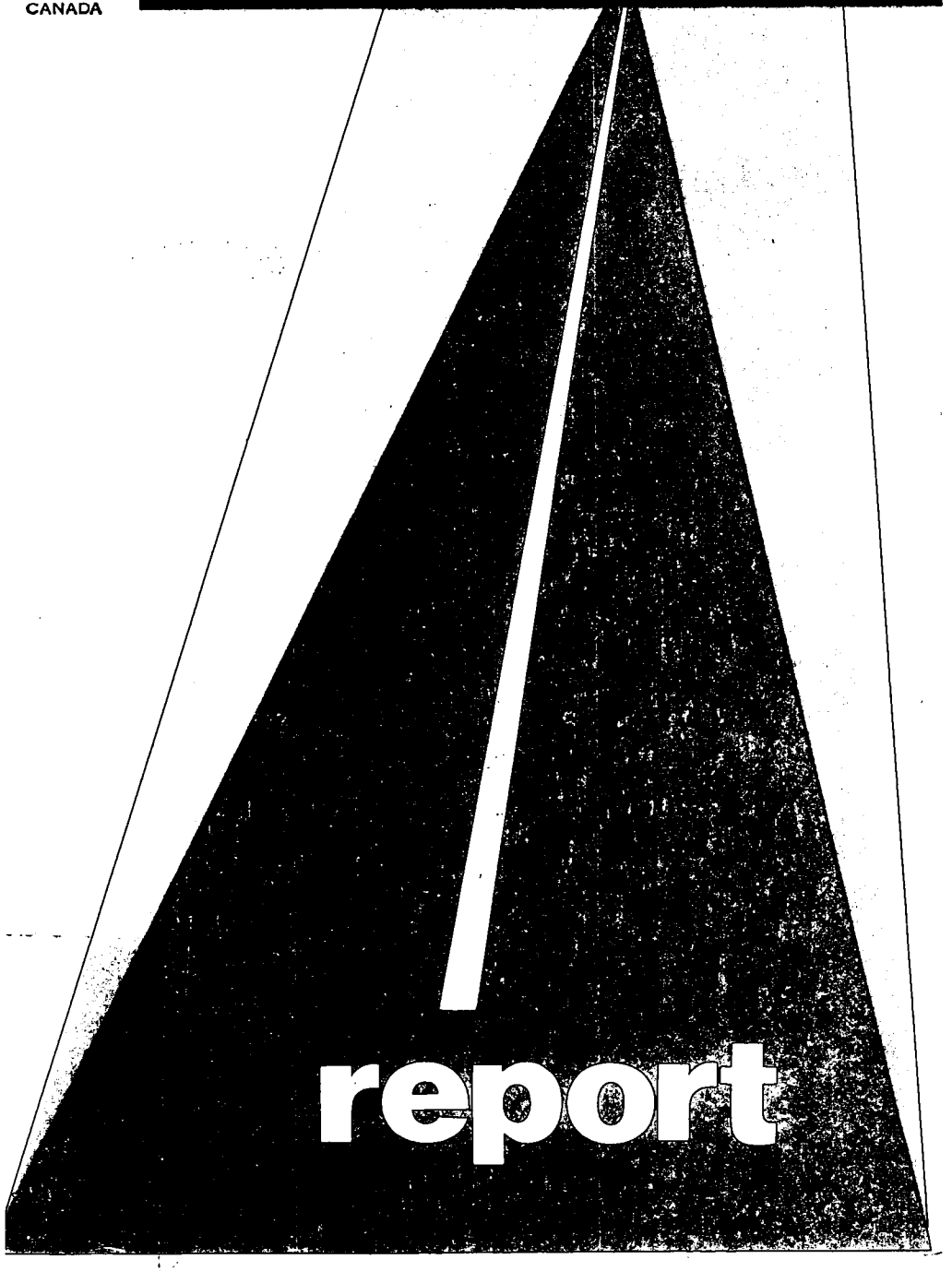
CANADA

Airport Inquiry Commission



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REPORT OF THE AIRPORT INQUIRY COMMISSION

CANADA

AIRPORT INQUIRY COMMISSION
COMMISSION D'ENQUÊTE SUR L'AÉROPORT

Chairman:
The Honourable Mr. Justice Hugh F. Gibson
Members:
Murray V. Jones, Esq.
Dr. Howard Petch

TO HIS EXCELLENCY

THE GOVERNOR GENERAL IN COUNCIL,

May it Please Your Excellency,

We, the Commissioners appointed by Order in Council P.C. 1973-3026 dated October 5, 1973, to inquire into and report upon certain matters in relation to the air transportation needs of the central Ontario market have completed the duties prescribed in the said Order in Council and now submit our Report.

Hugh F. Gibson,
Chairman.

Murray V. Jones,
Commissioner.

Howard E. Petch,
Commissioner.

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COMMISSION D'ENQUÊTE SUR L'AÉROPORT

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CHAIRMAN

The Honourable Mr. Justice Hugh F. Gibson

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CHAPTER I

Constitution and Organization of Airport Inquiry Commission

The Airport Inquiry Commission was constituted by and derived its powers from *Order in Council* P.C. 1973-3026. (See Appendix 1 to this Report)

The *Order in Council* recited certain decisions that had been made by the Government of Canada. The existing Toronto International Airport, hereinafter called Malton Airport, should not be expanded beyond its present boundaries in order not to increase the degree of disturbance from flight operations to the people residing in the communities around Malton; the needs of the central Ontario market required that another international airport be established in addition to Malton; and a site near Pickering, Ontario, had been chosen for the location of a new International Airport, hereinafter called Pickering Airport.

Simply stated, the *Order in Council* imposed two basic duties upon the Commissioners. Firstly, to inquire into and report upon whether there was any new evidence affecting the said decisions of the Government of Canada, and whether there was any new evidence of any relevant factor not previously considered by the Government of Canada in arriving at the said decisions. Secondly, to inquire into and to report on the role which the new International Airport should serve, the date such should be opened, the nature of ground access to the new International Airport and between the new International Airport and the Malton Airport and

whether downtown terminals should be established for passenger convenience.

The Commission held Organizational Hearings prior to each Public Hearing. At the initial Organizational Hearings held in the vicinities of the Malton Airport, the site near Pickering and in the City of Toronto, the Commission described in a general way, to those in attendance, its understanding of the *Order in Council.*

The Commission took the position at all times, and it reiterates at this time, that the *Order in Council* to it was perfectly clear, namely, to January 30, 1973, the Government had made the said decisions recited in the *Order in Council,* and it was looking for evidence, if any existed, which had arisen since that time, which could be classified as New evidence in respect to paragraph 1 and any evidence in respect to paragraph 2 of the *Order in Council,* which might have a bearing on Government decisions to date.

The fundamental questions which the Commission was to consider under Paragraph 1 of the *Order in Council* were the questions of need and location. In considering these questions, the Commission was not directed to conduct a new study of these matters parallel to studies already conducted by the Government of Canada, prior to 30 January, 1973. Instead, the Commission was directed to conduct an entirely different inquiry in respect to need and location, which the Commission did in depth. The Government of Canada had decided, as result of forecasts of growth in air passengers, air cargo and aircraft movements made prior to 30 January, 1973, that the air transportation needs of the central Ontario market required that there be a new international airport to serve the central Ontario market. The Commission was asked by the *Order in Council* to determine whether there was any new evidence that had arisen since 30 January, 1973, which would affect the decision of the Government of Canada as to the need for a new international airport. The Government of Canada had decided, as result of studies conducted for the location of a suitable site for a new international airport prior to 30 January, 1973, that a site near Pickering, Ontario, was the appropriate location for such a new international airport. By the *Order in Council,* the Commission was asked to determine whether there was any new evidence that had arisen subsequent to 30 January, 1973, which would prove that the site near Pickering, Ontario, was not a suitable location for a

new international airport to serve the central Ontario market. In considering both the questions of need and location, the Commission was also directed to consider whether there was any new evidence of any relevant factor that had not been previously considered by the Government of Canada when it made its decisions as to the need for and location of a new international airport.

The Commission also took the position that it was not authorized by the *Order in Council* to make funds available to various groups to assist them in research, the collection of evidence, and the presentation of that evidence before the Commission.

In organizing for its Hearings, the Commissioners promulgated a Practice and Procedure in December, 1973, which set out the manner in which the Organizational and Public Hearings would be conducted and the manner in which evidence would be received. A copy of this Practice and Procedure is Appendix 2 to this Report.

The Public was invited to participate in the Inquiry. To this end, the public was notified of the Terms of Reference of the Commission, that the Commission had established a Practice and Procedure, and the manner in which evidence could be presented before the Commission. In addition, notice was given well in advance of each Organizational Hearing and Public Hearing. This was done in many ways as set out in the Affidavit of the Registrar-Administrator which is Appendix 3 to this Report. In brief, advertisements were placed in the Toronto newspapers, in daily and weekly newspapers published in the central Ontario market, and beyond. A copy of the *Order in Council* and Practice and Procedure was mailed to television and radio stations serving the central Ontario market. A copy of the *Order in Council*, and Practice and Procedure was forwarded to all Members of the Federal Parliament from the Province of Ontario, the Executive Council of the Province of Ontario, and all Members of the Legislative Assembly of the Province of Ontario, the Mayors, Reeves and Chairmen, as the case may be, and Clerks of each Municipal and Regional Government in the Toronto Metroplex (Metropolitan Toronto and surrounding areas), and in the area comprising the central Ontario market, and beyond.

The Practice and Procedure adopted by the Commission was designed to facilitate the adducing of evidence before the Commission and to permit everyone to have knowledge, well in advance, of the evidence which would be adduced before the Commission at a particular Hearing. As a result, the Ministry of Transport, Canada, had to file, in advance, all the evidence that it intended to introduce, as did every other witness. Thereby, every member of the public, long in advance of any Public Hearing, had an opportunity to read such evidence and consider it. This assured that there would not be an Inquiry by "ambush".

Offices were opened in downtown City of Toronto, near Malton Airport and near the site of the Pickering Airport for the convenience of the public. Every Government document that was to be introduced into evidence, every evidence statement that was to be introduced into evidence by any member of the public, group, agency, corporation and municipal government was made available for public inspection. During the course of the Hearings, every interested person was afforded an opportunity to review the exhibits which had been filed into evidence and to review the daily transcript of the evidence. In effect, there was an opportunity given to all interested persons to examine in detail all evidence that was to be put before the Commission, all evidence that was in fact put before the Commission, and to have copies of documents made and to take the same away.

Commission Counsel spent many hours assisting prospective witnesses who wished assistance in adducing their evidence before the Commission.

The effectiveness of the Commission adopting this procedure may be assessed from the fact that over the entire course of the Hearings, which extended from March to August and covers some 6,000 pages of transcript of evidence and 600 exhibits, the evidence of 200 witnesses was received. In addition, there were about 250 additional persons who submitted evidence statements and had the opportunity to give oral evidence in support, but for reasons of their own they did not.

Both before and during the course of the Hearings, at the early stages at least, there was certain criticism that the Hearings were not conveniently held in terms of public participation. The Commission believes that it should be noted that it sat regularly during

the evenings for many hours and in different places, so that not only could the public participate after working hours, but also, so that persons interested in attending or wishing to give evidence would not in fact have to travel great distances. To this end, the Commission sat near Malton Airport for some weeks, both during the day and evening. Similarly, the Commission sat two weeks, both during the day and evening, in the Towns of Pickering and Brougham, in the vicinity of the site near Pickering. In addition, the Commission sat in the day and evening in the City of Toronto. Any witness, both professional or lay, who wished to give evidence but could not attend during the daytime was scheduled to testify before the Commission in the evening wherever possible.

To assist the public to cope with the magnitude of the questions raised in the *Order in Council*, and to be considered by the Commission, the *Order in Council* was divided into two parts called by the Commission, Phase I and Phase II. The questions raised by the *Order in Council* in respect to each Phase were subdivided into a class of common subjects. Public Hearings were then held in respect to each subject class. This was set out in the Schedule of Hearings prepared by the Commission. A copy of the Schedule of Hearings is Appendix 4 to this Report.

As previously mentioned, many private members of the public, interested agencies and groups, corporations, regional and municipal governments filed evidence statements and gave oral evidence in support of the same. Lists of those who submitted evidence statements only, and those who in addition actually testified before the Commission, are as set out in Appendix 5 of this Report.

The Commission wishes to express its indebtedness to both an enlightened, intelligent and active interest of the public, as was evidenced by the number of the written evidence statements, as well as by the obvious devotion and interest given to the Commission's work by those who attended to give evidence. It would be, in our opinion, inappropriate to single out any particular group or any particular individual, but at the same time, it would be equally unjust not to make some specific reference to the length of time and care in preparation which had been taken by many, some of whom submitted only written evidence and others who gave evidence orally.

A great deal of the evidence had been carefully thought out and was directed to the Commission in such a way and in such a spirit that the Commission wishes to note its appreciation. New propositions, new proposals and new thoughts have found their way into this Report as a result of the evidence of those who came forward to help the Commission. Unquestionably, some of the evidence was of more assistance than other evidence.

Although the Commission held Public Hearings at various places, no matter was repeated at any location. The Commission was of the view that there was only one Hearing regardless of location.

A general view of the evidence received by the Commission at each of its three general locations is now set out, that is to say:

THE MALTON HEARINGS

The Commission held Public Hearings at the Howard Johnson Motor Hotel, in The Borough of Etobicoke, near Malton Airport, hereinafter called the "Malton Hearings", to make it more convenient for any private member of the public, any interested agency, any group or corporation and any representative of any Provincial, Regional or Municipal Government to adduce evidence before the Commission on matters which might be of more direct concern to such persons living or situated near that location.

The Ministry of Transport, Canada, adduced evidence before the Commission at the Malton Hearings in respect to; the present development of Malton Airport; airspace organization and management in a two-airport system (Malton and Pickering); a summary of forecasts of airport demand for the central Ontario market up to the year 2000 including passenger forecasts, cargo forecasts, air carrier movements, general aviation movements forecasts of STOL patronage for the Toronto region; noise exposure forecasts to the year 1985, based upon Malton as the only airport, based upon the site near Pickering as the only airport and based upon a two-airport system consisting of Malton and Pickering; the attitudinal response of a community to aircraft noise; runway capacity; wake turbulence; and forecasts of ground access travel demands for the year 2000, based upon domestic and trans-border short-haul flights assigned to Malton and international, charter, and long-haul trans-border flights assigned to Pickering.

The evidence of the Ministry of Transport, Canada, was adduced before the Commission on each topic by a chief witness or witnesses who dealt with a particular topic and submitted into evidence, as exhibits, various reports and charts. The chief witness or witnesses together with the personnel who were involved with him, or them, in the preparation of a report were subjected to cross-examination. The witnesses of the Ministry of Transport, Canada, were followed by witnesses on behalf of various groups and witnesses who appeared on their own behalf. All were subjected to cross-examination.

THE PICKERING HEARINGS

The Commission held Public Hearings at Pickering High School, Pickering, Ontario, and in the Pickering Community Hall, Brougham, Ontario, hereinafter called the "Pickering Hearings". Once again, the Pickering locations were selected for the convenience of the public living in that area.

At these Hearings, residents, interested groups and municipalities in the surrounding area were heard first, followed by witnesses on behalf of the Ministry of Transport, Canada. Again, all witnesses were subjected to cross-examination.

At these Hearings, evidence was heard in respect to the following topics : airspace organization and management in a two-airport system; runway concept evaluation for a second international airport; noise disturbance forecasts; the affects of flight paths and the new Toronto Zoo; economic impact of the area; distribution of growth in the Toronto-Centered Region; agricultural land use within the proposed new international airport site boundaries and the on-going role of agriculture on airport lands; bird population and movements associated with proposed site of the new international airport; possible hazard from birds to future aircraft traffic; the effect of noise on animals; recreation land in vicinity of the proposed new international airport; and recommendations re Duffin's Creek.

THE TORONTO HEARINGS

The Toronto Hearings were held at 155 University Avenue, Toronto.

At these Hearings, evidence was heard from witnesses from the Ministry of Transport, Canada, various municipalities, corporations, and individuals and interested groups.

Evidence was heard in respect to the following: forecasts as to the traffic volume of passengers, aircraft movements and air cargo to the year 2000; as to the inconvenience of the proposed site of the second new international airport; as to the unsuitability of the site proposed in relation to on-site and off-site facilities that will be required to be built such as roads, railways, guideways, helicopter facilities; new technology such as new aircraft, including STOL, new noise abatement equipment and procedures, new navigational equipment and procedures; possible high speed public transportation systems; general aviation; dual lane runway concept; architectural and historical significance of certain buildings on the proposed site; the role of the proposed new international airport; including, flight sector assignment; passenger convenience of on-site and off-site terminals; and ground access to the proposed new airport.

Again, all witnesses were subjected to cross-examination.

SPECIAL PUBLIC HEARINGS AT TORONTO

As has been previously mentioned in this Report, the Commission, prior to the commencement of its Public Hearings, published and circulated a Schedule as to the dates of the Public Hearings and as to the topics which would be considered at each Public Hearing. The Schedule showed the Public Hearings extending from March to early June, 1974.

Many municipalities participated in the Public Hearings held by the Commission even though some of them had only been organized as of January 1, 1974. In all cases, with the exception of The Regional Municipality of Durham, the municipalities filed evidence statements within the time limits mentioned in the Schedule of Public Hearings. Although The Regional Municipality of Durham did not file its evidence statement in respect to the topic to which it related within the time specified in the Schedule of Hearings, its evidence statement was received at one of the later Public Hearings.

In March, Counsel for the City of Toronto advised the Commission that it might not be possible for the City of Toronto to file

an evidence statement within the time fixed by the Commission for receiving an evidence statement for a particular topic as a study was being prepared for the City of Toronto which might not be completed in time. Counsel for the City of Toronto also advised that the study would not deal with just one topic but with many topics being considered by the Commission. The Commission advised Counsel for the City of Toronto that the study of the City of Toronto could be considered as a separate matter at any time before the Public Hearings were completed.

After the completion of the scheduled Public Hearings, including the obligation on the part of anyone who submitted an evidence statement to appear before the Commission and submit to cross-examination on his evidence statement, it was announced that a study had been submitted to the Mayor and Council of the City of Toronto prepared by Diamond & Myers, Jack B. Ellis & Associates Limited and the Institute of Environmental Research Inc. styled, "Pickering Impact Study." It was also stated in the news reports that the study established that there was no need for the new Pickering Airport.

When a summary of the study was given to the Executive Committee of the City of Toronto by the authors of the study, one of the authors of the study, J.B. Ellis, made a statement that the forecasts of passenger growth by the Ministry of Transport, Canada, were not only exaggerated but that at a private meeting held with some of the experts of the Ministry, those experts agreed with his much reduced forecasts.

Commission Counsel wrote to the Mayor and Council of the City of Toronto requesting a copy of the study and the names and qualifications of the persons who had been involved in the preparation of the study. The requested material was not received.

The statement of J.B. Ellis that consultants to the Ministry of Transport agreed with his much reduced forecasts of passenger growth raised the question that the Commission may have been misled by witnesses who appeared before it and testified on behalf of the Ministry of Transport, Canada as to forecasts. News reports as to the conclusions made in the study raised the inference that the Pickering Impact Study did contain new evidence as to (1) forecasts and (2) noise disturbance from aircraft operations. Under the circumstances, the Commission decided that it should hold a

Special Public Hearing to receive the Pickering Impact Study. Commission Counsel was authorized to subpoena the persons believed to be involved in the preparation of the study. Commission Counsel wrote to the Mayor and Council of the City of Toronto to advise the course of action which had been adopted by the Commission.

Shortly after Commission Counsel had written to the Mayor and Council of the City of Toronto, the City of Toronto passed a resolution that a copy of the Pickering Impact Study be forwarded to the Commission and that the Commission be requested to hear as witnesses representatives of the Study Team in support of the Pickering Impact Study.

The Study submitted to the City of Toronto dealt with (1) forecasts of passengers to the year 2000; (2) disturbance by noise from aircraft operations; (3) forecasts of runway capacity, cargo, ground access; and (4) other matters which in the main were of concern only to the City of Toronto, such as, the impact of a Pickering Airport on planning considerations for the City of Toronto, the economic implications to the City of Toronto of a Pickering Airport, environmental considerations, the Province of Ontario's Toronto Centred-Region design and the Province of Ontario's strategic planning for its Central Ontario Lakeshore Urban Complex.

Volume II of the Pickering Impact Study contained two very serious statements, firstly that consultants to the Ministry of Transport, Canada, had advised the authors of the Pickering Impact Study that they had recomputed the Empiric model upon which passenger forecasts were made and a very different set of forecasting equations emerged, and secondly that in an informal conversation with one of the senior consultants to the Ministry of Transport, Canada, the Ministry consultant agreed with the authors of the Pickering Impact Study that the overall constraint value used by the authors of the Pickering Impact Study in preparing forecasts of passenger growth was the proper one that should be used.

An Organizational Hearing was held by the Commission on July 31, 1974 in preparation for the Public Hearing to receive evidence in support of the Pickering Impact Study. It was learned at the Organizational Hearing that the Pickering Impact Study was basically prepared by A.J. Diamond, J.B. Ellis and H.P.M.

Homenuck, all of whom are professors at York University. It was also learned that the report contained little, if any, original data and research and that it was basically a personal assessment by the authors of then existing data, exhibits, and testimony, much of which had already been presented to the Commission, in particular evidence as to (1) forecasts and (2) noise.

At the Public Hearing held August 20, and August 21, 1974, Messrs. Diamond, Ellis and Homenuck endorsed collectively and individually the comments and conclusions in the study. It was as Mr. Diamond described "a team effort".

J.B. Ellis gave evidence on behalf of himself, A.J. Diamond and H.P.M. Homenuck in respect to the part of the report which dealt with (1) forecasts for passenger volumes, (2) noise disturbance from aircraft operations, (3) runways, (4) cargo requirements, (5) terminals, and (6) ground access. In cross-examination, Professor Ellis admitted that he had no expertise in the forecasting of air passenger growth, although he did have some experience in making forecasts for recreational purposes; that he had no expertise in noise disturbance from aircraft operations; that he had no expertise in runway or terminal capacity and that he had no expertise in ground access to airports. He admitted that he had only read part of the exhibits and part of the transcripts of the testimony of the evidence adduced before the Commission. Cross-examination of Professor Ellis revealed that many of the statements in the study in relation to these topics were based on a misunderstanding or lack of knowledge of the entire evidence and were misleading and erroneous.

Professor Ellis in cross-examination stated that there were only two consultants to the Ministry of Transport, Canada with whom he had had informal discussions in respect to the forecasts. The two consultants were called under oath by Counsel for the Government of Canada in reply. They unequivocally contradicted and rejected the account of Professor Ellis as to the nature of their conversation. The Commission has no hesitancy in accepting the account of the two consultants as to the nature of the conversation and disbelieves Professor Ellis.

There was no cross-examination in respect to the other matters considered in the report because, as stated, there was a general acceptance that those matters were beyond the terms of reference

of the Commission and were of concern to the City of Toronto alone in its broader planning purposes. Accordingly, the Commission makes no comments as to the statements and conclusions in the study in respect to those items. However, anyone who reads and considers those portions of the study should do so guardedly in view of the lack of professionalism that was shown in respect to the portions of the report that were considered by the Commission and which were found not credible as a result of cross-examination at the Public Hearing.

In sum, there were two basic matters which were fundamental to the credibility of the entire Pickering Impact Study, namely, (1) forecasts of volume of passengers, and (2) forecasts of noise disturbance from aircraft. Notwithstanding that these two matters were so vital, no person who prepared any portion of the study, including Professor Ellis, had any knowledge or experience to enable them to be competent to give an opinion on either (1) forecasts or (2) noise. Yet, Professor Ellis and other authors of the study purported to criticize the opinions of others who had given expert opinion before the Commission on both these matters, and who were qualified to give such opinions in those two fields.

Under the circumstances, the Commission can give no credence to the unsupported opinions of Professor Ellis and his associates, in respect to (1) forecasts and (2) noise, and rejects them.

Other Sources

The Commission has had the advantage, in addition to the testimony and exhibits at its public hearings, also of reading many studies, and other literature from sources all over the world germane to the air transportation industry, and also to have discussed the many facets of this industry with many persons actively engaged therein throughout the United States and Europe.

APPLICATION TO FEDERAL COURT OF CANADA FOR PROHIBITION

An application by one Charles Morris Godfrey "on behalf of himself and as Chairman of People or Planes" was brought in the Federal Court of Canada against the Airport Inquiry Commission

and the three Commissioners asking for an order prohibiting the Airport Inquiry Commission "from conducting further proceedings or making any report in respect to proceedings already had upon the alleged grounds (1) that one of the Commissioners, Murray V. Jones, was biased in law, and (2) that the Airport Inquiry Commission has failed to exercise the jurisdiction conferred upon it by Order in Council P.C. 1973-3026".

The application was dismissed.[1]

1 Counsel advised as follows:

The Attorney General of Canada intervened in the proceedings and brought an application to quash the proceedings of Godfrey et al. Counsel on behalf of the Commissioners also brought an application to quash the proceedings of Godfrey et al. Prior to the date fixed for the hearing of the applications in the Federal Court of Canada, counsel on behalf of Godfrey et al requested counsel for the Attorney General of Canada and counsel for the Commissioners to consent to a termination of the proceedings. As the proceedings were of a nature that could only be terminated by leave of the Court, the application of Godfrey et al for the termination of the proceedings was considered by the Court on August 12, 1974. After hearing representations on behalf of counsel for Godfrey et al, the Commissioners and the Attorney General for Canada, the Court made an order dismissing the proceedings brought by Godfrey et al and ordered that Godfrey et al shall not take any other proceedings or commence any other action against the Commission or against the Commissioners individually or collectively in respect to any matter or cause based on or arising out of the conduct of the Commissioners in carrying out the terms of Order in Council, P.C. 1973-3026. With the consent of counsel on behalf of the Attorney General of Canada and on behalf of the Commissioners, the Court made no order as to costs.

CHAPTER II

Historical Review of Toronto International Airport Requirements of Central Ontario Market to January 30, 1973.

I. **1936-1939** In 1936, it was decided to establish Trans Canada Airlines (now Air Canada) and to build an airport for Toronto. The Toronto Harbour Commission, as representative of the Department of Transport, Canada, after inspecting and examining a number of sites decided upon Malton which was in the centre of a farm area near Toronto and consisted of 1,400 acres. The choice was made as it was believed that this area would remain beyond any built-up section. To-day the original area comprises only the north-east corner of the present airport at Malton. Building began in September, 1937, and was completed by the end of November, 1938.

The airport when completed, had three runways, 14/32, 10/28, 05/23, arranged in a triangle to give maximum wind coverage. Each runway was 3,000 feet long and 150 feet wide. A hangar was constructed by Trans Canada Airlines, and one of the farm buildings, in those modest early beginnings, was used as a passenger terminal, for communications and weather service.

II. **1938** On October 18, 1938, the Trans Canada Airlines commenced scheduled air service at Malton. Lockheed 14 aircraft accommodating 14 passengers made fewer than ten flights a day. The staff consisted of approximately 175 people.

III. **1939** The Toronto Harbour Commission, with Federal assistance, constructed a frame terminal building which with various extensions served the airport until after World War II.

IV. **1939-1945** During the war years, the airport was used by scheduled airlines, Trans Canada and American Airlines. It was also used as an elementary flying training school, as an air observers' school of the British Commonwealth Air Training plan and by Victory Aircraft to test airplanes.

V. **After the War.** Increased traffic brought more and larger aircraft after the war. To meet these needs, Trans Canada Airlines constructed a new hangar 1,800 feet long for servicing its aircraft. As well, a new terminal building was opened at Malton in 1949. The old terminal building was used as an operations and administrative building.

VI. **The 1950's.** By the early 1950's, more than half a million passengers a year were using Malton and rapid growth was continuing. In 1954, the turbo-prop Viscount was introduced. In 1954, an expansion of the airport was needed to meet future demands. In the same year, additional land was purchased. The first proposal to enlarge the airport was to build major runways, one in the 14/32 direction, one in the 05/23 direction and one in the 10/28 direction. Four terminal buildings, similar to the present Terminal I, were proposed and planned to accommodate 12.8 million passengers a year.

VII. **In 1957.** The runway in the 14/32 direction was extended from 6,000 feet to 11,000 feet. By 1958, the original site of 1,400 acres had been increased about two and a half times to 3,360 acres and plans for expanding the airport had been completed. At this time, before the introduction of jet aircraft for passenger service, noise was not a major problem.

VIII. **1962-1965** A new runway 05R/23L, 9,500 feet long, planned in 1958, was completed in 1962 and subsequently improved by building parallel taxiways and strategically located runway exits to increase capacity.

IX. **1964** The first of the four circular terminals, planned in 1958, was opened. New facilities for cargo and aircraft maintenance were built, and the airport area was increased to its present 4,272 acres.

X. **1965-1967** In 1964, passenger volume forecasts made by the Department of Transport, Canada, estimated 6.9 million passengers enplaned/deplaned a year by 1980.

The 1958 plan for the airport had been based on the assumption that the 1960's would bring a reduction in the growth of air travel. This proved to be wrong. Revised estimates, indicated that Malton would have to serve 13 million passengers a year, perhaps by the late 1970's rather than in the 1980's.

As a result of the latter forecasts, the Minister of Transport, Canada, in 1966 initiated studies of this problem. The studies indicated continued great growth in air transportation. Three thousand acres of land beyond the west limit of the present airport boundary, it was said, would have to be acquired. Additional runways, terminals, aircraft parking aprons and other ground facilities, it was said, would have to be built. These latter facilities would have to be developed to the east and to the west of the existing runway 14/32.

Three important conditions would have to be implemented to make this new plan a success. Additional land, it was said, would have to be acquired taking into account the planned and potential uses of the land for other purposes. This proposal, it was said, would have to take into account the communities surrounding the airport, the potential conflict between existing uses and planned uses and the limits to those uses that would result from flight operations. Also, adequate ground transportation, having regard to existing and planned highways of the Province of Ontario, would have to be taken into account to provide access to the airport.

XI. **Summer of 1968**. The Department of Transport, Canada, announced the said proposal in the summer of 1968. It was widely discussed with municipal and provincial authorities. A special Intergovernmental committee of representatives from the Federal, Provincial, and Municipal Governments was established to examine and study the plan and the effects it would have on existing communities and on the provincial and municipal plans for the area. In addition, public meetings were held to discuss the plan, and although there were some favourable comments, there were a great many more objections.

The intergovernmental committee held six technical meetings at which the Ministry of Transport, Canada, the Government of

the Province of Ontario, and the Municipal Corporations of Metropolitan Toronto, Mississauga, Chinguacousy, Brampton, Etobicoke, and Streetsville were represented. In the opinion of the committee, the concentration of virtually all air traffic, and especially the long-haul international traffic, at Malton would result in a vast increase in the area of land affected and the number of people disturbed by flight operations. Using the Composite Noise Rating, (CNR), system, the said committee estimated that some 68,000 people, already residing in the area in 1968, could be affected at the 100 CNR level by 1985 if the proposed plan was implemented. In 1965, only 10,000 to 15,000 had been so affected.

The municipal representatives on the committee were concerned about the need to zone land adjacent to Malton which would be affected by the proposed expansion. They were concerned about the effect that this control would have on the plans of the nearby communities for growth. These plans included the building of single and multiple homes, the tripling of housing units, building hospitals and industrial areas for an estimated 190,000 people. In some instances, the land had already been serviced for development and controls for airport development on these lands would have serious effects on the environment and economic vitality of these communities.

Another problem which would result from the proposed expansion was the need to relocate Dixie Road, a main thoroughfare.

Because of these factors and demands of residents in the respective municipalities, the municipal members of the committee concluded that the airport should not be expanded as proposed. The committee was of the opinion, however, that a limited expansion might be undertaken while the Ministry of Transport, Canada, searched for and decided upon a long term solution.

XII. **December, 1968**. The Ministry of Transport, Canada, having listened to and considered the many objections to its proposed plan, announced in December, 1968, that the Toronto International Airport Malton, would not be expanded beyond its present boundaries, and expansion within its present boundaries would only be done to accommodate traffic until a second international airport could be opened.

In the meantime, two programmes were planned to accommodate the traffic until 1976. First, new facilities were to be constructed, extending runway 05L/23R to 10,000 feet, strengthening runway 14/32, building new taxi-ways and a new terminal (Terminal II), which is in operation at present. The second programme was to establish guidelines to discourage further development close to Malton which would be incompatible with flight operations. This second programme took into account the amount of traffic forecasted for 1976, a better use of runways to reduce disturbance, and a three-runway system which had been announced earlier and was considered necessary for the needs of the 1970's.

XIII. **October, 1969**. The Government of the Province of Ontario suggested land use controls in October, 1969, for the communities which surround Malton, some of which have been implemented.

XIV. **1969** By early 1969, the Government of Ontario was working out a design of development for the Toronto region and other economic regions to the year 2000.

XV. **1968-1969** After the decision to limit the expansion of Toronto International Airport, Malton, work commenced on finding a suitable site for a second Toronto International Airport.

It was said that over 50 sites were considered which were narrowed to four as representatives for further study. These sites, north (Lake Simcoe), east (Lake Scugog), west (Guelph) and northwest (Orangeville) received greater study.

It was said that additional criteria was used to select the best site, namely, safety and technical aviation considerations, social and environmental effects, regional planning, and passenger convenience.

It was said that detailed studies were made by the Ministry of Transport, Canada, and the Government of the Province of Ontario. It was said by the Ministry of Transport, Canada, that three of the four areas presented substantial drawbacks, and that the preferred area of the four, Guelph, would result in air traffic control conflicts with Malton and would conflict as well with regional development plans.

XVI. **1970** By the spring of 1970, it was said, that the problems in all four sites mentioned above had been identified, and the Government of Canada conducted a review of the progress

made so far. The review concluded that greater consideration should be given to alternate airport systems, including possible roles for Malton.

In studying alternative airport systems, the possibility of closing Malton and using solely a new airport at Guelph was considered. It was said that there were objections to this plan. Malton is convenient for Toronto and for other parts of central Ontario, and a great deal of money from the Federal and Provincial governments and private sources had been invested at Malton.

Also, as part of this review of a system of airports, it was said, the Government of Canada began to examine ways to expand Toronto International Airport within the existing boundaries to determine if any of these alternatives could meet the needs of the future and at the same time avoid extensive noise disturbance. This approach was termed "reconfiguration". It was said that studies indicated that this could not be done.

The Toronto-Centered Region

The design for the Toronto-Centered Region was defined by the Province of Ontario in 1970. It extends from Hamilton, Brantford, Kitchener–Waterloo, in the west to Peterborough, Port Hope, and Cobourg in the east, and Midland and Lake Simcoe to the north. This area constitutes the central Ontario region and is one of the five economic regions defined by the Government of the Province of Ontario.

Investigation of the Site Near Pickering

A site near Pickering, it was said, was examined using the same five criteria used when investigating the other sites: safety and technical aviation considerations, social and environmental effects, regional planning impact, passenger convenience and cost.

The Province of Ontario, it was said, as part of the joint Federal and Provincial evaluation, undertook an appraisal of the environmental impact of airport construction and operation and found no major environmental problems with the Pickering site.

Regional Planning Impact

The Government of Ontario, it is said, prepared a design for the broad region that includes Hamilton, Toronto, Oshawa and north to Georgian Bay. This region is called the Toronto-Centered Region. The design envisages that in some areas there will be a reduction of the pressures of urbanization and in other areas improved economic and social opportunities. The intention of the plan is to accelerate growth in the area east of Toronto.

It was said that the Government of the Province of Ontario evaluated the Pickering site in the light of the Toronto-Centered Region plan and found it suitable, with some adjustments. These adjustments resulted in defining a new community, the North Pickering Community, on 25,000 acres of land south of the Pickering site. The Government of Canada agreed to act in close cooperation with the Government of the Province of Ontario, as is evidenced by the so-called Annex of Understanding (part of Exhibit 7), and the joint announcement of the site for the new airport.

At the same time, the Government of the Province of Ontario announced the said North Pickering Community Development Project to develop a new community adjacent to the airport. It was said that agreement in principle had been reached also between the Government of Canada and the Government of the Province of Ontario that the Province under the *Planning Act* would make sure that the development of lands would be compatible with flight operations. Such are formally recorded in sections 3 and 4 of the Annex of Understanding between the two Governments, which reads as follows:

> "3. The Government of Ontario has agreed to act within the full extent of its legislative authority to ensure that lands exposed to 95 CNR contour, or equivalent and above, will be controlled to prevent development inconsistent with airport operations. The Government of Ontario has agreed to issue a Ministerial Order under Section 32 of the Planning Act, subject to item 4 below, establishing development controls on lands to which the statute is applicable within the area between the CNR contour of 95 or its equivalent, for the final runway configuration for ultimate airport development, and the airport boundary. It will also recommend against local zoning changes or severances inconsistent with such development controls. The Government of Ontario will discuss with local municipalities

the development or modification of existing plans so as to seek to make them consistent with airport operations. When such consistency is achieved the Minister may withdraw direct Provincial controls.

4. For land between the 95 CNR contour or equivalent, and the airport boundary, the Federal Government has agreed to assume financial responsibility for claims that may result from existing developed and operative uses being incompatible with the uses permitted under the development controls introduced under Section 3 above."

XVII. 1972 – 1973

As a result of these decisions of the two Governments, the Government of Canada expropriated the lands comprising the proposed site for a new international airport at Pickering.

As provided for by the new Federal *Expropriation Act*, formal objections were received and recorded. A Hearing Officer was appointed and public hearings were conducted. He prepared "a resumé of the evidence and submissions relating to the nature and grounds of the objections made" and filed it with the Government of Canada prior to January 30, 1973. This report was tabled in the House of Commons, Ottawa by the Minister of Public Works on January 30, 1973.

XVIII. The Decision of the Government of Canada January 30, 1973

After receiving the Hearing Officer's report, the Government of Canada decided to confirm the expropriation of the site for a new Toronto International Airport near Pickering and on January 30, 1973, the Minister of Public Works announced to the House of Commons the decision to confirm the expropriation and tabled a statement by the Minister of Transport which summarized the position as follows:

"Fundamentally, it is a choice either enlarging Toronto International Airport Malton or developing a new airport. Clearly failure to meet the growing demand is not an acceptable option for the people of the region, for Ontario and for the nation. And in the balance of the number of people disrupted, the economic and planning advantages gained and the capacity of air transportation achieved, Pickering is preferable."

CHAPTER III

Response of Airport Inquiry Commission to the Questions Asked in Order in Council P.C. 1973-3026 dated October , 1973

A.

In this Chapter, the Commission sets out its reply to each of the questions on which the *Order in Council* directed the Commission to inquire into and to report. In order that the answers to the questions may be readily and easily ascertainable, the Commission does not in this Chapter set out the background and reasoning upon which its answers are founded, nor the evidence upon which it based its answers. The Commission sets out in Chapter IV of this report, in detail, the evidence which it accepted and upon which it based its answers.

B.

Order in Council P.C. 1973-3026 dated October 5, 1973, recited that the Government of Canada has made the following decisions in relation to the air transportation needs of the central Ontario market;

1. Toronto International Airport, Malton, will not be expanded beyond its present boundaries in order not to further increase the degree of disturbance from flight operations to the

people now living in communities surrounding Toronto International Airport, Malton;

2. The air transportation needs of the central Ontario market require that there be established another international airport in addition to Toronto International Airport, Malton;

3. The Government of Canada has chosen a site near Pickering, Ontario, to be the location for the new international airport.

In respect to those decisions, the Government of Canada wished to provide a means of receiving New evidence as to the need for and location of such an airport and New evidence of any relevant factor that had not been considered by it. In addition, the Government of Canada wished to receive any evidence in respect of other matters necessarily interrelated to and affected by its said decisions.

C.

The said *Order in Council* directed that a Commission be established, to be known as the "Airport Inquiry Commission", which would be a Commission pursuant to Part I of the *Inquiries Act*. The Commission was directed to inquire into and to report upon the air transportation needs of the central Ontario market in respect to two broad categories designated as numbers 1 and 2. Category No. 1 was divided into two questions, one question respecting need and the other question respecting location. Category No. 2 set out a series of questions.

In respect to the questions posed in the said *Order in Council*, in each category, the Commission, for the purposes of its Public Hearings, prescribed them in a Schedule of Hearings divided into what it called "Phase I" and "Phase II", questions. (See copy of Schedule of Hearings, Appendix 4 to this Report.)

CATEGORY NO. 1

The Commission was directed in relation to the decisions that there is a need for a new International Airport for the central Ontario market and that the new International Airport be located on the site near Pickering, Ontario, to receive and record New evidence, if available, and, if available and adduced, to report on such New evidence in respect to the following questions: (a)

respecting need, and (b) respecting location. The Commission now sets out the questions asked under each of these topics, the manner in which the Commission considered the evidence in respect to each of these topics and its response to each question raised under these topics.

1. (a) Respecting Need

I. (***Order in Council* Question)**

Is there any New Evidence as to what is the expected maximum passenger traffic volume in the domestic, trans-border and international air traffic market for the year 1980 and what are the best estimates of the rates of growth beyond 1980.

For the purpose of receiving evidence in respect to this question posed by the said *Order in Council,* the Commission held a Public Hearing at the City of Toronto, commencing April 22, 1974, under Phase I, Question 3 of its Schedule of Hearings. The relevant part of Question 3 was as follows:

(Commission Question)

3. The Government of Canada has made forecasts as to the traffic volume of passenger, air cargo and aircraft movements to the year 2000. The questions for consideration are:
   A. 1) Is there any new evidence as to what is the expected maximum passenger traffic volume in the domestic, trans-border and international air traffic markets for the year 1980?
      2) For the year 1990?
      3) For the year 2000?

There was New evidence as to such maximum figures, and also evidence of probable figures.

The evidence of the Ministry of Transport, Canada, included figures of the maximum, the median and the minimum. The evidence of the maximum forecast of the Ministry of Transport, Canada, was as follows:

Year	Forecast	
1980	16 Million	(Enplaned and deplaned
1990	35 Million	passengers including originating,
2000	68 Million	terminating and interconnecting.)

Apart from the forecast of Diamond and Myers, which was also maximum figures, forecasts of most probable figures were received from the Ministry of Transport, Canada, deHavilland Aircraft of Canada, Limited, Air Canada, Thomas Sullivan, John Kettle and John Duggan.

This New evidence (as to the expected volume for enplaned/deplaned passengers) for each of these periods was adduced by way of oral testimony and documents which were filed as Exhibits 414A and 414B, submitted by the Ministry of Transport, Canada, Exhibit 469 submitted by the deHavilland Aircraft of Canada, Limited, oral testimony on behalf of Air Canada, Exhibits 556A and 556B, submitted by Diamond and Myers, Jack B. Ellis & Associates Limited and the Institute of Environmental Research Inc., and oral testimony by Thomas Sullivan, John Kettle and John Duggan.

The New evidence in respect to the questions under said paragraph 3A is in respect to probable figures, and not maximum figures (which latter is what was called for in the question), was as follows:

A. 1) In respect to the year 1980.
   - (i) Ministry of Transport – 15 Million.
   - (ii) deHavilland – approximately 14 Million.
   - (iii) Air Canada[1]
   - (iv) Diamond & Myers, etc. (1981) – 13.513 Million
   - (v) Kettle (1980) – 10 to 11 Million[2]

A. 2) In respect to the year 1990.
   - (i) Ministry of Transport – 29.4 Million.
   - (ii) deHavilland – approximately 27 Million.
   - (iii) Air Canada – see above.
   - (iv) Diamond & Myers etc. (1991) – 19.17 Million.
   - (v) Kettle (1990-1991) – 17-18 Million.

A. 3) In respect to the year 2000.
   - (i) Ministry of Transport – 52 Million.
   - (ii) deHavilland – 43 Million
   - (iii) Air Canada – see above.
   - (iv) Diamond & Myers, etc. – 21.36 Million.
   - (v) Kettle – 25 Million

The probable forecasts of the Ministry of Transport, Canada, listed above are accepted by the Commission as its response to these questions.

1. (a) Respecting Need

II. (***Order in Council* Question)**

Is there any New evidence that Toronto International Airport Malton, can be expanded to meet all reasonable needs, having regard to runway capacity, ground access, terminal capacity and number of people affected by disturbance from flight operations for the period up to 1980, 1990 and 2000.

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing in the Borough of Etobicoke, near Malton, commencing March 18, 1974, under Phase I, Question 1 of its Schedule of Hearings. The relevant part of Question 1 was as follows:

(Commission Questions)

1. The Government of Canada has made forecasts as to the volume of passenger, air cargo, and aircraft movements in the central Ontario market to the year 2000. On the basis of these forecasts, (without receiving any New evidence at this time as to the validity of these forecasts as such evidence will be received at subsequent hearings), in relation to the following questions of fact, is there any New evidence that Toronto International Airport, Malton, can be expanded or reconfigured within present boundaries to meet all reasonable needs to the year 1980, to the year 1990, and to the year 2000, that is to say:
   1) Can the forecast growth of air traffic be met without increasing the number of people affected by noise disturbance from aircraft?

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1 Original figures were remarkedly close to those of the Ministry of Transport, Canada, but due to recent fuel and other cost increases, Air Canada was of the view that its figures should be reconsidered.

2 The Kettle forecast omitted the calibration factor which plays a significant role in the total forecast. The Commission cannot place reliance upon his forecast.

2) Can the runway capacity be extended to meet the forecast growth of air traffic?
3) Can the terminal capacity be increased to meet the forecast growth of air traffic?
4) Can ground access be provided to meet the forecast growth of air traffic?

In respect to these questions, the Commission reports as follows:

1.1) To the year 1980 – NO.
To the year 1985[1] – NO.
To the year 1990 – MAYBE.
To the year 2000 – NO.
2) To the year 1980 – YES.
To the year 1990 – YES.
To the year 2000 – NO.
3) To the year 1980 – YES.
To the year 1985[2] – MAYBE.
To the year 1990 – NO.
To the year 2000 – NO.
4) To the year 1980 – YES.[3]
To the year 1990 – The Commission is unable to answer due to lack of evidence.
To the year 2000 – The Commission is unable to answer due to lack of evidence.

1. (b) Respecting Location

I. (***Order in Council*** **Question)**

Is there any New evidence to prove that the site near Pickering, Ontario is not suitable for the new International Airport for the central Ontario market having regard to:

(i) disturbance from flight operations,

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at Pickering, Ontario,

1 The year 1985 is interjected, although it did not appear in the questions, as the nature of the evidence indicated that a change may take place between 1985 and 1990.

2 The year 1985 is interjected, although it did not appear in the questions, as the evidence indicated that on the basis of the probable forecast of enplaned/deplaned passengers Malton would have terminal capacity until 1984 or 1985.

3 Provided planned highways are constructed.

commencing April 8, 1974, under Phase I, Question 2.1 of its Schedule of Hearings. The relevant part of Question 2.1 was as follows:

(Commission Question)

2. In relation to the following three questions of fact, is there any New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market, that is to say:

1) Is this site not suitable because of the number of people that will be affected by noise disturbance from aircraft?

The Commission reports in respect to this question as follows:

There is no New evidence that this site is not suitable because of the number of people that will be affected by noise disturbance from aircraft.

1. (b) Respecting Location

II. (***Order in Council*** **Question)**

Is there any New evidence to prove that the site near Pickering, Ontario is not suitable for the new International Airport for the central Ontario market having regard to

(ii) passenger convenience,

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at the City of Toronto, commencing April 22, 1974, under Phase I, Question 3.B.1) of its Schedule of Hearings. The relevant part of Question 3.B.1) was as follows:

(Commission Question)

3.B. In relation to the following question (s), is there any New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market, that is to say:

1) Is this site not suitable because of passenger inconvenience?

The Commission reports as to this question as follows:

There is no New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market having regard to passenger convenience.

1. (b) Respecting Location

III. (***Order in Council*** **Question)**

Is there any New evidence to prove that the site near Pickering, Ontario is not suitable for the new International Airport for the central Ontario market having regard to

(iii) regional economic effect,

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at Pickering, Ontario, commencing April 8, 1974, under Phase I, Question 2.2) of its Schedule of Hearings. The relevant part of Question 2.2) was as follows:

(Commission Question)

2. In relation to the following .. question .. of fact, is there any New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market, that is to say:

2) Is this site not suitable because of regional economic effect?

The Commission reports as to this question as follows:

There is no New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market having regard to regional economic effect.

1. (b) Respecting Location

IV. (***Order in Council*** **Question)**

Is there any New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market having regard to

(iv) total environmental effect, positive and negative,

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at Pickering, Ontario, commencing April 8, 1974, under Phase I, Question 2.3) of its Schedule of Hearings. The relevant part of Question 2.3) was as follows:

(Commission Question)

2. In relation to the following .. question .. of fact, is there any New evidence to prove that the site near Pickering, Ontario, is

not suitable for the new International Airport for the central Ontario market, that is to say:

3) Is this site not suitable because of total environmental effect?

The Commission reports on this question as follows:

There is no New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market having regard to total environmental effect, positive and negative.

1. (b) Respecting Location

V. (***Order in Council*** **Question)**

Is there any New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market having regard to

(v) facilities required, including related infrastructures such as roads, railways, guideways and helicopter facilities,

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at Toronto, Ontario, commencing April 22, 1974, under Phase I, Question 3.B.2) of its Schedule of Hearings. The relevant part of Question 3.B.2) was as follows:

(Commission Question)

3.B. In relation to the following question(s), is there any New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market, that is to say:

2) Is this site not suitable because of the on-site and off-site facilities that will be required to be built, such as roads, railways, guideways, helicopter facilities, etc.?

The report of the Commission in respect to this question is as follows:

There is no New evidence to prove that the site near Pickering, Ontario, is not suitable for the new International Airport for the central Ontario market having regard to facilities required including related infrastructures such as roads, railways, guideways and helicopter facilities.

1. (c) Relevant Factors Not Previously Considered by the Government of Canada

(*Order in Council* Question)

Generally, is there any New evidence of any relevant factor that has not been considered by the Government of Canada, such, for example, as established facts on technology or travel habits, that may appear to affect any decision of the Government of Canada taken to date?

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at the City of Toronto, commencing May 6, 1974, under Phase I, Question 4.1) of its Schedule of Hearings. The relevant part of Question 4.1) was as follows:

(Commission Question)

4. In relation to the decisions of the Government of Canada that there is a need for a new International Airport for the central Ontario market, and that the new International Airport be located on the site near Pickering, Ontario, New evidence, if available, will be received in respect to the following question:

1) Is there any New evidence of any relevant factor that has not been considered by the Government of Canada, such, for example, as established facts on technology or travel habits, that may appear to affect any decision of the Government of Canada taken to date?

The Commission reports on this question as follows:

Yes, there is New evidence of relevant factors that have not been considered by the Government of Canada in relation to the decisions of the Government of Canada that there is a need for a new International Airport for the central Ontario market and that such new International Airport be located on the site near Pickering, Ontario, such as noise abatement technology, separation standards required by wake turbulence, the energy crisis.

CATEGORY NO. 2

There were certain matters necessarily interrelated to and affected by the decisions of the Government of Canada that Malton Airport would not be expanded beyond its present boundaries, that the needs of the central Ontario market require that another International Airport be established and that the site of the new International Airport be near Pickering, Ontario. In respect to these interrelated matters, the Commission was directed to receive and report on any evidence adduced, and if deemed avisable, to make recommendations in so far as they are within Federal Legislative competence in response to the certain questions therein mentioned. The questions in the *Order in Council* were seven in number extending from sub-paragraph (a) to sub-paragraph (g). Questions (a) to (c) inclusive, are closely related to each other and can be more conveniently answered together. Questions (d) to (e) are closely related to each other and can be more conveniently answered together.

The Commission now sets out the questions which it asked under each of the said questions, the manner in which the Commission received the evidence in respect to each of these questions and its response to each question.

(*Order in Council* Question)

2. To receive and report on any evidence adduced and, if deemed advisable, to make recommendations in so far as they are within federal legislative jurisdiction in response to the following questions:

(a) should the new International Airport be principally international in character or should it serve some other function,

(b) what airline traffic sectors or parts thereof should be allocated to the new International Airport in the major first phase in order to relieve the disturbance caused by flight operations at Malton,

(c) to what extent should domestic and United States traffic be served at the new International Airport in addition to the airport having an international role.

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at the City of Toronto,

commencing May 21, 1974, under Phase II, Question 1 of its Schedule of Hearings. The relevant part of Question 1 was as follows:

(Commission Questions)

1. In relation to the air transportation needs of the central Ontario market and bearing in mind the decisions of the Government of Canada taken to date that there is a need for a new International Airport for the central Ontario market, and that the new International Airport be located on the site nearing Pickering, Ontario.

To receive any evidence in respect to the following questions:

1) Should the new International Airport be principally international in character or should it serve some other function?

2) What airline traffic sectors or parts thereof should be allocated to the new International Airport in the major first phase in order to relieve the disturbance caused by flight operations at Malton?

3) To what extent should domestic and United States traffic be served at the new International Airport in addition to the Airport having an international role?

The Commission reports on these questions as follows:

The new airport should handle all international flights, with the exception of the United States flights, including scheduled and non-scheduled charter flights, pure freighter flights with necessary interconnecting short-haul domestic and trans-border flights. In addition, STOL facilities should be established for feeder services to regions without a major airport, and provision should be made for essential general aviation facilities.

(*Order in Council* Question)

2. To receive and report on any evidence adduced and, if deemed advisable, to make recommendations in so far as they are within federal legislative jurisdiction in response to the following questions:

(d) Should the opening date of the major first phase be 1980 or later.

(e) Should there be a partial or limited opening of the new International Airport prior to 1980?

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at the City of Toronto, commencing May 21, 1974, under Phase II Question 1.4) & 5) of its Schedule of Hearings. The relevant part of Question 1.4) & 5) was as follows:

(Commission Questions)

1. In relation to the air transportation needs of the central Ontario market and bearing in mind the decisions of the Government of Canada taken to date, that there is a need for a new International Airport for the central Ontario market, and that the new International Airport be located on the site near Pickering, Ontario.

To receive any evidence in respect to the following questions:

4) Should the opening date of the major first phase be 1980 or later?

5) Should there be a partial or limited opening of the new International Airport prior to 1980?

The Commission reports on these questions as follows:

There should be no partial or limited opening of the proposed Pickering Airport and the airport should not open until such time as proper, permanent terminals and all structures have been completed and all airport facilities are functionally operational, as planned, and all necessary ground access to and from the airport has been established. The Commission is of the opinion that realistically, this will not be possible until 1982-1984.

(*Order in Council* Questions)

2. To receive and report on any evidence adduced and, if deemed advisable, to make recommendations in so far as they are within federal legislative jurisdiction in response to the following questions:

f) what should be the nature of

(i) the ground access to the new International Airport, and

(ii) the inter-airport transportation between Toronto International Airport, Malton, and the new International Airport,

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at the City of Toronto commencing June 3, 1974, under Phase II, Question 2 of its Schedule of Hearings. The relevant part of Question 2 was as follows:

(Commission Questions)

2. In relation to the air transportation needs of the central Ontario market and bearing in mind the decisions of the Government of Canada taken to date, that there is a need for a new International Airport for the central Ontario market, and that the new International Airport be located on the site near Pickering, Ontario.

To receive any New evidence in respect to the following questions:

1) What should be the nature of the ground access to the new International Airport?

2) What should be the nature of the inter-airport transportation between Toronto International Airport, Malton, and the new International Airport?

The Commission reports on these questions as follows:

Primarily highways by public motor vehicle transportation and private automobile, complemented by all other types of ground transportation, both public and private, plus STOL for feeder service.

(*Order in Council* Question)

2. To receive and report on any evidence adduced and, if deemed advisable, to make recommendations in so far as they are within federal legislative jurisdiction in response to the following questions:

(g) from the point of view of passenger convenience, should a downtown terminal or terminals be established in respect of Toronto International Airport, Malton or the new International Airport?

For the purpose of receiving evidence in respect to this question, the Commission held a Public Hearing at the City of Toronto commencing June 3, 1974, under Phase II, Question 2.3) of its

Schedule of Hearings. The relevant part of Question 2.3) was as follows:

(Commission Question)

2. In relation to the air transportation needs of the central Ontario market and bearing in mind the decisions of the Government of Canada taken to date, that there is a need for the new International Airport for the central Ontario market, and that the new International Airport be located on the site near Pickering, Ontario.

To receive any New evidence in respect to the following questions:

3) From the point of view of passenger convenience, should a downtown terminal or terminals be established in respect of Toronto International Airport, Malton, or the new International Airport?

The Commission reports on this question as follows:

No, except for passenger collection purposes.

In Appendix 6 to this Report, are the questions considered by the Commission at its Schedule of Public Hearings with references to the transcripts of the evidence in respect to the questions. In Appendix 7 to this Report is a copy of the minutes of the Registrar-Administrator of the Commission in respect to the proceedings at Hearings held by the Commission.

CHAPTER IV

Review and Consideration of the Evidence

General Comments on Air Transportation Industry

As a result of the detailed consideration of the evidence put before it at the Public Hearings, in its private research, and in its consultations with many persons expert in the air transportation industry, not only in the United States but also in Europe, the Commission is of the view that there are a number of matters which should be identified.

First of all, it should be noted that the air transportation industry in Canada and throughout the world has had dynamic growth since the early 1950's, particularly during the last half of that period when "jets" first were introduced.

Since the commencement of the "jet age", the composition, importance and problems of the air transportation industry have progressively increased to such a tremendous extent that there has been a veritable revolution. There is hardly an airport, or an airport terminal, that has been built in the last 20 years that has not been saturated within a time span of 5 to 10 years. As a consequence, the planning and development of airports has had to be completely different from that obtained heretofore.

For example, in just a few years since the introduction of the jet, air transportation has established itself in a substantial way as the dominant mode of inter-city passenger travel by common carrier. It has largely displaced all other conventional modes of public transportation such as rail, ship and buses, and in doing so,

has opened up entirely new travel markets unheard of before, as witness the very substantial air charter market.

As part and parcel of this tremendous growth in the air transportation industry, the travel habits of Canadians, and other people throughout the world, have been completely changed. There is a part of the population in Canada and throughout the world which is using air transportation where heretofore its travel habits confined it to its own communities, or to an area very close to its own home communities.

These travel habits are irreversible, so that in the future, the air transportation industry will have to be expanded to meet the demand caused by such travel habits. Those areas which do not keep pace with demand will be bypassed in favour of the areas that provide suitable air facilities.

Entirely new means and methods of operating businesses and industry have arisen, both of which have a substantial dependence upon air cargo and passenger transportation. Industry and commerce will be looking to locate in areas where there are efficient airports with good ground access.

Unfortunately, this growth in the air transportation industry has caused problems which are world-wide. First of all, there is an urgent need to enlarge and improve existing airport facilities, and to construct new airports in order to meet these demands in a reasonably adequate and efficient manner. To do this has cost substantial sums of money for airport facilities to meet the needs up to the present time, and many more dollars will have to be invested if the demand is to be met for air cargo and passenger service in future. Such investment will have to be made in time, while there is space available in the correct location for such airport facilities.

The growth in air transportation industry has caused many ecological, social and economic problems.

The Commission recognizes that local environmental effects of airport development must be minimized, but at the same time, a balance must be struck between those environmental effects and the need to provide for, and sustain a viable national air transportation system. The evidence at the Hearings held by the Commission proves that this balance can be obtained.

This is especially true with a country like Canada, which encompasses vast distances, and in which a rapid, efficient transportation system is a basic necessity. A nation the size of Canada must be held together by a carefully planned national passenger and cargo air transportation system, which, in the judgment of this Commission, is mandatory.

In certain countries such as the United States, the national ability to provide adequate airport capacity has been practically halted, caused in large part by special interest groups and certain private citizens who object to every major project, especially those related to airports.

Another reason for the loss of the ability to increase airport capacity is the scarcity of land and the costs of new airports.

The Commission has heard evidence which indicates that some persons have the view that there should exist a policy of economic and ecological equilibrium. In the Old evidence, it was indicated that there should be differing priorities. For example, it was suggested that housing should be given a greater priority than airports. It was also suggested that the Government should establish a policy to discourage air travel. It was further suggested that the Government should have a policy to encourage people not to move from place to place.

The Commission considers that recommendations of this nature should be considered, so that the public in general may reach a consensus as to which goals are desirable. When a consensus has been reached, then perhaps the Canadian Government should establish this consensus as national goals. Perhaps going further, national goals should be advanced as international or global goals or policies.

However, the Commission wishes to point out that there are no such national, North American, or global goals, or policies, in existence prescribing that ecological and economic equilibrim is desirable; in fact, there is not even a semblance of a consensus that such is the wish of the people. For example, even the Executive Committee of the Club of Rome in its commentary on the Massachusetts Institute of Technology (M.I.T.) Treatise, *The Limits to Growth*, a monogram which The Club has used for the purpose of stimulating discussion, has this to say:

> "The concept of a society in a steady state of economic and ecological equilibrium may appear easy to grasp, although the reality is so distant from our experience as to require a Copernican revolution of the mind. Translating the idea into deed, though, is a task filled with overwhelming difficulties and complexities. We can talk seriously about where to start only when the message of the Limits to Growth, and its sense of extreme urgency, are accepted by a large body of scientific, political, and popular opinion in many countries. The transition in any case is likely to be painful, and it will make extreme demands on human ingenuity and determination. As we have mentioned, only the conviction that there is no other avenue to survival can liberate the moral, intellectual, and creative forces required to initiate this unprecedented human undertaking."

The Commission was not mandated to express any views as to the desirability or otherwise of attempting to obtain a national consensus, prescribing a policy of economic and ecological equilibrium. Because of this, and because at the present time it would appear to be the national policy of Canada that ever increasing gross national product is desirable, the Commission must proceed on the basis that the growth in the air cargo and travel transportation industry will continue relatively unfettered.

Having made the above observations, the Commission in this Chapter proceeds both to discuss and consider, in detail, the evidence, so as to enable it to answer the questions which it was requested to respond to by the *Order in Council* and to set out the background for its answers. The Commission now does so by dealing with the evidence under various topics or headings.

In doing so, it has been possible for the Commission to come to a decision whether in its view air transportation in Canada will continue to grow, and continue to be the dominant mode of intercity travel by common carrier in the foreseeable future. The Commission has also been able to reach a view as to whether or not, as the Canadian population and overall economy grows, an ever larger percentage of the total Canadian population will travel by air, and whether or not, in total movements, the demand for air transportation of persons and cargo, in Canada, will continue to increase.

This is very important because if the air transportation industry in Canada continues to grow, then it is important that airport facilities for the central Ontario market be constructed in time to

adequately accommodate the levels of traffic for the demand which such air service will require. At the same time, it should be borne in mind that refusal, neglect, or delay, in providing such facilities will not stop the growth in air traffic, but instead will only result in increasingly and absolutely untenable levels of congestion and delay, and a diminution of service.

With that in mind, the Commission now proposes to discuss and consider all the evidence and information received under the following headings, namely:

1. Forecasts
2. Noise Disturbance from Aircraft Operations
   (a) General Problems and Principles of CNR, NEF and ASDS,
   (b) Malton
   (c) Pickering
   (d) The Control and Reduction of Aircraft Noise
3. Terminal and related ground facilities at Malton
4. Ground Access to Airports
   (i) Malton
   (ii) Pickering
5. Runway Capacity
6. Airspace
7. Environmental Aspects
8. Economic Impact
9. Energy Crisis
10. Air Cargo
11. New Technology
12. Travel Habits
13. General Aviation
14. STOL
15. Two-Airport System
16. The Role of the Proposed Pickering, if built
17. Off-site Terminals
18. Airport Zoning and Compensation
19. An Airport and Its Planning
20. Airport Authority

1. Forecasts

The purpose of the Ministry of Transport, Canada, in producing a forecast was, in the first instance, to settle in its own mind what demands might be made by passengers and cargo for air accommodation in the future. In the second instance, the forecast was prepared by the Ministry of Transport, Canada, to determine the extent of any physical construction which it must undertake to accommodate the demand of the public for air travel and air cargo in the future. The third purpose of the forecast was to determine at what stages in the future the demand forecast would be realized, so that any physical accommodation which must be built could be constructed in phases in time to meet the demand.

The Commission recognizes the problems inherent in any kind of forecast. Forecasting is not a science and has been described to the Commission as an art. Forecasts combine not only what evidence there is of history with whatever judgment the forecaster applies, but they also involve the input of a tremendous number of factors which may or may not have weighted upon the final results.

The Commission recognizes that any forecast is subjective and that it constitutes nothing more than a conclusion based upon the best possible evidence available of what is most likely to take place in the future.

Having said this as a general background, one can say that there are in vogue many different methodologies used in arriving at forecasts, none of which seem to have a significantly higher degree of preference than another. It is for this reason that the Commission has approached the matter of forecasts in a rather pragmatic way by making the following assumptions:

1. That the forecast is going to be wrong in any event.

2. That the farther the forecast is projected into the future, the greater the error.

3. Since there will be a continued and increasing demand for travel in the future, some increased level of demand has to be the cornerstone of any kind of a future programme.

The Commission, therefore, comes to the conclusion that while the demand which is forecasted, is staggering by any dimension, nevertheless, by using some rather broad yardsticks, it has satisfied itself that the forecast is within reasonable probability.

Historically air travel has responded to the Gross National Product. If one is to test the validity of the forecast made by the Government of Canada simply by comparing it with the Gross National Product as forecasted by various organizations such as the Economic Council of Canada and others, the forecast of the Ministry of Transport, Canada, actually shows a narrowing of the growth rate of air travel to more closely parallel the growth of the Gross National Product. This, while not a definitive test, is nevertheless a salutary consideration to the Commission.

A second test is to look historically at the actual growth of air travel in the past which has been at a rate of more than 12%.

The Commission has concluded that if a forecast was based upon historic growth, that a forecast figure would have resulted in a demand figure higher than that projected by the Ministry of Transport, Canada.

A third test is to look at the forecast itself and to determine whether it seems to have been based upon assumptions which are warranted, and whether the forecast is based upon a methodology which can be reasonably defended.

The Commission has come to the conclusion that while the methodology has, like all methodology, weaknesses due to its subjective nature, nevertheless, the forecast is an acceptable, probable forecast.

The Commission concludes, for example, that even if the forecast was to have erred on the high side by 50 per cent, it would still produce a demand for accommodation, 50 per cent in excess of the capacity of Malton.

It is worth noting that the evidence disclosed that estimates of demand made in the past for American Airports have all, very

substantially, underestimated the demand. This, the Commission believes, is of vital significance.

The forecasts put in evidence attempt to deal with movements of three different subjects:

1. People
2. Cargo
3. Aircraft

Quite apart from people, cargo and aircraft, there is another major activity, in the air and at airports, which must be considered, namely, general aviation.

The figures to which the Commission now refers, (probable forecasts made by the Ministry of Transport, Canada, as of 1972), are figures which will obtain in any event, whether there is Malton or Pickering or both. In short, the figures to which we now refer are the figures for which the Commission believes there will be a demand:

	1980	1990	2000
Passengers (enplaning and deplaning which includes passengers who originate or terminate their trip at Malton and passengers making a connecting flight at Malton)	15.9 Million	32.5 Million	61.9 Million
Cargo per year (Pounds)	925 Million	3 Billion	8 Billion
Air Carrier Movements (Commercial) per year	166,730	228,300	371,200
General Aviation Aircraft Movements per year	1.6 Million	2.3 Million	3.6 Million

	1980	1990	2000
General Aviation Aircraft Movements which must be handled at a major carrier airport	21,000	48,000	63,000

In April, 1974, the Ministry of Transport, Canada, completed a revised passenger forecast of maximum, probable and minimum number of passengers to the year 2000.

The maximum forecast was as follows:

1980	1990	2000
16 Million	35 Million	68 Million

The evidence adduced before the Commission as to forecast dealt mainly with probable forecast.

The revised forecast changed a portion of the previous probable enplaned and deplaned passengers. These changes are as follows:

	1980	1990	2000
1972 Estimate of originating and terminating passengers	12.3 Million	25.4 Million	48.8 Million
1974 Estimate of originating and terminating passengers	11.6 Million approx.	23 Million approx.	41 Million
Reduction	.7	2.4	7.8
Percentage Reduction	5.8%	9.5%	16%

Applying the reductions of April, 1974, to the earlier probable forecast, the Ministry of Transport, Canada, arrived at a revised forecast as follows:

	1980	1990	2000
Enplaned and deplaned	15 Million	29.4 Million	52 Million

It is expected, following a present review by the Ministry of Transport, Canada, that the percentage reduction in the connecting passengers will be slightly greater than the reduction in originating/terminating numbers of passengers, therefore the number of enplaned/deplaned passengers in 1980 may be slightly lower than 15 million (and the same adjustments will apply to the years 1990 and 2000). It is expected that the changes will however, be marginal.

In reaching the above conclusions, the question which the Commission obviously faced in its own mind, was the reality of these forecasts.

In this connection, it is useful perhaps to compare the development of Malton in recent years, in terms of passenger traffic with the projected figures of the Ministry of Transport, Canada. For example, in 1971 the passenger traffic was approximately 6.7 million. In 1972 it rose to something in the order of 7.67 million (an increase of 14%) and in 1973 there was a 20 per cent increase rising to 9.24 million passengers. Clearly, from those figures alone, one can see that the traffic at Malton, from a passenger point of view, is increasing at a recent 3 year average rate of approximately 13% a year, and on that basis will alone double itself by 1979 to 18.5 million, a figure well in excess, in our opinion, of the capacity of Malton in terms of passengers alone.

The Commission is of the view that the forecast figure of 15 million passengers by 1980, unless there are some extremely unusual developments, will likely be exceeded. It may well be that there will be a reduction in the rate of growth during the late '80's or the early '90's but that the ultimate figures forecasted for 1990 and 2000 will likely be reached and probably will be exceeded.

It was strongly argued by one witness that the assumptions as to the propensity of international travel by the children of foreign-born parents was enough to invalidate the forecast. The Commission rejects this argument. The Commission notes that the argument rests heavily upon the necessity to make different assumptions, which have even less validity than those sought to be set aside.

It was also argued that the estimate of the price level of aviation fuel as used by the Ministry for certain years in the future having been already reached in 1974, the forecast was on that account alone cast in serious doubt. Based upon the total evidence, as to supply and likely price of aviation fuel in the decade of 1980 and 1990, the Commission does not feel justified either in setting aside the forecast or making alternate assumptions of its own on that account.

Opinions were submitted dealing with leisure time, advances in technology and the like. The whole of the evidence, when read together objectively, satisfies the Commission that the forecast of the Ministry for the years 1980, 1990 and 2000 is reasonable.

The forecast of the Ministry of Transport, Canada, was compared to a forecast made by Air Canada utilizing slightly different methodology. Air Canada questioned its own forecasts because of the energy crisis of the winter of 1973-74, and the facts causing cost escalation, but could draw no conclusion as to what would be the probable long range outcome.

The Commission is of the view that it is worthwhile pointing out that it believes that no valid long-term forecast can be adjusted either on a monthly or a yearly basis to respond to some particular economic, social or political event such as an energy crisis or economic recession, which may take place in any given year. Historically, performance or actual experience has moved along rather smooth upward paths.

The Ministry of Transport, Canada, has included in its forecast considerations such as the energy crisis, the change in energy costs, the adjustment in preferences of the travelling public. Nevertheless, it is difficult to quantify these conditions. The Commission is of the view that there will be substantial growth and that the

forecasts are not only realizable but, in the absence of any persuasive evidence to the contrary, of which there was none, are acceptable probable forecasts of projections of demand.

In reaching this conclusion, it is conceded by knowledgeable persons that forecasts made for the purpose of the construction and operation of airports must reach many years into the future, and as such are quite different to forecasts made by an air carrier to plan its future requirements for planes, equipment and facilities which need not encompass a forecast of more than three to five years.

Some comment is now made upon certain of the alleged weaknesses in the methodology of the Ministry of Transport, Canada.

First it can be said, with some justification, that the Government has presented or provided in recent years, a number of forecasts, all of which have differed one from the other. On the other hand, when one realistically looks at the problems involved in forecasting, and in dealing with the unknown, and particularly for some years in advance, one can hardly wonder that one forecast does differ from another. The Commission places no importance upon these differences.

It has been said, for example, that the central Ontario market has been over-estimated by including therein passenger, cargo and aircraft movements which emanate from other than the central Ontario market. While the Commission accepts this as the subject of criticism, it is nevertheless satisfied that any market forecast will contain a certain amount of duplication.

A second criticism made of the forecasting model arises in relation to the limited sampling that the Ministry of Transport, Canada, carried out in relation to the travelling public. The sampling took place during a two-week period at Malton during the months of August and September, 1973. There was some criticism that the two-week period was not sufficient and that the survey should have been conducted during other periods over the years. There was also the criticism that the survey was not completely at random and, therefore, produced certain inherent inaccuracies.

The Commission is of the opinion that there is merit in the observation that the sampling was not at random, but was based on a so-called stratified sample relating to certain income groups.

However, the Commission is not of the view that this invalidates the conclusions of the forecast.

Criticism was levelled at the model on the ground that it does not contain a provision for a sampling error. Again the Commission concludes that, although this might have been the appropriate step to have taken, it is not likely that the failure to allow for a sampling error constitutes a material weakness in terms of the overall forecast.

An additional weakness alleged was that certain assumptions were made as to income-related travel. Certain assumptions were made that certain business travel is income-related when, in fact, there does not appear to be sufficient evidence to support such a conclusion. On the other hand, the amount of travel that appears to be strictly business oriented, while of importance, again is not in the Commission's opinion, of sufficiently broad significance to throw the forecast into serious doubt.

The model itself is basically a reflection of the propensity of persons to travel, and these propensities in turn are affected by what are called modifying factors. In other words, the propensity to travel is affected by the change in the level of service; or the level of fares, etc. The propensity to travel was in certain categories adjusted by the Ministry of Transport, Canada, in preparing its forecast by way of what it calls a calibration factor. It was argued that the calibration factor was nothing more than an arbitrary assumption arrived at in order to obtain a fit of certain projections based upon the adjusted facts of 1961 as compared to the projected facts of 1971.

The Commission is of the view that the calibration factor in some of the categories may be higher than is justified, but this is a very difficult fact to establish and it seems to the Commission that it is easier to take the overall projection of the forecast and discount it somewhat in total, than it is to attempt to adjust individual criticisms of the model itself, and then accumulate the adjustments individually into an amalgam.

Certain observations were drawn to the attention of the Commission related to fare elasticity as the most important modifying factor and the use by the Ministry of Transport, Canada, of current dollars. The purpose of looking at price elasticity is to determine the effect upon demand for air travel in the event of the

change in the price of fares. The price in fares can come about through a number of different economic facts. Unfortunately, in estimating price elasticity it was necessary, according to the Ministry of Transport, Canada, to omit charters, simply because the charter experience had not been as extensive as had been the experience with other forms of travel. On the other hand, charters have a very material influence upon international travel, being the sector in which the greatest expansion is expected to take place in the future. However, here again, although this appears to be a weakness in the methodology, it does not appear to the Commission that the Ministry of Transport, Canada, has proceeded upon an assumption which it cannot justify.

There was also expressed some concern that one cannot really test price elasticity in terms of constant dollars and that a current dollar standard should have been used; the argument being that constant dollars require a price-frozen relationship between different commodities, whereas elasiticity is an attempt to determine what will happen to demand in the event that the relationship of price changes.

Some concern was also expressed in terms of the reliance of the Ministry of Transport, Canada, upon United States passenger carrier experience in terms of fare elasticity. Here again it may be said that there appears to be certain merit in such criticism, but the results that were obtained, while perhaps subject to certain weaknesses, nevertheless are acceptable to the Commission. The fact is that there did not seem to be available any evidence relative to elasticity in the Canadian market and, therefore, certain necessary assumptions were made by the Ministry of Transport, Canada, based upon United States experience.

The forecast indicates that the propensity to travel rises from 0.314 in 1971 to 1.06 in 1991 in terms of round trips per person. These figures are consistent with the forecasts and the model which produced the forecast, and do not seem to be at major variance from other tests to which the Ministry of Transport, Canada, has put the model, nor are the figures at major variance with the anticipated growth of the Gross National Product, nor the extension of historic growth in recent years, nor United States forecasts such as FAA and Civil Aeronautics Board.

The growth forecast works out at between 7 and 8 per cent compounded annually which the witness Mr. T. M. Sullivan (whose qualifications are discussed elsewhere) believes to be on the low side. Mr. T. M. Sullivan preferred a growth figure for Toronto in the order of 11%.

The forecasts put in evidence by the Ministry of Transport, Canada, were acknowledged to be not the maximum forecasts for the respective years, but were the rates of growth most likely to be achieved by the said years. The Commission in adopting these forecasts points out that they do not represent the maximum forecasts; but represent, in its view, the probable rates of growth for 1980 and beyond.

For these reasons, as stated, the Commission has concluded that the said forecasts of the Ministry of Transport are within reasonable probability.

While the Commission accepts the probable forecast of the Ministry of Transport, Canada, made in April, 1974, the Commission is of the opinion that the probable forecasts made in 1972 should be used for planning purposes. By adopting this course, the airport can be built with expansible facilities which will provide adequate capacity as required. The Commission makes this suggestion due to the fact, as already mentioned, that historically forecasts of passenger growth have been low.

2. Noise Disturbance from Aircraft Operations

ESTIMATING THE NUMBER OF PEOPLE AFFECTED BY DISTURBANCE FROM FLIGHT OPERATIONS

As aircraft noise became a serious community problem, a number of schemes were developed throughout the world to forecast the impact of aircraft noise around airports and to establish standards of acceptance levels of this noise. Some of these schemes are Composite Noise Rating system (CNR), Noise Exposure Forecast system (NEF), Community Noise Equivalent Level (CNEL), the Aircraft Sound Description System (ASDS), all developed in the United States, the British Noise Number Index (NNI), the French Isopsophic Index, the Dutch Total Noise Load, the German Mean Annoyance Level and the South African Noisiness Index.

The Commission heard and considered evidence in respect to three of these systems, Composite Noise Rating system, the Noise Exposure Forecast system and the Aircraft Sound Description System.

THE COMPOSITE NOISE RATING SYSTEM

Until 1972, the Ministry of Transport used the Composite Noise Rating system (CNR) as the means of predicting the number of people affected by disturbance from aircraft operations and anticipated community response to aircraft noise.

The concept of a scale response for predicting the reaction of a community to a particular noise in relation to other noise in the community was first advanced in 1952. This concept was known as the Composite Noise Rating system. During the period 1952 to 1964, the original concept underwent a series of modifications to adapt it as a means for exclusively predicting community reaction to aircraft noise. The system as finally developed was a logarithmical formula comprising various components based upon the noise characteristics emitted by the engine on take-off and approach for each class of jet aircraft operating from an airport, the frequency of aircraft movements, the particular runway used and whether the aircraft movements occurred during the daytime, 0700 hours to 2200 hours, or at nighttime, 2200 hours to 0700 hours. The original case histories obtained at the time the system was conceived were used, with some adjustment based upon judgments as to their validity in the translation of the formula to response. The formula did not include any factor in respect to noise emitted from ground run-up operations, or the general level of background or ambient noise of the community, or in respect to previous exposure of a community to aircraft noise. A composite set of contours was developed, based upon the formula, which could be overlayed on a map of the community surrounding an airport. Numerical values were assigned to a contour, or zone, based upon a community response scale which had evolved during the development of the concept. There were three zones established with a Composite Noise Rating assigned to each zone. Zone I had a CNR rating of less than 100. No complaints were to be expected from residents in this zone, however, there could be occasional interference with certain activities of the people who resided in the zone. Zone II had a CNR rating from 100 to 115. Residents in this zone might be expected to complain and complain perhaps vigorously. Concerted group action might also be expected. Zone III had a CNR rating greater than 115. Residents in this zone could be expected to complain repeatedly and vigorously. Concerted group action by the residents could be expected.

There were various technical weakness in the CNR system as finally developed. The step approximations in totalling the noise contributions by different types of aircraft or different types of

operations could lead to significant underestimation or overestimation in the affects of the CNR values as a result of changes in operations or changes in types of aircraft. The system did not take into account the maximum tone emitted by a jet aircraft engine nor the duration or period that the maximum noise was heard.

THE NOISE EXPOSURE FORECAST SYSTEM

The Federal Aviation Administration of the United States Government financed studies to develop a new system which would incorporate the refinements recognized as being needed to be made to the CNR system. The new system would be limited only to civil jet aircraft. The development of computer technology made it possible for a new system to be developed in 1969 known as the Noise Exposure Forecast (NEF) system.

The area around an airport affected by noise from aircraft operations is expressed in terms of the Noise Exposure Forecast system. The NEF value at a given point near an airport is calculated by totalling the noise energy received at that point from all the aircraft operating into and out of the airport during a day. In making the calculations, the number and type of aircraft, the noise characteristics of each aircraft, the flight paths which they follow, the manner in which they are operated, (weight, power thrust during take-off and landing, degree of glide slope on approach to the airport) are all taken into consideration. In making the calculations, consideration is given to the maximum tone emitted by the particular type of each jet aircraft and the period that this noise is heard. From the calculations, a set of contours is produced which then can be overlayed on a map of the community surrounding an airport. A numerical unit is assigned to each contour and community response can thereby be predicted or estimated. The unit produced by the NEF system has numerical values substantially different from the CNR values in order to avoid confusion between the two systems. An equivalent approximation between indices used in each system is as follows:

25 – 30 NEF	90 – 100 CNR
30 – 35 NEF	100 – 108 CNR
35 – 40 NEF	108 – 115 CNR
40 – 45 NEF	115 – 123 CNR

The relationship between an NEF contour and anticipated community response is as follows:

NEF Unit	Anticipated Response
Less than 30	Essentially no complaints are expected, however there may be interference with community activities.
30 – 40	Individuals may complain and there may be possible group action.
Greater than 40	Repeated vigorous individual complaints and group action can be expected.

It should be noted that the Noise Exposure Forecast system is a refinement of the CNR system with the basic difference being that in the NEF system calculations are included for maximum tone and the duration the maximum tone is heard. The same division of a day into two periods is used with a weighting given to nighttime operations over daytime operations. Ambient or background noise is not taken into consideration. The noise emitted from ground run-up operations is not taken into consideration. No new information on community response was applied from that used in the CNR system.

Characteristics of various aircraft are extrapolated to include longer distances using the best information regarding atmospheric absorption and scattering. The effect of noise level at each location around an airport is interpolated from the various curves, based on the geometric closest point of approach of the flight path for each aircraft with various corrections then being made. The noise levels calculated in this manner have a potential margin of uncertainty of several decibels in magnitude. The resulting NEF contour could be 50% to 100% of the proper value. This potential variation in proper value is most significant if a contour is being used to estimate absolute noise exposure conditions.

The noise generated by an aircraft can vary from 5 decibels to 20 decibels from the assumed statistical data as to its performance depending upon the manner in which the aircraft is flown. Load, temperature, wind, are important factors affecting the manner in which an aircraft is flown which in turn can result in a significant difference in the noise under the flight path where an airplane is taking off.

Greater uncertainty exists as a NEF contour is projected into the future as it involves a subjective estimate as to the number and class of aircraft that will be flying, the load factor of the aircraft related to maximum capacity, the actual flight paths that will be used, the number of aircraft movements, and runway utilization. It would be realistic to accept that such projections will have a plus or minus factor of five units. This could result in as much as 100% difference in the total area comprised in a NEF contour.

It is difficult to apply the NEF system in a rural area where the background or ambient noise level is low. Under such circumstances, the noise emitted by aircraft would be noticed as the major noise intrusion to people living in such community.

It is dangerous to regard the fine line of a NEF contour as the absolute limit of the noise represented by that contour. The contour line is comparable to a mountain with a high peak which spreads out as one descends the mountain. The line of a contour would be more realistically drawn by a paintbrush or by a paint spray gun.

People residing in an area which is highly sensitive to aircraft noise do not appreciate the benefit of soundproofing due to the fact that they experience a greater impact from noise when they go from their soundproof home into their gardens. A NEF contour cannot be used to generate a type of sound insulation parameter as far as acoustic absorption is concerned.

Wind is an important factor in the propagation of noise and can have a completely different effect insofar as disturbance from noise is concerned from that assumed by the NEF system.

The appropriateness of the division of a day into two time periods is questionable in the summertime where windows are open and people engage in outdoor activities in their gardens and patios. While a computer may indicate that there is no difference, it is a reasonable inference, from a practical viewpoint, to assume that there will be interference with such activities by aircraft

operations. Accordingly, the division of a day into three time periods in the summertime period would probably be a more realistic means of determining the number of people affected by disturbance from aircraft operations and community response than using the same time divisions of a day for both summer and winter. The Community Noise Equivalent Level, adopted by the State of California, does divide a day into three time periods; day – 0700 hours to 1900 hours, evening – 1900 hours to 2200 hours and night – 2200 hours to 0700 hours. The adoption of a three time period day would, of course, result in the enlargement of the NEF contours and the number of people affected.

THE AIRCRAFT SOUND DESCRIPTION SYSTEM

Due to the previously noted weaknesses of the NEF system, and the difficulty of explaining this complex system to non-technical people, the Federal Aviation Administration has adopted, as of 1 July, 1974, a new method for describing community noise exposure caused by aircraft operations, which is known as the Aircraft Sound Description System (ASDS).

The ASDS concept is designed to measure the total time during a 24 hour period that noise from aircraft operations around airports exceed a fixed level, generally 85 dB(A). Noise levels are represented in A-weighted decibel units which are used for the measuring of many transportation and non-transportation noise sources. The system contains no correction for the maximum tone and duration that the noise is heard. The system contains no subjective prejudgments in the calculating procedures, such as a night penalty, as these factors are peculiar to each individual community. The basic data required for the use of the system are; the aircraft type, aircraft gross weight, runway utilization rates, flight path utilization rates and time of day during which these specific operations take place.

The ASDS concept was designed primarily to assist in determining whether proposed changes around airports will improve or deteriorate exposure conditions by permitting a before and after comparison of noise exposure conditions in purely physical terms.

It is recognized that the use of the ASDS, or A-weighted decibels, is not appropriate for type certification noise requirements for new or existing turbo jet aircraft. The FAA intends to continue

the use of EPNL for turbo jet aircraft type certification requirements. The system is not useful for land use planning or for assessing the actual noise impact on the airport's neighbours. The FAA still prefers the use of the NEF for these purposes.

COMMUNITY RESPONSE TO AIRCRAFT NOISE

There was evidence adduced that community response to aircraft noise has two components, the actual physical noise heard by a person and the attitudinal response of the person to that noise. A person's attitudinal response to aircraft noise can be affected by his life style, that is, the total noise environment to which he has been subjected in his hourly, daily, weekly, monthly and yearly activities. His attitudinal response will also be affected by the time of day, his previous exposure to aircraft noise, the ambient or background noise of the community in which he resides, and whether his occupation is related to air industry employment. His attitudinal response will also be affected by whether those in authority are doing anything to alleviate his situation, a promise of action backed up by actual action can affect his response by as much as 10 decibels. Fear of crashes has developed among those who are affected by noise from approaching aircraft. Evidence was also adduced that two studies of attitudinal response were made of two airport communities within a short interval of time. It was found in the second study that at each airport the attitude of the population had hardened against the noise from airport operations as compared to their attitude in the earlier study.

APPLICATION OF THE CNR SYSTEM AT MALTON

Following the decision of the Government of Canada, December, 1968, that Malton Airport would only be expanded within the boundaries of the existing airport lands, the Province of Ontario developed a noise sensitivity zone plan based upon the CNR system and developed a Land Use Compatibility Table which established the basis for land use development in each of the zones. It was believed that the Land Use Compatibility Table would ensure that lands in each of the zones would be developed for uses compatible with the expected maximum level of noise expected in a

zone to 1975—76. Six zones were established. It was recommended that all new residential development be avoided in Zones IV to VI inclusive. These zones exceeded 110 CNR. It was recommended that wherever possible alternative land uses should be considered for those zones. However, townhouses, maisonnettes, and apartments were permitted in Zone IV subject to the recommendation that developers should be made aware of the noise problem, and be required to undertake to relay the information to all prospective tenants and purchasers of such residential units. Detached and semi-detached dwelling houses, townhouses, maisonnettes and apartments were permitted in Zone III which had a CNR rating of 105. It was recommended that a similar undertaking be required from the developer as that required from the developers of land in Zone IV. All types of residential development were permitted in Zone II which had a CNR rating of 100. It was recommended that developers be made aware that it was a marginal zone in which noise may start to become a problem and that developers be required to inform prospective tenants and purchasers of single family dwellings and maisonnettes of this fact. However, no undertaking was required from the developer to do this. All types of residential units were permitted in Zone I which had a CNR rating of 95. No recommendation was made that any notice of a noise problem be given to a developer or purchaser or tenant of a residential unit.

Evidence was adduced before the Commission by the City of Brampton that the residential population in some parts of the City in Provincial Zones II and III has increased during the period 1971 to March, 1974 by as much as 55%. In addition, official plan amendments which would permit residential development in various lands situated in Zones II and III had received Provincial approval as late as November, 1973. As a result of these amendments, residential development in these zones will be permitted which will have an ultimate population in excess of 100% of the present population. The former Township of Chinguacousy, which now forms part of the City of Brampton, did not "place entire faith" in the Provincial Land Compatibility Table as it felt there would be a lessening of aircraft noise as it believed there would be another airport, and it also believed that aircraft engines would be quieter in the future.

Evidence was adduced before the Commission by the City of Mississauga, which comprises the former Town of Mississauga. In granting approval to residential subdivision development of land situated in Provincial Zone III, it imposed the condition that a subdivider obtain a detailed analysis of noise reduction requirements caused by aircraft noise related to the use of Malton Airport. In respect to approval of residential development of land situated in Provincial Zone II, the Subdivision Agreement between the Municipality and the subdivider required the subdivider to inform purchasers that the area was in an area of aircraft noise. The Subdivision Agreement, which dealt with other matters in addition to noise, was registered on the title to the lands.

Evidence was adduced before the Commission as to the manner in which the Borough of Etobicoke applied the Provincial Land Compatibility Table to residential development. In the case of lands situate in a Provincial Noise Zone which was already zoned for residential purposes, but not yet developed, no warning was required to be given to prospective purchasers or tenants that the land was within a zone which may be affected by aircraft noise. In respect to lands which were rezoned to residential development, after the coming into force of the Provincial Land Compatibility Table, it merely incorporated into the provisions of its Official Plan the provisions of the Land Use Compatibility Table. There was no evidence that it required any undertaking from the developer to warn prospective purchasers or tenants that they could encounter a noise problem. There was also evidence by the Borough of Etobicoke that as late as the fall of 1973, proposed residential development situate in a highly sensitive noise zone, which the Borough wanted to be developed for residential purposes, was only stopped as a result of the efforts of residents adjoining the area who wanted to ensure that purchasers and tenants of the proposed development would not be subjected to the same noise to which they were subjected.

ESTIMATED NOISE DISTURBANCE AT MALTON AND PICKERING

In order to forecast the number of people affected by disturbance from flight operations, there must be first a forecast as to the volume of passengers, air cargo and aircraft movements for each period to be considered. In its consideration of the forecast of the number of people affected by disturbance from flight operations for the period up to 1980, 1990 and 2000, the Commission considered the evidence on the assumption that the forecast of the Ministry of Transport, Canada, as to the volume of passengers, air cargo and aircraft movements in the central Ontario market for each of the said time periods was correct. There was evidence that the Ministry had prepared forecasts in respect to these matters in 1971 which were revised in 1972. The latter forecast had been used for planning purposes since that time. There was also evidence that the Ministry was preparing a further forecast which would be submitted at a later Hearing. The validity of the forecasts are discussed under the heading "Forecasts".

The annual probable forecasts (made as of 1972) were as follows:

	1980	1990	2000
Passengers (enplaned and deplaned which includes passengers who originate or terminate their trip at Malton and passengers making a connecting flight at Malton)	16 Million	32 Million	62 Million
Cargo	925 Thousand lbs.	3 Billion lbs.	8 Billion lbs.

	1980	1990	2000
Air Carrier Movements (Commercial)	166,730	228,300	367,200
General Aviation Aircraft Movements	1.6 Million	2.3 Million	3.6 Million
General Aviation Aircraft Movements which must be handled at major carrier airport	21,000	48,000	63,000

In 1972, the Ministry of Transport, Canada, found that the estimated number of people affected by noise from aircraft operations exceeded by 7,000 the maximum number of people expected to be affected by aircraft noise in 1976 under the CNR system. The Noise Exposure Forecast system was then adopted as a means of estimating the number of people that would be affected by noise from aircraft operations.

The data used in the computer programme employed by the Ministry to produce NEF contours was obtained from general statistical information and not from actual measurements. Statistical information was obtained as to the noise characteristics of various classes of aircraft on approach and take-off, and as to the expected weight of various aircraft making flights of various distances. The programme took into account the direction of existing runways and proposed runways. The contours were prepared without taking into consideration the curfew presently in effect at Malton. The contours were prepared on the basis of a straight in approach for landing and a straight out departure for take-off. A 3 degree glide slope was assumed for each runway while in fact there is no flight procedure today which requires a 3 degree glide slope on any runway at Malton. The data used in respect to runway utilization took into consideration the preferential runway system that has been recently employed at Malton as a noise abatement procedure, the maximum utilization of each runway having regard to the separation required by wake turbulence and

limitations imposed on utilization by wind speed and direction and weather conditions. Assumptions were made as to the mix of the type of aircraft which would be using the airport in 1980 and 1985. In determining the population that would be affected, the 1971 census information was used and up-dated to 1973 by means of aerial photographs. No attempt was made to predict population growth in the communities surrounding the airport beyond 1973 as it was felt that there would be a danger of creating too hypothetical a situation. The same data as was used for preparation of the contours at Malton was used for preparation of contours surrounding the proposed Pickering airport with the exception of runway utilization and population counts.

After the contours were prepared they were overlayed on a base map of the Malton airport site and the Pickering airport site. The population within each contour was then totalled in order to determine the number of people affected by aircraft operations. The resulting figure is estimated to have an accuracy of approximately plus or minus 5%.

The NEF contour maps introduced as exhibits by the Ministry had three specific contours to indicate the anticipated degree of noise annoyance. This was done in order to relate the contours to the recently adopted policy of Central Mortgage and Housing Corporation in respect to making financing available under the *National Housing Act* for residential development adjacent to an airport. The policy of Central Mortgage and Housing Corporation is as follows:

> 35 NEF and over – no financing will be provided.
>
> 30 – 35 NEF – financing will be denied unless adequate insulation is provided.
>
> 25 – 30 NEF – in the upper limit of this zone (in excess of 28 NEF) financing will be denied when the proposed sound insulation is substantially below that considered to be adequate. Adequate sound insulation is recommended for the balance of the zone.

No attempt was made to forecast the number of people that would be affected by noise from aircraft operations beyond the year 1985 as it was felt that it would be extremely difficult to predict the noise characteristics of aircraft that will be in existence

in ten years time. However, the view was expressed that there would be a reduction in the number of people affected provided that no new runways were constructed.

The NEF noise contour maps introduced by the Ministry were basically of three classes. One class was described as actual Malton comprising years 1971, 1972 and 1973, the word actual was used to denote the actual runway utilization and the expected noise characteristics of the actual aircraft operated. The second class was based on an estimate of the number of people that would be affected at both Malton and Pickering if all traffic were assigned to either airport in the year 1980 and the number of people that would be affected at Malton in 1982 if all traffic were assigned to Malton and an additional runway had then been constructed. The third class represented the expected result to both Malton and Pickering under various assignments or division of aircraft operations at each airport. Some of these contour maps appear as appendices to this report. The total number of people affected by noise residing within the 28 to 30 NEF contour, based upon a population updated to 1973, may be summarized as follows:

	Malton	Pickering
1972	131,000	
1973	90,000	
1980	180,000	5,000
(All traffic assigned to either airport with each airport having 3 runways)		
1982	208,000	
(Malton alone with 4 runways)		

Results with various division of operations between Malton and Pickering, 1980, based upon Malton having 3 runways and Pickering having 2 runways

	Malton	Pickering
A – All Charter Aircraft (Scheduled and non-scheduled), pure freighters and North Europe traffic (representing 25% of the average daily summer movements) assigned to Pickering.	58,000	3,000
B – Charters (Scheduled and non-scheduled) pure freighters all international traffic (except U.S.A. short-haul traffic) assigned to Pickering.	35,000	3,000

It should be noted that in the case of Malton people are residing and will be residing within areas comprised in a 35 NEF and a 40 NEF contour, which have a greater sensitivity to aircraft noise. It is estimated that no one will be residing beyond a 30 NEF contour at Pickering. It should also be noted that the contours do not project population growth beyond 1973, and there was evidence by the City of Brampton and the City of Mississauga as to substantial proposed residential developments which would be affected by noise from aircraft operations.

THE MALTON COMMUNITIES TODAY

Evidence was adduced that population residing in various parts of the Borough of Etobicoke, the City of Brampton, the City of Mississauga and a small area of the Borough of North York, under or adjacent to the flight paths of runways, is affected by noise from aircraft operations.

Groups have organized in the Borough of Etobicoke, City of Mississauga and in the Borough of North York in areas that were defined under the Provincial Land Compatibility Table as being within a 95, 105 and 110 CNR zone. This is equivalent to 28, 30 and 33 contours on the NEF scale, where no concerted group action is to be expected. The groups represented communities affected by operations from all runways. They were affected by

noise emitted from aircraft on approach to the airport and by noise emitted by aircraft on take-off from the airport depending upon where they resided. There was also evidence of a community being affected by noise emitted from ground run-up operations.

There was evidence that the various groups had met with officials of the Ministry of Transport, Canada, over the period 1968 to the fall of 1973. Various commitments were made by the Ministry which it either did not fulfill or was unable to fulfill by reason of circumstances. In 1968, the Ministry of Transport, Canada, had promised to establish 8 monitoring stations but this has not as yet been done. There was a representation at that time by the Ministry that while runway O5L/23R was being extended, it would only be used in an emergency. However, the growth of aircraft movements has required that the runway be utilized. The utilization of this runway has been increased since 1972, and in 1973 its utilization was greatly increased with the introduction of a preferential runway procedure. The increased utilization of this runway has subjected population, in certain areas, to aircraft noise which had not been previously troubled. Some of the people newly affected by aircraft noise have organized into groups for concerted action. In a meeting among representatives of the various community groups with the regional representative of the Civil Aeronautics in the fall of 1973, they were advised that the Ministry of Transport, Canada, could not maintain its previous commitments in respect to runway O5L/23R and that their situation would become worse as growth in operations increased. They were also advised that while quieter aircraft engines in the future may alleviate the noise problem it will only be for a short period as increased movements will again result in increased noise. They were further advised that the only solution to their problems was a new airport.

None of the groups that gave evidence wished to have Malton Airport closed. However, they did not want their situation made worse, and they wanted some alleviation from the aircraft noise to which they are being subjected.

THE PICKERING COMMUNITIES TODAY

The airport site consists of a portion of land in the Township of Uxbridge, a portion of land in the Town of Markham with the majority of the land being situate in the Town of Pickering.

The land upon which it is proposed to construct the airport could generally be described as a rectangle, with an extension in the centre along the northern perimeter, running in a northerly direction. The bottom limit of the site is basically the east-west extension of King's Highway No. 7.

The airport site comprises approximately 18,000 acres of land. The site is transversed by the C.P.R. rail line which runs from the southwest corner to the northeast corner. It is also transversed by a number of local roads. The land was used primarily for agricultural purposes and contains a number of residences and old buildings which are regarded as being of an architectural historical nature.

A number of runways will be constructed on the site which will generally be oriented in two directions, a northwest-southeast direction and an east-west direction. These two alignments have been selected, so that they would be basically in line with or parallel to the existing runways at Malton. It has been stated that this is important from an airspace management point of view.

There are a number of communities adjacent to the airport site. These communities consist of the Village of Claremont, at the northeast corner, the Town of Stouffville, at the northwest corner, the Town of Markham, at the south-west corner, Brougham at the southeast corner, and the Town of Pickering, directly to the south of Brougham on Brock Road.

The Village of Claremont could be described as a small, picturesque, rural centre, with a population of approximately 500 people.

The Town of Stouffville is a larger community, somewhat more urbanized, and has a population of about 5,000.

The population of the Town of Markham is approximately 12,000 to 15,000 residents.

Brougham has several hundred residents and the Town of Pickering has a population of about 15,000 people.

Immediately to the south of the airport lands, and separated from the airport site by King's Highway No. 7, the Province of

Ontario plans to establish a new community to be known as the North Pickering Community. The site of the new community comprises approximately 25,000 acres of land. It is expected that this community will have a future population of about 200,000 people.

Evidence has been received by the Commission that the plans for the North Pickering Community have not been completed, therefore, the Commission can only deal with the North Pickering Community as a proposed residential development which will, no doubt, contain certain mixed uses of a commercial and industrial nature as well.

The lands of both the proposed airport and the proposed North Pickering Community are embraced in what is known as the design for the Toronto-Centered Region, which is a plan published by the Province of Ontario as a guideline, among other things, to delineate areas of development east of Metropolitan Toronto. Apparently, it was, in part, the intention in creating the Toronto-Centered Region design to encourage development towards the east of Metropolitan Toronto and to attempt to stem the development to the west of Metropolitan Toronto, rather than to leave development to take place, as seems to be traditional in North American megalopolises, on the western fringe of major cities.

The level of the prevailing ambient noise in the communities surrounding the proposed airport site near Pickering, was described to the Commission in two different ways. Two different witnesses, one called on behalf of the Ministry of Transport, Canada, and one called on behalf of the Town of Whitchurch-Stouffville, gave conflicting evidence as to the level of the background noise in these communities.

Each of the witnesses conducted various tests to determine the level of background noise in these communities in order to give testimony before the Commission. It is fair to say that criticism could be levelled in relation to both noise studies, but the Commission prefers the results of the study conducted by the witness on behalf of Whitchurch-Stouffville for a number of reasons. He attempted to determine the true background noise by making his tests away from the main arteries of transportation and the main points of sound concentration; whereas, the witness on behalf of

the Ministry of Transport, Canada, while taking more tests, conducted his tests from telephone poles and other similar receptacles which were aligned, through necessity, along the main arteries or rural roads. It appears to the Commission that if one is attempting to obtain an overall assessment of the level of background noise in these areas, one would not take tests exclusively along main arteries of transportation, less the tests in effect become nothing more than a highway noise record. While the witness on behalf of the Ministry took 700 noise soundings, the location of the tests taken by the witness on behalf of the Town of Whitchurch-Stouffville, although fewer, and subject to certain criticisms, recommend themselves to the Commission as being more representative of the level of background noise in the airport communities, than the overall tests of the Ministry's witness who found, in effect, as a result of the manner in which he conducted his tests, that the level of background noise was not very much different from the noise levels prevailing in residential districts centred right in the midst of the City of Toronto.

After considering and weighing all the evidence, it appears to the Commission that the noise level prevailing in the communities surrounding the site of the proposed Pickering Airport is of a low denomination and is appropriately described as basically rural.

The Commission wishes to note that one of the major reasons that background, or ambient, noise is so important, is that it is the noise level with which the residents of a particular community have become accustomed or to which they have become immunized. The magnitude of the intrusion of noise from aircraft operations can only be considered in relation to the prevailing level of the background noise of the community. It is only with an increase in noise over the prevailing ambient level that one anticipates an additional or new reaction from the community. Accordingly, the level of ambient noise in the community is of importance to the Commission. The Commission is of the view that the noise level implied by a 28 or 30 NEF contour may be more bothersome to those who live in a community with very low background noise level as opposed to those who live in a much more urbanized community where one would expect a greater ambient noise level from many competing noises and sounds.

It is worthwhile to reiterate at this stage that NEF contours do not include, and are drawn irrespective of, any background noise. The witness called on behalf of the Town of Whitchurch-Stouffville testified that one can anticipate a different reaction from a resident who historically, in relation to his community, has experienced a low level of background noise and then is confronted with a level of noise represented by a 28 or 30 NEF contour. The Commission accepts his evidence.

It might be pointed out that the level of noise represented by a 30 NEF, which has been referred to elsewhere, is often said to be acceptable because it is a level of background noise which generally prevails in a community. It is the view of the Commission, however, that this is not a truism when one suddenly lays down a 30 NEF line in an area, which in all directions for mile upon mile, has been accustomed historically to a very, very low level of background noise.

It is very difficult for the Commission to generalize on the level of noise which could obtain in the future at this airport, if built, for a number of reasons, including:

(i) the airport may contain anywhere from one to six runways;

(ii) the mix and type of planes has not yet been determined. As has been pointed out elsewhere, each type of plane has its own noise footprint or characteristic;

(iii) the type of airport itself has not yet been determined, that is to say, whether it is to serve an international, trans-border, domestic or other role. The role the proposed airport is to fulfill will, of course, determine the number of aircraft that use it, as well as the type of aircraft, and this, of course, has an immense impact upon the noise levels which will be generated by aircraft operations; and,

(iv) the juxtaposition of the runways to the borders of the airport, as well as to the terminals and the other services feeding the airport have not yet been located in a final form. This, of course, confounds attempts to lay down specific noise

contour lines, all of which are specifically associated with the different designs of runways and the planes that use them.

However, what the Commission has attempted to do is to look at the noise which will obtain, assuming that the proposed airport is developed to its highest intensity, and to comment upon those noise contours, since those are, in the Commission's view, the outside possibilities of noise intrusion into the community.

The Commission does not, in the case of the proposed Pickering Airport, accept that the 28 or 30 NEF line is an acceptable level of toleration in a community accustomed historically to a low level of background noise. There is a great deal of evidence to support the Commission's conclusion.

Additional evidence was submitted which indicated that in order to obtain a favourable night's sleep, the NEF contours should be brought down into the teens. The Commission does not want to take a position on a specific NEF contour, nor does it think it is necessary to make a finding of what is a proper level under all circumstances, or perhaps any circumstances, but it is of the opinion that a 28 or 30 NEF level is not the appropriate level to apply in the case of the proposed Pickering Airport and that it is dangerous to regard such contours as absolutes. There was both oral evidence and documentary exhibits which the Commission has considered in arriving at this general conclusion.

The Commission believes that it should make some observation upon the noise contours insofar as they relate to Claremont, Stouffville, Markham, Brougham and Pickering as well as the North Pickering Community.

An examination of Appendices 12 and 13, which show the outer perimeter of the airport, the aforesaid communities, and the respective noise contours, reveals the relationship of the 28 and 30 NEF contours to those communities, which contours do not represent the situation that will exist at the ultimate development of the airport.

It must be remembered when looking at Appendices 12 and 13 that the contours are drawn on the basis of two runways and not six runways. It will be noted that the 28 NEF contour runs very closely to the Village of Claremont and the Town of Stouffville, but not as close to Stouffville as it does to Claremont. The 28 NEF

contour runs directly over Brougham. These contours are rather broad lines and, as previously mentioned in a different way, cannot be regarded as rigid fences driven into the surface of the ground which will prevent the passage of noise.

In addition, the Commission wishes to urge the Government of Canada to avoid now, once and for all, the social, economic and other problems that have developed around Malton as a result of no one, without fault on the part of anyone, foreseeing the development of the air transportation system to the stage that it has reached today, nor the encroachment that it represented upon the social well-being of the residents in the environs of the airport. It is highly possible, if when laying out Malton there had been the kind of understanding which history has taught, or which history has made available, that Malton even now might have been expanded and a second airport avoided. This is an issue which has been spoken of elsewhere, but having happened once, this Commission cautions that care be exercised to prevent it happening again. The Commission is of the opinion, having heard all the evidence, that the 28 NEF contour comes too close to Claremont and too close to Stouffville and if the Pickering Airport is to be developed that the lands embracing both of these communities should be acquired under conditions and terms upon which the Commission reports separately in this Report under the heading of "Airport Zoning and Compensation".

This leads us then to make some comment upon the subject of the Town of Markham, the proposed North Pickering Community and the Town of Pickering. The Commission does not want to go so far as to say, or to suggest that it is possible to guarantee for that matter, that something will not happen in the future. This is so for a number of reasons, some of which have been discussed elsewhere in this Report. However, the Commission is of the view that some greater concern may need to be had for the Town of Markham than has been attempted so far. A great deal will depend upon the turn out paths of the aircraft, as well as to other aspects upon which the Commission has commented. The Commission does not want to go so far in terms of Markham as it has in respect to Claremont or Stouffville in terms of acquisition of those lands, but it does feel that there may be need for some greater sensitivity as to the intrusion of noise into the Town of Markham than has been represented. In

terms of the North Pickering Community, it is quite apparent that there will be intrusions of varying levels of noise from the aircraft themselves as well as from ancillary services or the associated development of the airport. Special treatment will be required in this regard. It is the Commission's view that the project should include, as a minimum, the expropriation of all land within the 25 NEF zone level, or greater, in addition to that which it has commented upon concerning Claremont and Stouffville.

The Commission is of the opinion that if the persons who own land within the 25 NEF contour must be zoned to protect the ongoing use of their land, or in any event their inhabitants, that it is equitable in this day and age to acquire that land. Upon this, the Commission also comments separately under the heading of "Airport Zoning and Compensation". It may well be that there should be some form of zoning, even under the 25 NEF contour.

Speaking specifically to the North Pickering Community, it is quite apparent that there will be on the northern boundary of that community types of intrusion of varying levels of noise from the aircraft themselves, and from the ancillary services of the associated development of the airport. Special treatment will be required in this regard but there is less concern to the Commission concerning this land because the same has been expropriated by the Province of Ontario, and once owned, it will be in a position to deal with this concern by appropriate measures. The Commission does, however, caution the Province that extreme care must be exercised in planning this community from a noise point of view.

It might be useful before leaving this subject to make some comment about the former Township of Pickering which is on the spine which extends southerly from Brougham, known as the Brock Road.

It is quite clear that the 28 and 30 NEF contours include lands beyond the borders of the airport itself and which will require certain zoning restrictions to protect future buyers of those lands as well as the airport itself. In short, there are going to be noise intrusions into the community in which persons live, if only on a sparsely developed basis, which will require legislative action to limit the kind and intensity of development which might take place within those contours. It is the Commission's view that the airport project should include, as a minimum, the expropriation of all land

within the 25 NEF contour in addition to that which it has commented upon concerning Claremont and Stouffville.

OBSERVATIONS AND CONCLUSIONS

It appeared from the evidence adduced by the Ministry of Transport, Canada, that it was using the NEF system for estimating absolute noise exposure conditions. This has inherent dangers. The use of the NEF system as a tool for land use planning around airports should be recognized as representing the point where land use planning is to begin, rather than the point where it should end, if compatibility is to be obtained between the airport and the communities which surround it.

The approach of the Ministry in obtaining data for the calculation of NEF contours has been basically dependent upon assumed statistics rather than based upon obtaining data from actual operations at Malton. This approach has inherent weaknesses.

Sound proofing is only an effective noise abatement tool in a marginally sensitive zone. A NEF contour is not a proper parameter as far as the requirement of acoustical absorption material is concerned.

For all practical purposes, the response of a listener to the noise represented by a 28 NEF contour cannot be distinguished from the response of the listener to the noise represented by a 30 NEF contour. A minimum reduction of 5 units on the NEF scale is required before any noticeable change can be distinguished in the listener's response to the level of noise.

The Ministry of Transport, Canada, has done little to improve the attitudinal response of the communities around Malton Airport to the exposure from aircraft noise. Surveys should be conducted at Malton to investigate the real attitudinal response of these communities. In this investigation, the surveys should be conducted in a manner to determine whether there is any difference in community response, in the summertime, in respect of a day divided into three time periods as contrasted to a day divided into two time periods.

It must be remembered that the NEF system is based upon a computer logarithmical formula. The essential weakness of this technique, as well as others, was found to be that local social, economic, attitudinal and psychological factors are as important, if not more so, than an abstract value of noise exposure. In addition,

this system, as well as others, provides no means of estimating the degree of acceptance that will be tolerated by changing life styles. Unless there is recognition of this fact, the Commission warns that not only will additional problems be encountered at Malton, there is real danger that the Malton situation will be repeated within 20 years at Pickering, if built.

The Commission cannot accept the proposition that the people who moved into the communities around Malton knew that there was a noise problem and accordingly they should bear the consequences. The manner in which the surrounding municipalities and the Government of Ontario applied the Land Compatibility Use Table and the commitment given by the then Department of Transport, Canada, that runway 05R/23L would be only used in the case of emergencies, do not support the proposition.

The Commission is of the view that the only satisfactory means of warning people that they may be buying land or renting a dwelling unit in an aircraft noise sensitive area is by the registration of notice on the title to the lands comprised in noise sensitive areas, in a document related exclusively to the giving of such notice.

The full benefit to be derived from the introduction of quieter engined aircraft will not be as well appreciated if the aircraft fleet operating from an airport is composed of JT3D or JT8D powered aircraft. The noisier aircraft will stand out and will be the ones that are heard. While the DC-10, the L-1011, and B-747 are regarded as quieter aircraft, as contrasted to the first generation jet aircraft, the noise of these aircraft will increase with the number of movements and as the size of these aircraft are increased. It should also be noted that aerodynamic noise will be a significant problem with future generation of jet aircraft.

In determining the number of people affected by aircraft noise, it is erroneous only to look at the land area comprised in a contour without regard to population. One only needs to look at O'Hare Field in Chicago which has a much greater land area affected by noise than LaGuardia Airport in New York where an actual count of people shows a greater significant number of the population affected by aircraft noise than at O'Hare Field. The noise characteristic at each airport will vary depending upon the mix of fleet, whether, the airport is an international or merely a domestic airport, the location of the runways, the location of the airport in

relation to water and land, the number of aircraft movements at the airport, the distance of nearby communities from the airport and the degree of flexibility in setting flight paths to avoid noise sensitive areas.

The impact of aircraft noise will have a greater effect on Pickering than Malton by reason of the communities surrounding the proposed Pickering Airport being rural communities with a lower level of ambient or background noise than Malton. However, the actual number of people affected by noise disturbance from aircraft operations will be considerably less at Pickering than at Malton.

The Commission accepts the projections by the Ministry of Transport, Canada, of the benefits that will be obtained at Malton in the reduction of the number of people affected by noise from aircraft operations once all charter aircraft (both scheduled and non-scheduled) pure freighters, and north European traffic are transferred to Pickering as this will basically remove from Malton the JT3D powered aircraft which are at least 10 decibels higher in noise emission than the aircraft which will remain at Malton. However, it should be noted that the JT8D powered aircraft, which will remain at Malton, exceed the limits of FAR 36 and will continue to form a significant part of the fleet flying from Malton for at least the next 15 years.

Applying the NEF contours in the manner in which they should be applied, that is for comparative purposes only, the Commission concludes:

(a) There will be a greater number of people affected by aircraft operations if Malton is expanded within its present boundaries and all traffic is assigned to Malton than there would be if Pickering were opened.

(b) There will be a reduction in the number of people affected by noise disturbance from aircraft operations at Malton if all north European traffic, all charter traffic (both scheduled and non-scheduled), and all freighters are assigned to Pickering, and there will be less people affected at Pickering.

(c) There will be a further reduction in the number of people affected by disturbance from flight operations

at Malton if all international traffic (except U.S.A. traffic) is transferred to Pickering instead of only part of the international traffic, and there will be no increase in the number of people affected by disturbance from flight operations at Pickering by so doing.

AIRCRAFT NOISE ABATEMENT, OR REDUCTION AND CONTROL

The Commission heard evidence and considered the question of aircraft noise reduction by means of legislation, technology and flight procedures.

LEGISLATION – CANADA

The control of aeronautics in Canada is governed by the *Aeronautics Act*, R.S.C. c.2,s.1. This Act charges the Minister of Transport, Canada, to consider, draft and prepare for approval by the Governor General in Council such regulations as may be considered necessary for the control or operation of aeronautics in Canada. In addition, the Act vests the Minister of Transport, Canada, with broad powers to make regulations, subject to the approval of the Governor in Council, to regulate air navigation over Canada.

The only specific regulation made under the Act in relation to aircraft noise abatement is a prohibition against flying aircraft in a manner as to create a shock wave or sonic boom.

Regulations have been passed under the Act authorizing the Minister to make air navigation orders and flight procedures. These have been used for aircraft noise reduction such as preferential runways, curfews, glide path degrees for approaching aircraft and other aircraft noise reduction procedures. These are not of general application and some are only advisory.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Canada is a member of the International Civil Aviation Organization, hereinafter called ICAO, comprising the signatories to the Convention on International Civil Aviation (Chicago 1944). There are 124 countries belonging to this organization.

ICAO has adopted certain standards and recommended practices for the reduction of aircraft noise. These are embodied in Annex 16 to the Convention which was passed by the Council of ICAO, effective August, 1971 to become applicable 6 January, 1972.

Recognition of the seriousness of aircraft noise in the vicinity of many of the airports of the world requiring urgent solution was recognized by ICAO at a Noise Conference in London in 1966. Recommendations for the reduction of aircraft noise and disturbance were made at an ICAO conference held in 1967, based upon the conclusions of the 1966 conference. At its 1968 conference, ICAO passed a resolution instructing its Council to call another conference to establish international specifications and associated guidance material relating to aircraft noise. A special conference was held in 1969 to deal with aircraft noise in the vicinity of aerodromes and to consider many of the aspects related to aircraft noise and its reduction. Based upon the recommendations from this conference, Annex 16 was formulated.

Annex 16 sets out minimum standards applicable to all subsonic jet airplanes in excess of 12,566 lbs. weight, except short take-off and landing aircraft, engaged in international air navigation, which are either:

(a) powered by engines with by-pass ratio of two or more and for which a certificate of airworthiness for the individual airplane was first issued on or after 1 March, 1972, or

(b) powered by other classes of engines, and in respect of which the application for certificate of airworthiness for the prototype was accepted, or another equivalent prescribed procedure was carried out by the certificating authorities, on or after 1 January, 1969.

The Annex establishes maximum noise levels for aircraft, based on effective perceived noise levels (EPNdB) when tested in

accordance with specified flight procedures, at a lateral noise measurement point, at a flyover noise measurement point and at an approach noise measurement point, based upon the certificated weight of the aircraft. Trade-offs are permitted where maximum noise levels are exceeded at one or two measurement points and there is a corresponding reduction at the other point or points provided that the excess in noise level at a single point shall not be greater than a specified EPNdB, and provided further, that the aggregate of excesses does not exceed a specified EPNdB. There are different requirements for aircraft certificated prior to 1 December, 1969 to those certificated subsequent to 1 December, 1969, the limitation being greater for the latter.

The Annex also deals with aircraft noise certification, aircraft noise measurement for monitoring purposes, noise exposure reference unit for land use planning and aircraft noise abatement operating procedures. The Annex recognizes that there are major advantages to public amenity, in case of certain aircraft situations, in adopting some noise abatement operating procedures designed to keep aircraft as far away as possible from communities in a way which keeps noise disturbance to the minimum. Some of these operating procedures include use of noise preferential runways, use of noise preferential routes, use of turns to direct aircraft away from noise sensitive areas under or adjacent to the usual take-off and approach flight paths, use of a steep initial climb gradient, so that the aircraft on take-off will reach a noise sensitive area at the maximum possible height, the use of reduced power thrust over noise critical areas and turns during approach and on take-off climb.

The Annex requires contracting states to suspend or revoke the noise certification of an aircraft if the aircraft ceases to comply with applicable noise standards.

The effect of the aircraft certification provisions of Annex 16 is that all aircraft manufactured after 1976 will have to comply with the requirements of Annex 16.

Signatories or contracting states to the convention are required to notify the Council before the date specified in the resolution of adoption of any difference that will exist on the date of applicability of the Annex between national regulations and practices and

the international standards set out in an Annex. Annexes to the Convention do not automatically become mandatory for all States.

Some of the contracting states have notified the Council that no differences will exist between their national regulations and recommended practices from those in Annex 16, and some contracting states have given notice of differences existing between their national regulations and practices from those of the standards and recommendations of Annex 16. These notices have advised in some cases that their standards are greater (The United States) and in other instances that they will not be able to meet the requirements of the Annex. The majority of the contracting states have submitted no information to the Council whatsoever.

While Canada is a signatory to the convention, it has not filed any objection to the Annex nor has it implemented any of its provisions.

The Annex incorporates no provision in respect to retrofit and refan.

There is a committee at work within the Ministry of Transport, Canada, drafting a navigation order in respect to aircraft noise standards. It is expected that the order will be available for consultation with the air transportation industry sometime during mid 1974, and will be promulgated possibly by the end of 1974. It is being drafted on the basis that all aircraft operating into certain designated airports will have to meet the noise certification standards set out in Annex 16. The proposed date for compliance is 1980.

THE UNITED STATES

The United States Government has adopted a determined and vigorous policy for the control and reduction of aircraft noise. This policy is evidenced by *Public Law 90-411* issued July 1968, which authorized the Federal Aviation Administration to prescribe and amend such regulations as they may find necessary to provide for the control and abatement of aircraft noise and sonic boom. This was followed by the issue of Part 36 of the Federal Aviation Regulations, made under *The Federal Aviation Act of 1958, The National Environmental Policy Act, 1969* and amendment to *The*

Clean Air Act, December 1970, directing the Environmental Protection Agency to study the effects of noise on public health and welfare and *The Noise Control Act of 1972.*

It is stated in *The Noise Control Act of 1972,* that it is the policy of the United States to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The Act not only authorizes the publication of regulations for aircraft noise standards, the control and abatement of aircraft noise and sonic boom but also authorizes regulations for noise emission standards for each product which is identified as a major source of noise in the fields of construction equipment, transportation equipment, any motor or engine, including any equipment of which an engine or motor is an integral part, and electrical and electronic equipment.

Part 36 of The Federal Aviation Regulations, hereinafter called FAR 36, was promulgated in November 1969 and was effective 1 December, 1969.

In the exercise of its regulatory powers, The Federal Aviation Administration takes three steps. If the proposed action is of a nature that information and technology are not readily available to accompany the regulation, an Advance Notice of Proposed Rule Making will be given, which is an expression of general intent to regulate. Those who will be affected by the regulation are asked to provide comment and information to the Administration. After consideration of the submissions, a decision is then made whether to continue with the proposed regulation. If a decision is made to continue, a Notice of Proposed Rule Making is issued and comment is requested from the public and other interested parties. The Federal Aviation Administration may proceed to Notice of Proposed Rule Making without giving Advance Notice of Proposed Rule Making where it feels that there is sufficient proven data and technology. Comments received following Notice of Proposed Rule Making are assessed and a decision is then made as to whether to issue the regulation in final form.

FAR 36 prescribes noise certification standards for the issue of type certificates and changes to those certificates for subsonic transport category airplanes and subsonic turbo jet powered airplanes regardless of category. It restricts the maximum allowable noise of newly designed transport category aircraft and turbo jet engine powered subsonic airplanes. It prohibits the modification of

new or old aircraft in such a way as to increase their noise levels. The standards of FAR 36 are more stringent than those established by ICAO.

The history of some of the regulations issued under *The Federal Aviation Act* of 1958 is as follows:

FAR Part 91 which prohibits sonic boom by civil aircraft within the United States was issued March, 1973, effective April 1973.

Regulations have been issued, January 1974, applying the standards of FAR 36 to newly produced airplanes of older type designs such as newly produced 727's and 737's, etc.

Notice of Proposed Rule Making was issued September 1971 to tighten the test procedures and conditions for ensuring that modifications of turbojet and transport category subsonic airplanes do not increase the noise generated by those aircraft.

Advance Notice of Proposed Rule Making to restrict the noise levels of civil supersonic aircraft was issued in August 1970. The Federal Aviation Administration is now processing for issue the proposed regulation.

Advance Notice of Proposed Rule Making was issued in August 1970, in respect to the reduction of the noise level of currently operating aircraft to the levels prescribed for new aircraft by FAR 36.

Notice of Proposed Rule Making was issued in March 1974, in respect to civil aircraft fleet noise requirements. This would require all existing commercial aircraft to progressively meet the requirements of FAR 36 by providing that one-half of the current fleet meet the requirements by 1 July, 1976 and the full fleet to meet the requirements by 1 July, 1978. This will involve the acoustical retrofit of some aircraft.

Notice of Proposed Rule Making was given October 1973, in respect to the establishment of noise standards for propeller driven small airplanes. This will limit the noise level of new design propeller driven small airplanes.

Advance Notice of Proposed Rule Making was issued December 1973 of the establishment of noise standards for short-haul aircraft.

Advance Notice of Proposed Rule Making was given March

1974 of the establishment of a two segment instrument landing noise abatement approach.

The Federal Aviation Administration is also preparing Notice of Proposed Rule Making in respect to the following:

(a) the lowering of noise standards of present FAR 36 for new aircraft designs by some 10 EPNdB.

(b) take-off and climb-out procedures to reduce noise on take-off, and,

(c) the introduction of a fourth measurement point for aircraft noise certification applicable to aircraft of new design.

THE JET ENGINE

The jet engine and the noise emitted by it are very complex problems which will require continued study for an indeterminable period in the future before it will ever be completely controlled.

For an understanding of the problem created by the jet engine, without being overly technical, the following is noted:

Engine jet thrust is a function of the quantity of air processed by the engine and the velocity of exhaust gases.

The low frequency jet noise (or exhaust noise) rumble is strongly influenced by the exhaust velocity.

The high frequency fan noise is affected somewhat by the rotational speed of the fan but predominantly by specific component design characteristics such as blade spacing and blade loading (energy developed over the fan blade area).

The aircraft which cause the greatest noise, often referred to as first generation jets, are powered by JT3D engines (707's, and DC-8's) and JT8D engines (B-727's, B-737's and DC-9's). The engine frontal area (or diameter) of these engines is small thereby limiting the quantity of air that is introduced into the engine. This results in high velocity exhaust conditions required to develop the necessary thrust. It is the high exhaust velocities that produce high jet noise characteristics. The addition of a fan to the basic engine provided additional air at low velocity that, when mixed with the higher velocity of the basic jet exhaust, produced significant reduction in total engine exhaust velocity. In addition, more exhaust energy was extracted by a larger turbine which was required to drive the fan, thereby reducing the engine core velocity

as well. This resulted in exhaust noise reductions. There was a physical limit to the size of the fan that could be used in these engines. These were identified as low by-pass ratio fans (the by-pass ratio refers to the quantity of additional low velocity air developed by the fan relative to the air passing through the basic jet engine).

The addition of the fan reduced the exhaust rumble at take-off. It magnified the high frequency "squeal" from the front of the engine. On landing approach, with the engine at a relatively low thrust level, the fan noise now predominated.

At the time the low by-pass fan was being developed for the then existing generation commercial jet aircraft, research was being conducted into high by-pass fans. The result of these studies proved conclusively that benefits in performance, operating costs and noise would result from a high by-pass fan. High by-pass fans are incorporated into the second generation jet aircraft such as the B-747, the DC-10 and L-1011 which have shown improvements in noise technology as well as operating costs over those of the earlier generation jet aircraft.

It should be noted that the first generation jet aircraft do not meet the requirements of FAR 36 while the later generation of jet aircraft do with the exception of some of the earlier B-747's.

RETROFIT AND REFAN

Extensive research and development has been conducted in the United States, funded by the Federal Government, for the reduction of noise created by the first generation jet aircraft. These programmes are known as retrofit and refan.

RETROFIT

It was found that some of the noise of the jet engine was due to the high flow of air through the fan discharge duct which was located in the front quarter of the engine. Modifications were made to extend the discharge duct to the back of the engine. Sound absorption acoustical material to absorb most of the high frequency noise energy developed by the fan and compressor is applied to the inlet, to the inner wall of the cowl, or nacelle, and at

the tailpipe. The modification of the jet engine by the application of sound absorption material (SAM) is known as retrofit. The effect of retrofitting a jet engine is that it enables the engine to meet the requirements of FAR 36.

REFAN

Refan is an engine modification to replace the two stage fan section on both JT3D and JT8D powered jet engines with a larger diameter single stage fan. The refan programme would increase the engine by-pass ratio for these engines resulting in lower exhaust velocities which in turn would result in reduced jet noise. Appropriate sound absorption material is also required to reduce the high frequency fan noise which is most noticeable on approach to landing. The application of the refanned engine to the 727 and DC-9 with aft fuselage mounted engines would involve major aft-end fuselage and tail modifications and some modifications may be required to the front end of the aircraft to maintain balance and stability. A serious problem also exists in the application of the refanned and SAM engine to the 737 which has under wing engines. Modifications to the landing gear, wing and possibly the fuselage will be required, due to the under the wing engine installation, to maintain adequate ground clearance.

The refan programme will not apply to the JT3D powered aircraft as such a programme will not provide any meaningful reduction in the noise emitted by such aircraft. However, while retrofit will result in some reduction in the noise level of JT8D powered aircraft, a greater reduction can be obtained through both the refan and retrofit programmes. The refan development programme is continuing. There have been initial ground tests of a DC-9 aircraft. Flight tests for a 727 aircraft are due to take place in mid 1975. No development is currently taking place in respect to 737 aircraft.

THE POSITION OF THE INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) TO RETROFIT

At its 29th Annual General Meeting in Auckland in 1973, the International Air Transport Association approved a policy statement in respect to retrofit.

It is stated in the policy statement that IATA will cooperate in and support any realistic programme towards the reduction of noise produced by non-noise certificated aircraft to the levels specified in ICAO Annex 16. Any regulations developed for such purpose should be internationally agreed, should be technically feasible and should be economically reasonable and acoustically significant.

The salient features of the policy statement are as follows:

1. Regulations should only apply to specific aircraft types of which fully developed modifications have been demonstrated and for which noise and performance guarantees and firm prices are available.
2. Any consequent adversed effects on aircraft weight, performance and operating costs by reason of such modifications should be reasonable.
3. The cost of modifications for each four engine jet aircraft will be approximately $1 Million and the approximate cost for each two engine and three engine jet aircraft will be approximately $250,000.00. The estimated aggregate cost to the members of IATA will be approximately $1.5 Billion. Recognition should be given to the fact that airlines cannot fund such a project out of operating revenues. Public funding to accomplish such modifications is therefore essential as a prerequisite to the programme.
4. Assurances should be given that after such modification further modification for noise purposes during the remaining operating life of the aircraft will not be required.
5. Assurances should be given that no rules will be promulgated adversely affecting an aircraft type pending the development of suitable definitive modifications for that type of aircraft in the State of manufacture.
6. Reasonable timetables for implementation of any regulations should be afforded to the airlines, including consideration for the remaining operating life of the aircraft.
7. The operation of aircraft which have demonstrated compliance with noise levels specified in Annex 16 (First Edition as originally issued August 1971) should be protected against curfews and operating restrictions

which are not related to airworthiness or safety but are simply imposed for noise reasons.

There are a number of features of this policy statement that should be noted. It is the position of IATA that a retrofit programme should be government financed and that there should be performance guarantees before any retrofit programme is required. IATA is opposed to any unilateral action by a nation which would require retrofit. It is implied that if IATA members are required to undertake the retrofit of their JT8D powered aircraft, they should not be required to later undertake a refan of their JT8D powered aircraft, or in the alternative, if a refanning of the JT8D powered aircraft is contemplated, its members should not be required to undertake a retrofit of their JT8D powered aircraft until a decision has been made in respect to refan.

It is also implied that IATA is opposed to any rule that would prevent the manufacture of new aircraft of old design or which would affect an existing aircraft type that does not comply with Annex 16 until modifications for such aircraft have been developed. If this policy was adopted by governments, there would be no prohibition against the production of aircraft that do not meet the standards of Annex 16. IATA is opposed to any retrofit regulations being of general application and any such regulation should be modified having regard to the remaining life-span of such aircraft. If such regulations were framed in this manner, there would be no encouragement to an airline to dispose of a noisy aircraft which was nearing the end of its productivity. The consequence would thereby lessen the benefits in noise reduction which would be obtained from the retrofit of other aircraft of the same type that have an economic expectancy of productivity. IATA is opposed to any curfew or noise abatement procedure that would limit the operation of an aircraft that meets the requirements of Annex 16. As previously noted under this heading, the number of aircraft movements during the night, or curfew period, has a direct effect in the expansion of an NEF contour and thereby the number of people affected by noise disturbance from aircraft operations. In addition, it has also been previously noted that the number of aircraft movements in themselves has an effect on the number of people affected by noise disturbance and some alleviation from the disturbance can be achieved through various flight procedures.

COST OF RETROFIT AND REFAN PROGRAMMES

The cost of the retrofit and refan programmes involves both direct and indirect costs. The direct costs are composed of the initial investment for appropriate equipment and spare parts as well as the labour and cost of installation. The indirect costs are made up of lost time while the aircraft is undergoing modification, changes in direct operating costs resulting from modifications due to increased weight, increase in fuel consumption and lower performance, and lost productivity. It should be noted that the direct costs will be one time costs while the indirect costs, with the exception of loss of income while the aircraft is undergoing modification, will continue through the lifetime of the aircraft.

The direct costs for retrofit to a 707 are approximately $900,000.00 per plane and the direct cost for retrofitting a DC-8 ranges from between $200,000.00 to $1 million per plane depending upon whether the engine has a short nacelle or a long nacelle. The cost of retrofit for a 727 is approximately $185,000.00 and the cost for a 737 and a DC-9 is approximately $200,000.00.

The cost of refanning an aircraft is as follows:

727 – $2 Million

737 – $1.5 Million

DC-9 – $1 Million

Estimates as to the earliest date that the retrofit programme could be started vary from late 1974 to the early 1980's and estimates of the earliest completion of the retrofit programme vary from 1978 to early 1980's. Estimates of the earliest date that the refan programme could commence vary from 1977 to the early 1980's and estimates as to the earliest completion date of this programme vary from 1981 and beyond. It should be noted that if the retrofit programme is required for the entire fleet followed by a refanning programme for JT8D engine powered aircraft the cost of investment incurred for the retrofit of the JT8D powered aircraft will be lost as these engines will again have to be retrofitted after refanning.

It is forecasted that there will be a substantial number of JT8D engine powered aircraft operating to the year 1985 and beyond,

and a substantial number of JT3D aircraft operating to 1985. It is estimated that retrofitted aircraft will be retired about 1993 and refanned modified aircraft will probably be retired about 1998.

Air Canada adduced evidence before the Commission as to the present composition of its fleet flying out of Malton and the forecast of the fleet composition to 1980. The fleet mix is as follows:

> Lockheed L-1011 – 10 with an additional 2 to be leased in the summer time – *total* of 12.
>
> 727-200 – committed for a *total* of 11.
>
> Boeing B-747 – 5 with a commitment for 1 additional, *total* of 6.
>
> DC-9 – 52
>
> DC-8 of various models – *total* of 38. It is probable that there will be a disposition of 13 of these by 1975. 6 DC-8's are cargo airplanes and will probably be retired during the period 1978-80.

Air Canada also adduced evidence that to retrofit the DC-8's, which will be retained, the DC-9's and 3 – 747's which do not meet the requirements of FAR 36, it will cost $30 Million in 1974 dollars for equipment, including spare parts and labour. No estimate was given as to the indirect costs of the modification.

It was also testified, on behalf of Air Canada, that if required to retrofit its aircraft flying into the United States it would be cheaper from an operational point of view to retrofit the entire Air Canada fleet rather than to attempt to segregate the aircraft which meet the requirements of FAR 36 from those that do not meet the requirements of FAR 36.

Evidence was filed with the Commission that of the total fleet of 26 aircraft flown out of Malton by Canadian Pacific Air, 23 are powered by JT3D and JT8D aircraft engines. The Commission received no evidence from Canadian Pacific Air as to its plans in respect to the retrofit and refan programmes.

The estimated cost of the retrofit and refan programmes for the American fleet, including direct costs (costs of equipment, spare parts and labour) and the indirect costs (lost time while the engines are undergoing modifications, changes in direct operating costs and costs to make up any lost productivity) is $5,001 Million in 1974 dollars.

There is mixed opinion in the United States as to the implementation of the retrofit and refan programmes. United States airlines, most foreign governments and foreign aircraft carriers have indicated strong opposition to the programmes. Anti-noise groups, airport operators, the Environmental Protection Agency and the National Academy of Sciences support the programmes. Recent hearings indicate that there is a difference of opinion among members of the United States House of Representative's Science and Astronautics subcommittee on aeronautics and space technology and among members of the aviation subcommittee of the Commerce Committee of the United States Senate in respect to each of the programmes and the implementation of the proposed rule requirement that the entire United States fleet meet the noise standards of FAR 36. Some members of each committee have expressed the view that the requirement of retrofit of the entire United States civil aircraft fleet may be premature due to the fact that refan technology will not be available until 1975. They also expressed concern that if the retrofit programme is required before the refan programme, there will be a loss of investment by retrofitting 727's, 737's and DC-9's due to the fact that the investment in these programmes will have to be discarded if refanning of these aircraft is required to be undertaken. Some members of each committee have indicated that they are not satisfied that valid evidence exists that the implementation of the retrofit programme will provide meaningful relief to the public particularly in the terms of acoustic impact on individuals. The same members have indicated that the refan programme, although more expensive, may be more effective than the retrofit programme in achieving a reduction in aircraft noise. They have urged a delay in the promulgation of the rule that would require one-half the United States civil aircraft fleet to meet the noise requirements of FAR 36 by 1 July, 1976 and the remainder by 1 July, 1978. Other members of each of the said committees have expressed the view that due to the cost of the refan programme it cannot be considered as a meaningful alternative to the retrofit programme. They have also expressed the opinion that the retrofit programme will bring meaningful relief to noise impacted communities. They have urged that the proposed rule which would require the entire United States civil aircraft fleet to be retrofitted by 1 July, 1978 be promulgated as soon as possible.

Representatives of both McDonnell Douglas Corporation and Boeing Co., in testifying before each of the said sub-committees, agreed that the timetable of the said proposed rule could not be met. The earliest estimates which they could give that the said proposed rule could be met would be in the early 1980's having regard to the shortage of materials and required time for further development. McDonnell Douglas representatives testified before the committee that in their opinion, the retrofit programme would not provide sufficient noise reduction to satisfy the public.

Evidence was adduced before the Commission that the Japanese Government plans to undertake the retrofit of the Japanese fleet. In its discussions with British and French airport authorities, the Commission learned that neither the French Government nor the United Kingdom Government has formulated any policy in respect to the retrofit and refan programmes.

The Commission heard evidence that if airline carriers are required to bear the costs of retrofitting their fleets, they would expect some consideration from governments in the form of removal of curfews.

In addition to the technological questions of the retrofit and refan programmes, the other major consideration is one of cost. Are the costs of the programmes to be borne by the air carrier? Are the costs of the programmes to be borne by national governments? Are the costs of the programmes to be levied against the air transportation user? Do the benefits to be derived from the programmes warrant the costs of the programmes, or would it be more economical to retire the JT3D and JT8D powered aircraft? No Government, except Japan, has adopted a policy on these questions.

COMMENT

The Commission is of the opinion that if the retrofit and refan programmes are undertaken the effect will be to prolong the use of the retrofitted and refanned aircraft in order to recover the costs of investment. This, in turn, will result in an inclination by the airlines to meet growth demands by greater use of the retrofitted and refanned aircraft rather than by the introduction of wide-bodied aircraft. This will result in greater aircraft movements. This, in turn, will negate some of the benefits to be gained from the programmes. As previously noted, an increase in aircraft movements has the

effect of expanding NEF contours and thereby increasing the number of people affected by noise from aircraft operations. It should also be noted that as the number of wide-bodied aircraft, which are regarded as quiet aircraft, are increased, the noise from these aircraft will increase. It should be mentioned that while the 747's, DC-10's do meet the requirements of FAR 36, on approach and take-off, they do so only marginally. It should also be noted that as the size of an aircraft is increased, airframe noise will be a significant problem.

The Commission hesitates to express an opinion as to the date the entire United States fleet will be required to meet the requirements of FAR 36. However, as a result of the determined effort demonstrated by the United States to reduce the level of noise generated by aircraft operations, it is reasonable to assume that by 1985 the entire American fleet will meet the present requirements of FAR 36.

The Commission is of the opinion that the jet engine and aerodynamics are very complex subjects which will require continued research for an understanding and control of the resulting noise. As a consequence, the present noise levels generated by jet aircraft operations will realistically be with us at least until 1985. While it is difficult to estimate the noise levels which will be generated by aircraft operations after 1985, it is fair to say that they will never be comparable to the noise level generated by a glider, as some people would have the Commission believe. However, it is probable that after 1985, the then noise level from aircraft operations will increase gradually with the probable increase in aircraft movements.

FLIGHT PROCEDURES AS A MEANS OF REDUCTION, OR ABATEMENT, OF AIRCRAFT NOISE

There are a number of flight procedures and related procedures that may be employed to provide some alleviation from aircraft noise, such as curfews, use of the preferential runways, monitoring of aircraft noise to determine compliance with and to check the effectiveness of noise abatement requirements established from time to time for aircraft in flight or on ground, low drag

approach, multi-segment approach, power cut back after take-off and curved flight paths.

CURFEWS

Curfews can take various forms. There can be complete prohibition against flights originating or terminating at an airport after a designated hour, such as is employed at Washington National Airport, Washington, D.C., U.S.A. There can be a prohibition against a certain type of aircraft flying into or out of an airport, such as the prohibition of four engine powered jet aircraft flying into LaGuardia Airport in the United States. There can be a percentage reduction of existing originating and terminating aircraft of each airline at an airport after a designated hour. There can be a complete ban on all normal summer night jet take-offs, night being 2300 hours to 0600 hours and summer being 1 April to 31 October inclusive, as is the case at Heathrow Airport in the United Kingdom. There can be a restriction on the introduction of new schedule flights between 2400 hours and 0700 hours, a prohibition against the use of an airport by jet aircraft for technical stops or charter operations between the hours of 2300 hours and 0700 hours, the restriction of authorized departures by jet aircraft to the use of certain runways between the hours of 2300 hours and 0700 hours and the restriction of landing aircraft to the use of certain runways between the hours of 2300 hours and 0700 hours as is the case at Malton.

While curfews definitely result in a reduction in noise disturbance caused by aircraft operations, curfews provide no answer to the disturbance from aircraft noise which results during the approach to the peak hour, during the peak hour and following the levelling off from the peak hour.

It must be noted that curfews impose a serious economic penalty on the air transportation system. Curfews prevent the maximum utilization of airports and aircraft and thereby reduce the rate of return from the substantial investment in these assets. This in turn is reflected in increased cost to the customer of the air transportation system. The imposition of a curfew at an airport where a flight originates and the imposition of a curfew at the airport of destination restricts flexibility in the scheduling of flights in that a flight must originate outside the curfew period, at the

airport of origin, and must land outside the curfew period, at the airport of destination at times acceptable to the travelling public. Curfews also limit the ability to spread out peak hour movements at an airport.

The Commission is also of the opinion that if a curfew at an airport prohibits the free movement of air cargo into and out of that airport, the airport will never reach its full potential for handling air cargo due to the fact that air cargo will be flown to the nearest airport where there is no limitation on operations. It is anticipated that the Charles de Gaulle Airport in Paris, France, which has no curfew, will make serious inroads into cargo operations at the London, England airports and the Frankfurt, Germany airport which have curfews.

PREFERENTIAL RUNWAY SYSTEM

It has been mentioned, elsewhere in this Report, that a preferential runway system as a means of noise abatement was partially employed at Malton during part of the summer of 1972 and was employed completely in the summer of 1973. While the use of the preferential runway system during the summer of 1973 did result in some reduction of the number of people affected by noise from aircraft operations, it did have the effect of exposing people to noise from aircraft operations not previously affected.

It is discussed, elsewhere in this Report, that the use of a preferential runway system as a means of noise reduction does have the effect of reducing the maximum movements on each runway.

The employment of the preferential runway system is limited by snow, ice or slush, rain, oil or other substances on runways, cross winds, greater than 15 knots, and tail wind component, including gust effects, greater than 5 knots.

It was suggested in evidence that the number of people affected by disturbance from aircraft noise could be reduced by restricting the noisiest aircrafts to the use of a particular runway. There was evidence, which the Commission accepts, that it would be impractical from an operational point of view to put this into practice. It would not only create a heavy burden on the air traffic controller but would also result in a substantial reduction in runway utilization. Even if such a scheme was feasible, which it is not, the increase in movements by noisy aircraft on a particular

runway would create too intolerable a burden for the persons living under the flight paths of the runway which is designated for use by noisy aircraft.

MONITORING

Effective monitoring of aircraft noise involves a large number of measurements per day from which an immediate indication of the noise levels may be obtained. From this information, adjustments can be made to flight procedures and flight paths in order to reduce aircraft noise. In addition, aircraft that stray from the flight path or make their approach below the designated altitude can be identified.

Monitoring sites are usually established for each departure route to ensure that the noise levels in the first major built-up area overflown do not exceed specified limits, some of the larger and noisier aircraft are unable to use certain runways. In order to meet specified limits, some of the wide-bodied aircraft which have substantial capacity for cargo and which require large supplies of fuel for operations on trans-Atlantic routes must reduce their fuel load or freight load so as to meet the limits. This in turn results in increased cost of operations due to the fact that the aircraft cannot carry a full pay-load or they must make a refueling stop earlier than normal which adds to the cost of operation, delays and inconveniences to the passenger.

The effect of establishment of specified noise limits at a particular point on a departure route, enforced through monitoring, is to reduce the level of noise to which persons residing within the area from runway take-off to the monitoring station are subjected. However, there is a tendency among pilots to apply full thrust once they have passed the monitor. This has been called "turning on the taps" and "beating the box". This in turn results in a greater level of noise disturbance to persons residing beyond the monitor point than they would have been subjected if there was no monitoring

There was evidence adduced before the Commission, by a witness on behalf of the Ministry of Transport, Canada, that an extensive noise monitoring programme has been undertaken at Vancouver. This programme enabled the identification and quantification of the noise problem, and as a result, a substantial

reduction of aircraft noise disturbance to residents in the Richmond Community of Vancouver has been achieved. It is unfortunate that the Ministry has not seen fit to undertake such a programme at Malton, even though it gave an undertaking to do so six years ago.

It should be noted that Vancouver Airport has substantially fewer movements than Malton, and, at Vancouver, approaches and departures over water can be used.

LOW DRAG APPROACH

With the low drag approach, an aircraft intercepts a glide slope at 3,000 feet above ground level, or more, and the extension of the under carriage and flap is delayed to reduce drag. This enables the aircraft to descend with reduced engine power. This procedure does not require any special equipment in the aircraft other than that required for a standard instrument landing approach (ILS).

The implementation of the low drag approach procedure would reduce disturbance from aircraft noise operation for persons situate outside the outer markers for runways 23R/05R, 05L/23L and 14/32 at Malton (3.8 – 4.1 nautical miles from the runway) although it would not provide any benefit for persons residing within the area of the outer marker for these runways.

The low drag approach on these runways has been recommended by the Ministry of Transport, Canada, but is not mandatory.

MULTI-SEGMENT APPROACH

The multi-segment approach is commonly regarded as a two segment approach.

The general practice at present is for an approaching aircraft to fly to the glide slope and intercept it from below. Configuration and speed changes are made in anticipation of the interception, so as to secure stabilized conditions during the final descent. This stabilization is achieved by the 1,500 foot height point which is about 6 miles from the runway touchdown. The interception of the glide slope usually takes place at an angle of 2.5 degrees to 3 degrees.

The multi-segment approach involves an approaching aircraft intercepting the 3 degree glide slope from above by means of a steeper descent. This has the advantage that an aircraft approaches an airport from a higher point and descends to the 3 degree glide slope with less power thrust. The aircraft can make its descent at any angle from 6 degrees to 4 degrees, intercept and makes its transition into the 3 degree glide slope at about 700 feet above ground level, where stabilization takes place, which is approximately 2 or 3 miles from the end of the runway. There is little advantage, from a noise reduction point of view, of intercepting the glide slope at less than 700 feet.

With the interception of the glide slope from above at a higher degree of descent, the aircraft flies at a higher altitude at an increased speed until the point of interception of the 3 degree glide slope. It can then make its transition into the 3 degree glide slope by applying only a little additional power, or none at all, as a consequence it makes no additional noise than it would have if the pilot had adopted the standard 3 degree glide path approach as is the case when the glide slope is intercepted from below.

The point of descent for interception of the glide slope can take place anywhere from a 4 degree to a 6 degree angle. There is about a 4 decibel reduction in noise from aircraft operation as a result of each change in the degree of approach to a runway.

To summarize, the multi-segment approach involves the aircraft following a steeper approach than normal, 4 degrees to 6 degrees, and then joining the conventional 3 degrees ILS glide slope between 2 and 3 miles from runway touchdown, stabilizing on the final 3 degree glide slope at an altitude of 700 feet. The effect is that the aircraft is at a higher altitude during the intermediate approach stage and thereby lessens noise on the ground beneath. The greatest benefit would be to persons residing within a distance of 3 miles to 8 miles from the runway.

The introduction of a multi-segment approach at an airport where the fleet is composed of a mix of first and second generation aircraft can result in a reduction of noise from 10% to 40%, depending upon the characteristics of the particular airport, by reason of a greater height between the aircraft and the ground due to the steeper approach.

In order to put a multi-segment approach into practice, expenditures will have to be incurred for aircraft equipment and ground equipment. The modifications to the aircraft are estimated to cost between $15,000.00 and $45,000.00 depending upon the manner in which the aircraft is equipped, second generation aircraft being better equipped and therefore requiring less expenditure. These are estimated costs only as some contractors have expressed the view that equipment costs could be less. The cost of additional ground equipment is estimated to be $5,000.00 – $6,000.00.

The use of the multi-segment approach procedure is limited by weather. If there is a tail wind of 20 knots, or greater, a two segment approach is not possible. Engine and wing icing can prevent the use of this approach procedure. Cloud ceiling and visibility can also limit the use of this procedure. Wake turbulence is also a limiting factor depending upon the mix of aircraft, but the present separation between aircraft may be sufficient to overcome this problem. The problem of wake turbulence arises where a single-segment approach procedure and a multi-segment procedure are employed on the same runway. This is particularly the case where a larger aircraft is using the multi-segment approach and there is a calm wind. If there is not adequate separation, the smaller aircraft will be affected by wake turbulence.

In the United States, 300 to 400 pilots have flown the multi-segment approach procedure in 727's and DC-8's and none expressed any opinion that they experienced any difficult problems, and the majority of the pilots indicated that this procedure did not raise any problems at all.

Tests of the multi-segment approach procedure were to commence in May of 1974 at Vancouver Airport.

It should be noted that there is a greater limitation on the use of the multi-segment approach where aircraft fly under IFR conditions than under VFR conditions. The FAA has indicated it would propose initially limiting the multi-segment approach procedure to aircraft flying under VFR conditions.

The United States Air Line Pilots Association has recently expressed strong opposition to the multi-segment approach. In addition to the matters previously mentioned which limit the use of

this procedure, the Association claims that in the case of wide-bodied aircraft, the pilot must increase power when making transition from the 6 degree approach to intercept the 3 degree glide slope which in turn increases the noise on the ground at that point.

It is admitted by the FAA that continued investigation and research is required into the multi-segment approach procedure. Notwithstanding these limitations, it appears that the multi-segment approach procedure is the best hope of present day technology of achieving the greatest reduction in disturbance from noise from aircraft operations at the least cost and at the earliest time.

While the multi-segment approach or two-segment approach has not been introduced in the United Kingdom, the United Kingdom is increasing the degree of the glide slope approach to 4 degrees. As has been previously mentioned, each increase in the degree of the glide slope approach has the effect of increasing the distance between the ground and the aircraft on approach and thereby reduces the number of people affected by noise from approaching aircraft on landing.

POWER CUTBACKS AFTER TAKE-OFF

An operational procedure has been developed to reduce noise caused by aircraft on take-off. On take-off from the runway, the aircraft climbs as rapidly as possible by means of application of maximum thrust, power or acceleration, to obtain high enough speed and altitude as possible, so that it approaches a noise sensitive community at an altitude of about 1,000 feet. The thrust or acceleration is reduced over the community, and thereby, the jet velocity and noise generated by the aircraft. The aircraft still continues to gain some altitude. Once the noise sensitive area is passed, thrust is again applied until the aircraft reaches its desired altitude.

The use of this procedure is limited by the weight of the aircraft, temperature, wind and safety conditions. On a warm, humid summer day with little wind, a fully loaded large-bodied aircraft or a stretched DC-8 requires the use of 10,000 feet of runway, and the rate of climb will be markedly less than at other times. Power cut-back after take-off has not achieved significant

noise reduction in unmodified aircraft. However, a retrofitted aircraft achieves a significant noise reduction.

The use of the power reduction after take-off could provide some benefit to the areas at Malton affected by operations from Runways 05L, 14 /32.

FLIGHTS PATHS

Curved flight paths for approach and departure are used extensively at many of the airports of the world in order to avoid noise sensitive areas. The use of this procedure depends, to some extent, upon the type of equipment with which the aircraft is equipped.

On approach, large aircraft should be stabilized for descent at 700 feet – 1,000 feet altitude. Accordingly, any curved descent path should take place prior to the outer marker, which is 4.5 – 5 nautical miles from touch-down. The nearer the curved approach path is to the airport the better the results are for noise abatement. However, such a procedure could result, in some cases, in the stabilization altitude being lowered by an unacceptable amount.

For air management purposes, all approaching aircraft are held as high as possible, as long as possible, on their approach sequence and any benefit from a curved flight approach procedure would be limited to areas within the outer marker, that is 4.5 nautical miles to 5 nautical miles from touch-down.

On a normal straight-out departure, the aircraft follows a straight flight path until it attains an altitude of 1,500 to 3,000 feet before it turns on course. On a curved departure, the aircraft makes a turn after only a brief climb in order to avoid a noise sensitive area.

With a curved departure, the rate of climb is reduced during the turn which could result in a spreading of the noise over a greater area.

Presently, a straight-in approach and a straight-out departure flight paths are followed at Malton. On departure, the aircraft climbs straight until it reaches an altitude of 2,000 to 3,000 feet or more. It then makes its turn onto its route.

While additional ground equipment may be required for a curved arrival approach procedure at Malton, no additional air or

ground equipment would be required for curved departure procedure.

The evidence of witnesses on behalf of the Ministry of Transport, Canada, was to the effect that adoption of curved flight paths for approaching and departing aircraft would be of little benefit at Malton. However, the use of curved flight path departures on runways 23L and 23R would benefit the areas affected by operations from these runways, which areas are becoming rapidly populated.

The Commission is of the opinion that further studies should be conducted into the benefits that could result from the employment of these procedures by directing as much approaching and departing traffic as possible over Highways 401 and 427 where the level of background noise is highest.

REDUCTION OF GROUND RUN-UP NOISE

Jet engines require a short period of ground running, so that they can be tested for safety reasons. After routine maintenance or repairs, longer running is necessary. At the London Airports to minimize the disturbance resulting from the running-up of jet engines, the running-up takes place, wherever possible, in special mufflers, which are giant silencers placed close to the engines. In Germany, a special structure has been developed in which the ground running of the engines can take place. It is anticipated that the noise from the running-up will be confined to the compartment. This special structure will be installed at the new Tegel Airport in Berlin.

In addition, noise from ground run-up operations can be reduced by restricting the testing of engines to specified times and places and the installation of noise shields around maintenance areas.

It has been noted earlier in this Report that there are communities around Malton that experience noise disturbance from ground running operations since the opening of Terminal II. This disturbance can and should be reduced by these means which should be implemented.

COMMENT

Results are being obtained in the reduction of noise caused by aircraft operations. Second generation jet aircraft are less noisy than first generation jet aircraft as a result of technological improvements and modifications to the jet engine. The greatest success has been achieved in the reduction of noise on take-off and side line noise. The success in reduction of aircraft noise on approach has not been as great.

The jet engine is a very complex piece of equipment. A greater understanding of its operation has enabled modifications which have resulted in a reduction of some of the noise emitted by it. As modifications are made to the jet engine for reduction of some aspects of the resulting noise, the existence of other factors which contribute to the noise emitted by the engine are discovered, and now predominate, such as core noise. The control of the noise emitted by these other factors will require continued study and research for the foreseeable future.

The United States has set for itself the goal of a 10 EPNdB reduction in aircraft noise per decade from 1970 to the year 2000. The United States has made a marked progress toward the achievement of this goal for the period 1970 to 1980. However this achievement has been basically related to the reduction of noise emitted by second generation aircraft. The accomplishment of this goal for succeeding decades is questionable as the point of diminishing return, in relation to foreseeable technology, is being reached.

It should again be noted that as aircraft become larger aerodynamic noise will be a problem.

The exact extent of the noise that will be emitted by an aircraft fleet flying into and from an airport in which second generation aircraft will dominate is uncertain. It can only be stated that an increase in aircraft movements will result in an increase in disturbance from aircraft operations.

While it is anticipated that the DC-8's will be basically phased out by the mid 1980's the DC-9's will form a substantial part of aircraft fleets until 1990 and even beyond. If any reduction is to be achieved in the noise emitted by these type of aircraft, it will have to be done through the retrofit and refan programmes. It is difficult

to predict, at this time, whether either of these programmes will be implemented, and if so, which one. Accordingly, the Commission is unable to make an estimate as to when the existing world fleet will meet the standards of FAR 36. There are international problems associated with a country implementing a rule requiring all existing aircraft flying into its airports to meet the requirements of FAR 36. The United States FAA has indicated to the Secretary-General of ICAO that it supports a multi-lateral approach to the rule. But, it has not committed itself to multi-lateral agreement with respect to the retrofit and refan requirements as it is still of the belief that foreign aircraft operating into the United States should be included with its own aircraft in noise reduction actions.

The Commission concludes that noise from aircraft operation will always be with us. While there will be some reduction in the level of noise from that which prevails today, it would be unrealistic to make an estimate as to the extent of the reduction of noise and as to the date when the reduction will occur, other than to state that it is possible by 1985. This estimate must be qualified by the fact that an increase in aircraft movements will result in an increase in noise disturbance from aircraft operations. The probability must also be considered that there will be change in future life style. This raises the question as to whether the reduction in aircraft noise that may be achieved by 1985 will be acceptable to the life style of 1985, or whether the then life style will demand that there be a greater reduction in the level of noise from aircraft operations.

While a reduction in noise from aircraft operations can result from the introduction of various aircraft operational procedures, the implementation of a particular procedure alone will not by itself result in an overall reduction in noise caused by aircraft operations. A variety of operational procedures will have to be introduced to obtain the maximum possible reduction in noise. In some cases, significant gains in reduction of noise from aircraft operations by the introduction of certain procedures will only be achieved after all first generation aircraft are retrofitted and refanned.

The achievements which have been obtained to date in the control of noise from aircraft operations is attributable to the vigorous and determined policy pursued by the United States. Without such a determination on the part of the United States, it is

highly doubtful that there would have been any marked change in the noise emitted by the second generation aircraft from that emitted by the first generation aircraft. This success would not have been achieved without legislation.

While the policy pursued by the Ministry of Transport, Canada, for the reduction of noise caused by aircraft operations has not been one of complete indifference, there has not been forcible and unflinching attack on the problem. The Commission was disturbed to hear the Director of Civil Aeronautics testify that the Ministry of Transport, Canada, did not favour the implementation of regulations of general application due to the fact that noise was not yet a problem at some airports. A policy based upon complacency until a problem arises can only lead to the jeopardy of the whole air transportation system. While the Commission accepts the proposition that different factors exist at different airports, such as approaches and take-offs may be possible over water, this can be recognized by making exceptions in such instances to regulations of general application.

The Commission is of the opinion that undue consideration has been given by the Ministry of Transport, Canada, in seeking to obtain the approval of the International Air Transportation Association (IATA) before implementing any change in flight procedures. The Commission can only report that its experience with IATA has been less than fruitful. Newspapers reported the appointment of this Commission shortly after its appointment. The Commission advertised extensively, as has been previously noted, of its appointment in mid-December, 1973. Commission counsel wrote to IATA in February, 1974, asking for its participation in the Hearings. No response was received. After the termination of the postal strike, Commission counsel wrote to each member of the IATA Airport Consultative Committee for the Toronto Region requesting participation in the Public Hearings of the Commission. The only positive response received was from Air Canada, which agreed to appear as a Commission witness. The other carriers took the position that they did not have enough time to prepare for the Hearings. If the Ministry of Transport, Canada, continues the policy of seeking the opinion of IATA before implementing any noise programme, not alone its approval, it is doubtful that any noise abatement programme will be introduced.

The Commission is also of the opinion that the Ministry of Transport, Canada is unduly concerned that it may infringe bilateral agreements by the introduction of any new procedures, standards or requirements. These practices have been introduced into the United States and United Kingdom, notwithstanding bilateral agreements, without reaction.

The Commission is of the opinion that if the problem of noise emitted from aircraft operations is to be controlled in Canada, it must be by way of regulation under *The Aeronautics Act.* The Commission recommends that such regulations be introduced in a manner similar to that followed under the *Federal Aviation Act of 1958,* of the United States, that is, an Advance Notice of Proposed Rule Making be given where insufficient data and technology are known; Notice of Proposed Rule Making be given where sufficient data is known followed by the implementation of the regulation. Each phase should have a prescribed time limit in which comments may be submitted, and where there is substantial opposition to a Notice of Proposed Rule Making, a hearing should be held.

It must be remembered that Malton must continue in its present role, if there is a decision to build Pickering, until Pickering is opened. Realistically, if such a decision is now made, it will not be possible to open Pickering until some time between 1982 and 1984. It must also be remembered that even if Pickering is opened, Malton will continue to play a significant role in the Central Ontario Air Transportation System.

The Commission, in any event, recommends that there be a complete re-examination and reconsideration of the flight operational procedures that can be implemented to bring some alleviation in the noise resulting from aircraft operations at Malton. The Commission recommends that this work be conducted by a committee responsible directly to the Minister of Transport, Canada. This committee should also be directed to conduct surveys for determination of attitudinal response of the residents in the communities adjacent to the airport. The survey should be designed in a manner to determine the attitudinal response in a 3 period day; day, 0700 hours to 1900 hours; evening, 1900 hours to 2300 hours and night 2300 hours to 0700 hours. The committee should also have authority to cause to be conducted a meaningful aircraft monitoring programme. A reasonable time limit should be set for

the completion of the report of the committee. The implementation of the recommendations of the committee should follow as soon as possible.

3. Terminal and Related Ground Facilities at Malton

The Commission discusses present runway capacity and the requirements for future runway capacity at Malton under the heading "Runway Capacity". It now discusses the evidence concerning present and future terminal and related ground facilities at Malton.

The present Malton Airport comprises 4,272 acres of land, of which 2,705 acres are used for airport facilities. Included in the 4,272 acres is a smaller parcel of land situated north of Airport Road, and is hereinafter referred to as the "northeast parcel".

The existing facilities at Malton, in addition to runways and taxi-ways, consist of an air cargo complex, a service complex, a terminal support complex, an air traffic control centre, a field maintenance garage, a fire hall, transmitter and receiver areas, a general aviation complex, parking areas, for the public and for employees, and a terminal complex.

The air cargo complex consists of cargo facilities and warehouses. In addition, there is included in this complex, support services for airlines such as flight kitchens, airline ramp and maintenance service equipment, sewage disposal and individual employee parking spaces. Car rental maintenance and storage areas are also located on this site and a post office.

The general aviation complex is known as Skyport. A number of private agencies in this complex provide maintenance and storage services for general aviation.

The service complex consists of an administration building, a central workshop for airport maintenance and a central power plant to provide heat and air-conditioning to the airport buildings.

The airport traffic centre complex consists of an air traffic control tower and an air traffic control service area.

The fire hall is operated on a 24-hour basis to provide aircraft rescue and fire protection. Adjacent to the fire hall is an area for fire fighter training.

The field maintenance complex consists basically of an equipment maintenance garage from which the entire airport ground fleet is controlled.

Parking areas are provided for both the public and employees. An enclosed public parking garage has been constructed on top of Terminal I. This garage has a capacity for approximately 2,200 cars. Additional parking is provided for Terminal I at an open remote parking lot which can accommodate approximately 980 vehicles. An open parking lot provides parking service for Terminal II. This parking lot can accommodate 3,300 automobiles. There are a number of parking areas to service individual facilities such as maintenance, hangars, power plants, administration building, flight kitchens and air cargo complex. There are two main employee parking lot areas.

The terminal complex comprises two terminal buildings, Terminal I and Terminal II. The Commission intentionally uses the words "terminal complex" as it would be misleading to use only the words terminal buildings. In addition to the actual terminal building, there must be sufficient land adjacent to the terminal building for aircraft parking aprons or gates.

The land area requirement for aircraft aprons is much greater than the land requirement for the actual terminal building. The land area required for the aircraft aprons varies with the size of aircraft. A B-747 requires an aircraft apron approximately comparable to aircraft aprons required for two medium size jet aircraft.

The actual time that an aircraft occupies an apron will vary depending upon the flight sector in which it is operated. The occupancy time of an apron by an aircraft operated in the short-haul sector will be less than the occupancy time of an aircraft operated in the long-haul domestic sector and much less than an aircraft operated in the international sector. If the occupancy time of all aircraft flown in the various flight sectors was averaged, the average occupancy time of an apron by an aircraft at Malton would be approximately 100 minutes.

It should be noted that even if facilities are provided for the processing of passengers at a downtown location, or any other off-site location, it will not reduce to any material extent the land required for a terminal complex having regard to the amount of land required for aircraft aprons and the number of aprons required.

Terminal I was opened in February, 1964. It has undergone a series of modifications, primarily due to the advent of the jumbo jet. At present, it is used to service all international, trans-border and domestic air carriers serving the Toronto Metroplex with the exception of Air Canada. It presently has 23 gate positions, or aprons, around the terminal and 8 off-terminal gate positions, or aprons, away from the building on the south side of the terminal, for a total of 31. However, only 30 gate positions or aprons may be used at one time.

The first phase of Terminal II was opened in June, 1972. The present stage of development of Terminal II was opened in April, 1973. It is used exclusively by Air Canada for its own operations and that of airlines serviced by it, Aero Mexico and Air Jamaica, for the processing of all its domestic, trans-border and international scheduled and charter flights. There are 16 gate positions, or aprons, around the terminal, 5 off-terminal gate positions, or aprons, and 6 remote aprons for a total of 27.

When Malton Airport was expanded in the late 1950's and early 1960's to its present boundaries, a master plan was prepared for the ultimate development of the 4,272 acres which then comprised the airport site. At its ultimate development, the master plan provided for Malton to have sufficient capacity for handling annually 13 million enplaned and deplaned passengers. A forecast was made in 1964 of the annual enplaned and deplaned passengers at Malton for various time periods. It was predicted that by the year 1980 the annual number of enplaned and deplaned passengers would be 6.9 million. As noted elsewhere in this report, several additional forecasts of enplaned and deplaned passengers have been made subsequent to 1964 with different results. In addition, the actual experience at Malton to date has exceeded the 1964 forecast for 1980. To understand the terminal capacity required at Malton, the Commission believes it would be helpful to set out the actual 1973 total enplaned and deplaned passengers at Malton and

the forecasts of enplaned and deplaned passengers for the central Ontario market for the years 1978, 1980 and 1984, which are as follows:

Year	Enplaned/Deplaned
1973	9.2 million
1978	13.3 million
1980	15.9 million
1984	21.5 million

Terminal I, with certain modifications, will be adequate to meet enplaned and deplaned passenger requirements for all air carriers, except Air Canada, to the year 1975 or 1976. Notwithstanding any modifications, there will be no increase in the number of gate positions, or aprons, for aircraft. The forecasted increase in the number of jumbo jets using the terminal will necessitate the reduction of the present gate positions by 2 for a total of 28 that can be used at one time. Additional facilities will have to be provided after 1975 or 1976.

In order to meet the requirements of all air carriers, other than Air Canada, from 1975 or 1976 to 1980, the existing cargo complex will have to be converted into a temporary third terminal. To convert the present cargo complex into a temporary third terminal, the cargo facilities will have to be relocated to the northeast parcel of the airport lands. A relocation of the cargo facilities on this site will result in an access problem as this parcel is separated from the main airport site by Airport Road. Another site will have to be found for the remote transmitter which is presently located on the northeast parcel.

Terminal II has not yet been constructed to its ultimate stage of development. By completing Terminal II to its final stage of development, all the requirements of Air Canada will be met to the year 1980 or 1981. At final development, the Terminal II complex will provide an additional 11 gate positions, or aprons, for a total of 38. In addition to final development of Terminal II, the open

parking lot area which serves it will have to be replaced by a multi-level structure in order to provide adequate parking facilities for the public.

To continue all aircraft movements at Malton beyond the year 1980, a permanent third terminal will have to be constructed on the west side of the airport to replace the temporary terminal which had been constructed in the area of the cargo complex. If a fourth runway is constructed parallel to present runway 14/32 at a distance of 4,400 feet, the permanent third terminal complex could be constructed between the runways. The third terminal complex would provide an additional 38 remote gate positions, or aprons. In addition to the actual terminal complex, support services would also be required to be constructed.

With modifications to Terminal I, an expansion of Terminal II to full development, and the construction of a permanent Terminal III, including aircraft parking gates, Malton will have capacity to meet the low forecasts of the Ministry of Transport, Canada, of enplaned and deplaned passengers to 1986 or 1987, and capacity to meet the probable forecast of enplaned and deplaned passengers to 1984 or 1985.

It should be noted that after all previously mentioned changes have been made, including the construction of a runway parallel to runway 14/32, separated from existing runway 14/32 at a distance of 4,400 feet, all lands within the present boundaries of Malton would be developed to their ultimate. At its ultimate stage of development, there will only be 104 to 106 aircraft gate positions, or aprons.

The Commission points out, as will be more fully discussed under the heading "'An Airport and Its Planning", the time required for the planning and construction of an airport, in the opinion of the Commission, is from 6 to 10 years. Accordingly, if a decision is now made to proceed with the Pickering Airport, the opening year of the Pickering Airport will be shortly before or shortly after Malton has reached its ultimate capacity.

4. Ground Access to Airports

The Commission heard evidence, (from the Ministry of Transport, Canada, personnel but no evidence from the Province of Ontario or Municipal personnel)[1] although not complete evidence, as to forecast of ground trips to and from the Toronto Airport system for the years 1980 and 2000. The evidence was incomplete in that there was no forecast as to the number of airport trips by well-wishers, that is trips by people who travel to an airport to say farewell to a friend, or by greeters, that is trips by people who travel to an airport to welcome a friend, or trips for air cargo purposes, or trips between the present Malton Airport and the proposed Pickering Airport. However, the Commission did receive forecasts as to the number of trips to and from the Toronto Airport system by air passengers, employees, sightseers, by people on business, and by an unidentified class called, "other persons".

The forecast involved a variety of assumptions such as the level of activity at each airport, changes in the efficiency of the airport workers, forecasts in population distribution and employment opportunities in the area. It was emphasized in the testimony that the forecast of trips in the Toronto Airport system was a preliminary estimate only and that continued study will be required.

In preparing the forecast, estimates were made by travel direction, to and from the airport, for an average summer day and design hour. The average summer day was defined as representing a typical summer day activity at the airport during the months of July, August and September. The design hour was defined as an

1 This matter is more fully mentioned under ground access to Pickering, infra.

hour of a summer day, for analysis purposes, which is higher than the average volume and which will only be exceeded a few days of the summer. The design hour which was chosen was 4:30 p.m. to 5:30 p.m. as this hour would coincide with general commuter and recreation travel in the region.

For the year 1980, the forecasts were based upon vehicular trips due to the fact that realistically the motor vehicle would be the chief means of transportation. The forecast made for the year 2000 was based upon person trips as opposed to any specific mode of transportation due to the fact that no prediction as to the mode or modes of transportation that will then be available can now be made. The forecast made for the year 2000, while dealing with the entire Toronto air transportation system, made an apportionment of the trips between Malton and Pickering on the premise that Pickering would be open and would serve all flight sectors, including necessary connecting trans-border and domestic short-haul sectors, while Malton would be confined to serving domestic and trans-border short-haul sectors. For an understanding of the magnitude of the problem, as indicated by the forecast, the Commission now sets out the forecast for 1971, 1980 and 2000. The Commission refers to the forecast for the year 1971 by reason of the fact that the 1971 figures do not represent the actual data for that year but are synthesized from statistical data.

	1971	1980	2000		
			Total[1]	P[1]	M[1]
Average summer day, 2-way person trips	38,000		309,000	243,000	66,000
Design hour 1-way trip from airport	2,400	5,750	20,600	17,100	3,500
	(Vehicular Trips)		(Person Trips)		

1 For the year 2000, the total represents the total person trips for the entire Toronto Metroplex air transportation system, "P" represents the Pickering trips and "M" represents the Malton trips.

It is estimated that in 1971, 95% of all the trips to and from the airport originated or terminated in the Toronto Metroplex. It is estimated that in the year 2000, 80% of all the passenger trips to and from the Toronto Airport system will originate or terminate in the Toronto Metroplex, and that 95% of all other trips to and from the airport system will originate and terminate in the Toronto Metroplex. The forecast represents a 1100% growth factor in passenger trips to and from the airport system in the year 2000 over the 1971 estimate of trips. This is equivalent to 5 trips per 1,000 population in the Toronto Metroplex in 1971 and 36 trips per 1,000 in the Toronto Metroplex in the year 2000. The forecast represents an 800% increase in trips to and from the airport in the year 2000 over the year 1971, when the forecast of other categories of trips were averaged with the forecast of passenger trips. It should be remembered that the forecasts do not include trips by well-wishers, greeters, cargo trips and inter-airport trips.

Because, as stated, the Commission was not assisted, in so far as the Province of Ontario and Municipal authorities were concerned, with direct evidence upon this problem of ground access, the Commission of its own volition has sought to identify some of the problems.

The Commission, while not professing to have any proficiency in designing highways or access services to airports, or to solve the general ground transportation problems in the Toronto Metroplex area, does for the purpose of this Report indicate the magnitude of the problems, and the magnitude of the solutions, that will have to be adopted to solve these transportation problems.

MALTON (SPECIFIC COMMENTS)

In so far as Malton is concerned, there was evidence that changes have taken place in respect to proposed highways mentioned in previous documents. In some cases, planned highways have been abandoned. In other cases, there are proposed changes

in the alignment of the highways from proposed alignments in the earlier documents, and there has been no resolution of the question of providing access from those highways to Malton. In the earlier documents, provision was made for an interchange on King's Highway 401 at Dixie Road in order to provide access to the west side of the airport. In the fall of 1973, the Province of Ontario advised the Ministry of Transport, Canada, that it would not permit an interchange at that location as it would be too disruptive to the regional highway system.

There was evidence adduced before the Commission that the highway system in the Malton area, at present, is at capacity. However, planned highway construction, as far as it could be ascertained, will provide sufficient capacity to 1980. It is doubtful whether the existing highway system together with the planned construction to 1980, will be adequate to meet both regional and airport demands to the year 1984 if Malton continues to be the only airport serving the Toronto Metroplex.

The adequacy of highway capacity is a most significant consideration at least until the year 1984, as it is generally recognized that the only mode of ground access to Malton will be by way of private and public automobiles and bus transportation.

In considering the question of ground access to Malton, it is not enough to only look at the highways around Malton. People will have to travel to Malton from the eastern environs of the Toronto Metroplex as well as from the centre of the Toronto Metroplex. The only north-south express routes connecting the southern east-west expressway, which is comprised of the Frederick G. Gardner Expressway and the Queen Elizabeth Way, and the northern east-west expressway, King's Highway 401, are the Don Valley Parkway and King's Highway 427. There is a substantial travel distance between these two north-south express routes. The lack of an additional north-south express automobile route between the two existing north-south express routes is significant when one considers the number of forecasted trips to the airport and the fact that these routes also serve as general commuter and recreation travel routes. If relief is not provided to the existing north-south express routes by means of another north-south express route, the existing north-south express routes will probably not have the capacity to meet required demand.

The Commission is of the opinion that Malton can be expanded within its present boundaries to meet all reasonable needs, having regard to ground access to the year 1980, provided present planned highway construction is completed. It is improbable that the existing highways and planned construction to 1980, will provide adequate ground access to Malton to the year 1984. The question of adequate ground access to Malton to the year 1984 will depend, in part, upon a satisfactory resolution between the Government of Canada and the Province of Ontario to the question of providing a means of access from King's Highway 401 to the western boundary of the airport lands and also upon the construction of additional highways and expressways.

PICKERING (GENERAL COMMENTS)

Exhibits 535, 541 and 543 set out various road access to the proposed new international airport at Pickering which will be part of a whole grid system of roads, not just to service the airport, but to accommodate the proposed and planned development of the whole northeast quadrant of the Toronto Metroplex area. In addition, the Commission has also had the opportunity of seeing on the ground some of the problems. As a result, the Commission is of the view that it will be necessary, in view of the forecasts, (the numbers which will have to be accommodated) that every available mode of transport will have to be utilized.

The Commission is also of the view that it would be a grave mistake to think that one form of transportation will be adequate to satisfy the great demand for ground transportation in this northeast quadrant of the Toronto Metroplex area.

With that in mind, the Commission is of the view that not only a network of roads should be undertaken immediately, but also that rail transport should be extended and developed; that a particular type of bus service should be established; that a rapid transit study should immediately be undertaken which could recommend appropriate undertaking within 12 months, and that a policy regarding taxis and other delivery to the airport should be adopted and implemented.

As stated, the Province of Ontario did not, (although invited to do so) adduce evidence before this Commission. The Commission

was advised, however, that the Province of Ontario had representatives in attendance at the Hearings and particularly when the Public Hearings were held in respect to the specific matter of road access or ground access to the proposed international airport at Pickering. A letter was delivered and read into the record from Mr. A.T.C. McNab, then Deputy Minister of Transportation and Communications, the gist of which was that the Province of Ontario has worked in close cooperation with the Ministry of Transport, Canada, in developing the studies and reports which were submitted in evidence by the Ministry of Transport, Canada, to the Commission. In addition, the Province of Ontario is a party with the Government of Canada to a document which has been referred to as the Annex of Understanding and is document A-7 of Exhibit V, Appendix "A" of Government Summary, References and Appendices in Exhibit 7. The essence of the position of the Province of Ontario at this time appears to be that until the Government of Canada determines the precise role and the date of implementing that role for the Pickering Airport, the Province of Ontario is unable to be more precise in terms of a programme or plan in relation to ground access. The representations indicated that as soon as the Government of Canada has made this determination, the Province of Ontario is more than willing to cooperate and assist, and presumably this is within the terms of the Annex of Understanding.

Because of the time required to obtain rights-of-way, to undertake research and development and construction, the Commission is of the view that considerable coordinated effort involving Federal and Provincial legislative action must be undertaken immediately. This should involve the establishment of an Airport Authority, which subject is discussed more fully elsewhere in this Report. Even if that was done immediately, there is serious doubt in the mind of the Commission whether the target of 1980 can be met.

The Commission is of the opinion, based upon experience in Europe and the United States, that Pickering Airport, if built, should not be opened for use unless and until the whole access network is in place and operating. This the Commission believes to be of cardinal significance.

In addition to the problems involved in moving passengers and cargo is the problem of transporting employees who will be

employed at the airport and at surrounding commercial and industrial establishments. The airport employees alone are estimated by the year 2000 to be something in the order of 50,000 people. On top of that, the Province of Ontario has discussed publicly the creation of a city known as Cedarwood; Cedarwood has been mentioned in evidence before this Commission as the North Pickering Community. Various figures have been given as to the number of persons involved, up to something in the order of 200,000 residents. When it is realized that many of these persons will also have to commute back and forth, the problem in terms of the numbers alone is staggering. The Commission feels it is worth noting that the credible evidence from all sources, respecting forecasts heretofore made, had one factor in common, namely, they all fell short of what developed to be actual numbers involved. A number of airports were cited as examples where expansion of facilities was required within a number of years and in some cases within months of the opening of the airport. It is therefore absolutely vital, in the Commission's opinion, that the forecasts be looked at; be treated seriously and, in fact, be thought of in terms of planning, as being on the low side, despite any other opinions to the contrary.

The fundamental problem obtaining in a number of other important communities where planning of access to airports, and general road access to service the whole economic community is utterly inadequate, is that it is now impossible and too late to rectify the problem. As a result, these communities, with shrinking economic activity in the years ahead may become progressively unviable and from an environmental and social point of view, will become undesirable.

At present, there is time in the Toronto Metroplex area to adequately plan and build for the future, so that this area will not be confronted with these problems and difficulties. However, aggressive steps must immediately be taken.

The Commission has noted that the Toronto Metroplex area is the fastest growing community on the North American Continent and is aware that people are attracted to it. The people can be accommodated if adequate planning and implementation of such planning is commenced now.

Access to a new Pickering Airport can be properly planned and built if action is taken now.

PICKERING (SPECIFIC PROBLEMS)

Some of the problems of access to the proposed site for a new airport at Pickering are now discussed. The proposed airport lies in two regions, The Regional Municipality of York and The Regional Municipality of Durham. There is no overall municipal jurisdiction governing these two regions. To compound the problem, there are a number of different semi-autonomous municipalities. In addition, the Province of Ontario, which has an overriding jurisdiction, does not appear to have asserted its jurisdiction in terms of active planning.

Thus, the community, of which the proposed airport may be but a part, has immense and complex problems associated with ground access.

The site severs certain north-south and east-west roads which presently exist in Durham. It also severs the boundary road between Durham and York (which road is under the jurisdiction of York). Further, York Region road 25, which is a proposed connection to the Durham-York boundary, will be "dead-ended" on the west side of the site.

This site is surrounded by the communities of Stouffville, Claremont, Sandford, Mount Albert, Markham, Locust Hill, Whitchurch, Green River, Pickering, Ajax and Scarborough, and the proposed North Pickering Community.

The site is also in the path of the one-time proposed direct route of Metro-East Expressway from Scarborough to the east side of Lake Simcoe, the Kawarthas and Muskoka.

The proposed north-south King's Highway 404 would lie west of the site. It is proposed that basically this highway will utilize the existing York Regional right-of-ways from Newmarket to Lake Simcoe. King's Highway 404, as it is presently conceived, is essentially an extension northerly of the Don Valley Parkway to Newmarket and Lake Simcoe, and is limited in its capacity by the capacity of the Don Valley Parkway, and is therefore not an alternative to the proposed Metro-East Expressway.

In sum, the problem of the access to the proposed airport site must be considered in light of the evidence detailed elsewhere in

this Report, which indicates that by far the majority of the passengers going to and from the proposed airport will originate and terminate in the present Toronto Metro area.

The roads presently serving the site of the proposed new International Airport at Pickering are essentially York and Durham Regional roads supplemented by local roads. They are absolutely inadequate at the present time to cope with even the initial traffic to any proposed new airport, not to mention the traffic which will be generated by the new North Pickering Community.

In this connection, it should be noted that although both are still only two lane roads, the Durham roads in the area are generally better developed than the roads in York. The significance of this is great because, as stated, most of the passengers coming to and from the proposed airport will have to travel over the roads in the Region of York.

The local road system in both York and Durham is one of narrow gravel roads, poorly graded and inadequate for anything but local services.

There are no King's Highway system roads directly serving the proposed new airport site except King's Highway No. 7 which runs along the southern boundary in this area.

King's Highway No. 7 is basically a two lane east-west highway providing the traditional services as a connector for communities along its route, as for example, Woodbridge, Thornhill, Unionville, Green River, Brougham, Brooklyn, Manchester, Beaverton, Lindsay, Peterborough. Heavy recreational traffic uses King's Highway No. 7 from the Toronto Metroplex area to the recreational areas to the northeast although the road was not designed for such purpose.

King's Highway 401 is about six miles south of King's Highway No. 7, runs in an east-west direction, and is the main east-west expressway. The present and projected expansion of this highway will probably not even meet present and projected normal requirements.

Proposed King's Highway 407 is in a design stage only. It is proposed that it will parallel King's Highway No. 7 south of it. The apparent original purpose of King's Highway 407 was that it would serve as an additional east-west expressway to take through traffic

from King's Highway No. 7 and relieve pressure on King's Highway 401.

King's Highway No. 12, a north-south highway, is too far east of the proposed site to provide any significant service to the site except perhaps for some airport traffic which might originate and terminate at Whitby or eastwards. It has two lanes only.

King's Highway No. 48, a north-south highway through the former Town of Markham, is essentially a two-lane regional service road serving the Scarborough and Beaverton areas and the traffic moving from Markham to Lake Simcoe. It cannot be developed into a major artery or expressway because of existing and proposed land-use patterns.

King's Highway No. 11, and King's Highway 400 provide no service to the proposed site. If York Region Maple road No. 25 were extended, as was proposed, to the boundary of York-Durham, it would provide a 20 mile long lowspeed moderate capacity route to the Pickering site from King's Highway 400.

There is no existing major highway to the proposed airport site capable of carrying traffic volumes which can be expected to travel to such site.

The road financing in the area at the present time is as follows:

1. **Local**
   The local municipalities levy direct taxation on real property. On projects approved by the Ministry of Transportation and Communications, Ontario, the local municipality receives a Province of Ontario subsidy of 50% on roads and 80% on bridges.
2. **Regional (York and Durham)**
   The region raises its funds by apportioning its costs against member municipalities according to equalized assessments. Province of Ontario subsidies, up to 75% on a sliding scale, are paid on Provincially approved bridges and projects.
3. **Province of Ontario**
   The Province receives its funds from taxation and spends according to its own criteria as determined from time to time.

If the airport is built on the proposed site, there will probably be federal grants in lieu of taxes in respect to buildings. There will

also be grants in lieu of taxes for lessees occupying certain buildings of the airport.

This makes an equitable distribution of revenues to the regions concerned very difficult. The grant of monies for airport buildings would be paid to the Region of Durham because the bulk of the real property of the proposed airport site is located in such region. However, since most of the airport traffic and a substantial part of the traffic from the new North Pickering Community would be to and from Metropolitan Toronto, most of the road construction to accommodate such traffic would be done in and by the Region of York, which, without a special arrangement, would get practically none of the grants in lieu of taxes.

This is an additional reason for the establishment of an Airport Authority whereby there can be an equitable distribution of Federal and Provincial grants in lieu of taxes to the respective municipalities, which will have the burden of the costs and responsibility of building and maintaining certain access roads.

It would appear to the Commission that first priority should be given to the construction of a ring road or a perimeter road around the proposed airport site. This should be a multi-lane two-way expressway that would serve roads all around the airport site and intercept the existing roadways which will be severed by the airport. This will ensure the continuance of communications between the centres now located both north and south of the proposed airport site.

The proposed Metro expressway should be incorporated as a direct connection between King's Highway 401 and King's Highway No. 7 and the proposed King's Highway 407 to the site via the perimeter expressway. It then could be continued northerly and easterly and would provide access to the proposed airport, and to the North Pickering Community, and to the east for persons from Muskoka and North Bay areas, and also the Kawarthas and other easterly areas.

In making this suggestion, it should be emphasized that whatever is done it is absolutely essential that a new major east-west highway and a new major north-south highway be established to accommodate the movements of people from the downtown Toronto Metro core and the Toronto western Metroplex areas to the airport.

A suggested schematic plan of highways for airport access appears as Appendix 14 to this Report.

In making these suggestions regarding roads, the Commission is not unmindful that it is dealing only with the conventional method of moving people and goods; that is by highways. It does not really believe that there will be any astounding change in the development of any mass transportation systems within sufficient time to be of any practical use to provide access to and from the proposed new Pickering airport, or the proposed new North Pickering Community. Such additions to the transport system will include for example, Ontario Rail Go System, the proposed Go-Urban System on new elevated or semi-elevated track using high or moderately high speed magnetic levitation and TRAC trains.

The Commission is of the view that these new modes as and when established will be only complementary to the contemporary oriented systems for the next 30 years.

It has been the experience in Canada, and elsewhere in the world, where government controlled public transit systems have been established that the individual is reluctant to abandon the convenience afforded by his own automobile, in favour of a government controlled public transit system. Unless and until the latter is more convenient, more comfortable, more satisfactory to such individual, he is not likely to abandon the use of his private automobile for local purposes including transportation to the airport. In any event, at the present time and in the foreseeable future, there is no reason why he should abandon his private automobile because it is improbable that any public transit system other than bus will be provided. There is no reason why public highways cannot be built in the Toronto Metroplex area to satisfy public requirements, and also be compatible with environmental requirements.

In sum, the Commission is of the view that a major construction of highways must be immediately undertaken. This necessity arises not just because ground access to and from the proposed Pickering airport site must be provided to make the airport operation a success, but equally important is the need to provide access to the new proposed North Pickering Community, and the accomplishment of the objective of the Province of Ontario, which is to

create growth to the east of Toronto, thereby reversing the traditional and usual trend in most communities to grow to the west. This ground access to the proposed Pickering airport should not be an exclusive one for airport purposes only because the costs would be uneconomic, but instead, it should be integrated with access for all purposes from the Metroplex area to the east. The details of how this should be accomplished will have to be worked out between the Federal and Provincial Governments. The Annex of Understanding contemplates this.

The Commission reiterates the urgency of providing access, and repeats its view that the proposed Pickering airport should not be opened unless and until adequate reliable access to the airport is in place and operating, as access is fundamental and an inseparable component of an airport system.

BETWEEN MALTON AND PICKERING

It is absolutely essential that a four (4) lane, two-way highway be planned and built immediately between Malton and Pickering.

Further details of suggestions are contained elsewhere in this Report under the heading of "An Airport and Its Planning."

5. Runway Capacity

The number of runways at an airport and the actual ability of those runways to receive, move and discharge aircraft, is of vital concern in determining the adequacy of the airport. If existing runways are incapable of meeting demand, problems are created on both the ground and in the air. On the ground, the inadequacy of runway capacity leads to a backup of aircraft on the taxi-ways, and if there is insufficient space for the queuing of aircraft on the taxi-ways, the aircraft are backed-up to parking positions. In the air, arriving aircraft cannot land, so they must be stacked, or held, in the airspace above and around the airport, which leads to a congestion of the airspace of the airport, untenable delays, and eventually a saturation of the airport's airspace. In addition, this results in an undue economic penalty to the air transportation system. To prevent these problems, new runways must be constructed or a diminution of traffic results. If new runways cannot be constructed within the present boundaries of the airport, the airport boundaries will have to be expanded, but if this is not possible, an additional airport will have to be established to serve the community. Notwithstanding that the airspace around the airport can accommodate more aircraft than are presently flying into the airport, or that the ground access to the airport is capable of handling many more trips to and from the airport, or that the present terminals, or future terminals to be constructed on the site, can handle many more passengers than at the present, an airport without sufficient runway capacity to meet present and anticipated future demand, is at capacity.

THE FORECASTING OF AIRCRAFT MOVEMENTS

Aircraft movements result from the number of flights that originate, terminate and make stops at an airport in the course of their journey. To determine the ability of existing runways to handle such aircraft movements in the future, there must be a prediction or forecast of the future peak hour scheduled demand which will be created by aircraft flying into and out of the airport. Scheduled peak hour demand represents the number of aircraft movements that can be expected in the peak hour of each day of the busiest season of the year if all flights adhere to their scheduled times. The scheduled peak hour for aircraft movements is not necessarily the same as the scheduled peak hour for passengers due to the various sizes of aircraft. The arrival peak hour and departure peak hour are not usually the same. In order to determine the scheduled peak hour for aircraft movements, the Ministry of Transport, Canada, first determined the arrival peak hour and the departure peak hour. In order to arrive at the arrival peak hour, the Ministry of Transport, Canada, computed the number of flights that occurred during each hour of the day of the busiest season of the year (July, August and September) and averaged the result to obtain the scheduled aircraft arrival peak hour. The scheduled peak hour for aircraft departures was determined similarly. The resulting figures were combined to produce the scheduled peak hour for aircraft movement.

In order to forecast the number of aircraft movements in the scheduled arrival peak hour, and the scheduled departure peak hour for the period to 1980, 1990 and 2000, various predictions and assumptions had to be made in respect to many factors including; an estimate of future schedules in the international, in the long-haul and short-haul domestic and trans-border and charter flights sectors, an estimate of the mix of the aircraft fleet which will be flying, including the maximum passenger and cargo capacities of such aircraft, an estimate of the number of passengers and tonnage which will be carried by the aircraft in relation to the maximum capacity of the aircraft, and the degree of flexibility in spreading out the peak movements to other parts of the day.

It should be noted that in making its forecasts, the Ministry of Transport, Canada, predicted that an increase in aircraft

movements will be slower than the predicted growth of passengers and cargo due to an anticipated increase in the use of larger aircraft.

During the period 1968 to 1972, the Ministry of Transport, Canada, made various forecasts as to the number of aircraft movements in the scheduled peak hour. The earlier forecasts were revised in April, 1973. Prior to 1973, it was estimated that 10% of the aircraft flying in the international, long-haul domestic and trans-border sectors would have stop-overs at short distances before reaching their ultimate destinations. The new forecast estimates that stop-overs at short distances by aircraft flying in those sectors will be reduced to 5% by 1982 and will then remain constant to the year 2000. The prediction that there would be a reduction in the number of stop-overs in the international and long-haul domestic and trans-border sectors was based upon the fact that present experience and trends indicated a greater portion of total passenger occupancy of the aircraft at Toronto, where the flight originates and terminates, than in the past. With an increase in passenger occupancy at the point of origin of a flight, there would be no need for the aircraft to make a stop along the way to pick-up additional passengers, or to force passengers to change aircraft at another airport. As a consequence of an increase in the number of direct flights in the international, long-haul domestic and trans- border sectors, there will be a greater number of domestic flights to Toronto where the long-haul flight originates in order to permit passengers from these flights to connect with a long-haul flight or direct flight.

A summary of the forecasts of the Ministry of Transport, Canada, as to aircraft movements, exclusive of general aviation movements, is as follows:

	1980	1982	1990	2000
Total annual movements of passenger and freighter aircraft	166,730		228,300	371,200

Peak Hour

	1982	1990	2000
Arrival aircraft	19	28	44
Departure aircraft	31	39	58
Total scheduled peak hour movements	50	67	102

The forecast of scheduled peak hour demand must be considered with the factors which limit the use of runways in determining whether the existing runways will be able to meet future demand. Some of the factors limiting the use of runways are weather and atmospheric conditions, the mix of the aircraft fleet flying into and out of the airport, whether the aircraft are flying by visual flight rules or instrument flight rules, the extent of ground separation between existing runways and any future runways that may be constructed, the number of exit-ways from the runways to the taxiways, curfews, whether a preferential system of runway utilization is employed as a means of noise reduction, whether any noise reduction flight procedure is in force which has the effect of requiring an aircraft to fly at less than maximum weight, the anticipated hourly and daily distribution of traffic, air traffic control rules and regulations governing the arrival and departure of aircraft, whether the air traffic controller maintains sequencing manually or is assisted by computer aids and wake turbulence.

CURFEWS

Curfews imposed at an airport where the flight originates, and curfews imposed at the airport where the flight terminates, restrict flexibility in scheduling in that the flight must commence outside the curfew period of the airport where it originates, and land outside the curfew period of the airport where it terminates. Both the departure and arrival times must be acceptable to the travelling public. A flight from Malton to London's Heathrow Airport must originate at Malton between the hours of 1800 hours and 2300 hours in order to land at Heathrow between 0600 hours and 2300 hours, and a flight departing from Heathrow between 0800 hours and 1800 hours must land at Malton between 1100 hours and 2100 hours. Even without the curfew, these time restrictions would still

apply as departures or arrivals during other time periods would lead to either an inconvenient arrival time, or an inconvenient departure time for most passengers at one end of the trip.

SCHEDULES

An airline does not prepare its schedules in a vacuum. It must prepare its schedules to meet the demands of passengers to arrive or depart from an airport at a particular time of the day. In addition, the airline wishes to achieve the greatest utilization possible for each aircraft and must plan its schedules accordingly. The airline must also consider schedules offered by competing airlines. Accordingly, an airline has little flexiblity when preparing its schedules.

While there is little flexibility to spread out aircraft movements from the peak hour, in so far as scheduled passenger flights are concerned, there is a greater degree of flexibility in so far as charter and freighter aircraft movements are concerned. The ability to shift charter aircraft movements to other parts of the day is basically only limited by curfews. During the summer months at Malton, there is a scheduling committee composed of the charter aircraft operators. This committee develops schedules for arrival and departures of charter aircraft in order to relieve pressure on the airport during the scheduled peak hour.

Arrivals and departures for freighter aircraft movements can be moved out of the peak hour to other parts of the day.

In preparing its forecast of scheduled peak hour aircraft movements, the Ministry of Transport, Canada, did take into consideration that movements by charter aircraft and freighter aircraft would basically take place outside the scheduled peak hour.

REDUCTION OF RUNWAY UTILIZATION AS RESULT OF NOISE ABATEMENT REQUIREMENTS

As mentioned under the discussion of noise disturbance from aircraft operations, some airports have established monitoring sites for each departure route to ensure that noise levels at the first major built up area overflown do not exceed a specified limit. As a result, some of the larger and noisier aircraft are unable to use certain

runways. In addition, a large aircraft in many instances is required to reduce its total capacity in order to meet the specified limit. This in turn will result in two aircraft having to do the work of one aircraft.

PREFERENTIAL SYSTEM OF RUNWAY UTILIZATION FOR NOISE DISTURBANCE

The experience at Malton by the employment of a preferential system of runway utilization for noise abatement purposes reduces the number of movements on a runway, per hour, from 34 movements to about 20 movements in cases where the aircraft flying into and out of the airport consist of various sizes of jet aircraft, according to the evidence on behalf of the Ministry of Transport, Canada.

FLEET MIX

Where the aircraft fleet mix flying into and out of an airport includes heavy jets, the capacity of a runway is reduced by reason of the separation required between a heavier jet and a lighter jet both on arrival and departure. The percentage of runway capacity reduces rapidly as the percentage of heavy jets in the fleet increases. About a 50% higher runway occupancy time is required by a heavy jet over that of a smaller jet. A fleet composed of 20% heavy jets will increase delay values as much as 80% over a fleet without heavy jets. Heavy jet departures cause a two minute wait upon the next non-heavy jet departure, under present air traffic control procedures.

INSTRUMENT FLIGHT RULES

Aircraft are flown either under visual flight rules or instrument flight rules. Under instrument flight rule procedures, a runway must be suitably equipped with visual and non-visual aids providing adequate directional guidance intended for operation down to a specified decision height and down to a specified runway visual range. Where aircraft are required to operate under instrument flight rule procedures, there is a greater safety factor than in the

case of operation under visual flight rules. However, flight operations under instrument flight rule procedures reduce the capacity of a runway as compared to operations under visual flight procedures as the separation standards between aircraft are greater under IFR than VFR procedures.

Where the operations of a runway are governed by instrument flight rules, an arriving aircraft may make a complete instrument landing, or if weather conditions permit, a pilot of an arriving aircraft may change from IF rules to VF rules subject to certain conditions. The pilot must be able to see the runway and there must be a clear visibility for at least 3 miles. If both these conditions do not exist, a pilot must make an instrument landing.

The evidence adduced before the Commission by the Ministry of Transport, Canada, was that instrument landing to touchdown is a requirement at Malton for all commercial aircraft, regardless of weather conditions.

WEATHER CONDITIONS AND ATMOSPHERIC CONDITIONS

Prevailing weather conditions have a direct effect on the operation of runways. On an hour by hour basis, the use of a specific runway is dictated by prevailing cross-wind and tail-wind conditions on such runway. Accordingly, it may not be possible to use all runways of an airport at the same time.

HIGH SPEED EXITS

High speed exits have the potential to reduce average runway occupancy time by arriving aircraft after they have touched down. Exit-ways from the runways to the taxi-ways are provided at various distances along the runways, so that if the arriving aircraft misses the first exit-way after touchdown, it only has to travel a short distance to the next exit-way instead of travelling to the end of the runway in order to exit from the runway. The angle of an exit-way is designed in such a manner as to permit the aircraft, in theory, to exit at a speed of 60 miles per hour. Rain, snow, ice and winds will reduce the speed at which an aircraft leaves a runway from that of the optimum speed.

WAKE TURBULENCE

Every airplane generates a wake while in flight which is a pair of counter rotating vortices trailing from the wing tips. The vortex generation commences with rotation when the nose wheel of the aircraft lifts off the ground and ends when the nose wheel touches down on landing.

As aircraft became larger, the intensity of the vortices began to create a problem for smaller aircraft. Jumbo jets generate vortices with roll velocities exceeding the roll control capability of some aircraft. The turbulence generated within the vortices can damage aircraft components and equipment and cause loss of control if encountered at close range.

The strength of the vortex is governed primarily by the weight, speed and shape of the wing of the generating aircraft. The strength of the vortex increases with increases in weight and span loading of the aircraft. The tangential velocities of a vortex can be as much as ninety knots. The diameter of the vortex core ranges from 25 to 50 feet, but the field of influence is greater. The vortices may stay close together until dissipation.

The vortices from heavy jets commence to sink immediately at about 400 to 500 feet per minute. They tend to level off at about 800 to 900 feet below the generating aircraft's flight path. The strength of the vortex diminishes with time and distance behind the generating aircraft. Atmospheric turbulence hastens break up. However, residual choppiness remains after vortex break up.

When the vortices sink toward the ground, they tend to move laterally outward at a speed of about five knots. A cross-wind component will decrease the lateral movement of the up-wind vortex and increase the movement of the down-wind vortex. This may result in the up-wind vortex remaining in the runway touch-down zone or hasten the drift of the down-wind vortex towards a parallel runway. A tail wind condition can move the vortices of a preceding landing aircraft down the runway.

Wake turbulence is invisible and the only way it can be avoided is by imposing separation standards.

A separation of five nautical miles is required between a heavy jet and an aircraft vectored directly behind it at the same altitude or within 1,000 feet. This has the effect of increasing the time

interval between arriving aircraft. It should be noted that the American Air Line Pilots Association is advocating an increase in the separation distance between a heavy jet and a following jet from five nautical miles to eight nautical miles.

An arriving aircraft should touch down on the runway before reaching the rotation point of a departing heavy jet to avoid the wake turbulance which is created once the nose wheel of the departing aircraft lifts off the ground.

In order to avoid the wake turbulence generated by the arriving aircraft, which only ends when the nose wheel of the arriving aircraft touches down on the runway, a departing aircraft must take off from the runway with rotation beyond the landing point of a heavy jet.

After a heavy jet departs, a two minute separation is required before another aircraft departs on the same runway, or on a parallel runway located at 2,500 feet or less.

For planning purposes a runway has a capacity, under instrument flight rule conditions, of 40 aircraft movements per hour. However, wake turbulence has the effect of reducing the number of aircraft movements for planning purposes from 40 to 34.

Research is presently being conducted into the development of devices for the detection of wake turbulence. However, there is no foreseeable technology which will enable wake vortices to be broken up and dissipated. Wake turbulence is a limitation with which the air transportation system will have to live for the foreseeable future.

RUNWAY SEPARATION

The evidence adduced before the Commission by the Ministry of Transport, Canada, is that a separation of 4,300 feet, or more, between two parallel runways permits each runway to be operated independent of the other. The FAA, of the United States, issued a policy statement, September 1, 1974, that a separation of 4,300 feet between parallel runways permits each runway to operate independent of each other. This policy statement has been accepted by the American Air Line Pilots Association subject to certain conditions. Thus, if a single runway under IFR conditions has a capacity of 34 movements per hour, having regard to wake turbulence, the construction of another runway parallel to the existing runway, and

separated from the existing runway by 4,300 feet, or more, will increase total runway capacity to 68 movements per hour or by 100%.

Where movements on one runway are affected by movements on the other runway, such as two intersecting runways, the total capacity of 68 movements per hour achieved by two independent runways may be reduced to 46 or to 57 movements per hour, depending upon circumstances.

The restriction of the use of one runway of a parallel set of runways to aircraft having a weight greater than 300,000 pounds, and the limitation of the use of the other runway to aircraft having a weight less than 300,000 pounds, would have a marginal effect in increasing the total capacity of the two runways. But, such a scheme of utilization would create a sequencing problem for air traffic control as the aircraft using one runway would cross the flight path of the aircraft using the other runway. Under such circumstances, air traffic control should issue a cautionary as to potential wake turbulance. The two minute separation which is imposed between departing aircraft on independent runways is designed, so that when the following aircraft crosses the flight path of the preceding aircraft, it can do so without regard to wake turbulence. If the following aircraft crosses the flight path of the preceding aircraft within an interval of less than two minutes, which occurs in the case of departures from intersecting runways, there is a potential wake turbulence hazard.

DUAL LANE RUNWAYS

It was advanced in evidence before the Commission that the runway capacity of an airport can be increased by dual lane runways.

Dual lane runways are defined as two parallel runways separated at 2,500 feet or less from centre line to centre line of each runway. The separation distance can be as little as 750 feet.

The dual lane runway concept involves the construction of another runway, parallel to an existing runway, which together with an existing runway forms a set of dual lane runways. In addition to the construction of the parallel runway, a storage taxiway should also be constructed to hold two aircraft, ready for departure, between the runways in order to maintain a high level of

operation. Otherwise, the potential increase in flow rate by this concept will fall off by approximately 15%. No additional capacity is attained if the storage taxi-way can accommodate more than two aircraft.

Under the dual lane runway concept, it is recommended that the outer runway be used for arriving aircraft, and the inner runway be used for departing aircraft, due to the fact that the inner runway has a substantially higher missed approach potential than the outer runway by reason of the time required on the inner runway to permit crossing operations from the outer runway. The runways should have at least three well placed exit-ways to reduce occupancy time by arriving aircraft. Runway exits which permit exit speeds of 60 miles per hour generally provide 11% increase in flow rate over exiting at conventional speeds. However, the real flow rate for departures on the inner runway is reduced as departures must be held, when possible, to permit the arriving aircraft on the outer runway to cross the inner runway without stopping.

Computer simulations have shown that dual lane runways can accommodate a range of IFR arrival demand rates from 30 to 38 operations an hour depending on actual site conditions such as aircraft mix, air traffic control environment, runway/taxi-way configuration and arrival demand scheduling. However, current dual lane runways are being operated at an IFR arrival rate of approximately 30 aircraft per hour where the fleet mix consists of 20% heavy jets (747,DC-10 L-1011) 40% large jets (707,DC-8) 30% medium jets (727,DC-9) and 10% general aviation aircraft. Demand rates beyond this range under IFR rules require fully independent parallel runways for arrivals (that is a separation of at least 4,300 feet between runways). It should be noted that any increase in the number of heavy jets composing the fleet mix reduces the arrival rate of the runway. As the percentage of heavy jets increase, the time in the system for each departing aircraft mounts rapidly. It should also be noted that heavy jets have about 50% higher runway occupancy time than other jets. This is also a factor in reducing the number of runway operations.

The underlying premise of the dual lane runway concept as a means for increasing runway capacity is that movements will proceed on a precision basis. Any small problem or deviation from the expected will result in many other problems developing very

quickly. If a departing aircraft takes longer than expected to begin departure roll, the air traffic controller must issue instructions to an approaching arrival aircraft to do pass stretching or he must instruct the departing aircraft to get off the runway. As a consequence, other jobs such as clearance for approaching aircraft to the other parallel runway and authorization to an aircraft that has arrived on the outer runway to cross over the inner runway must wait. As result, the flow rate in the system will be reduced until a normal operation flow can be re-established. Another problem is created by missed approaches. In practice, an air traffic controller can handle two to four missed approaches within an hour without any material effect on his work load. However, if he is required to handle more missed approaches per hour, his work load will be increased and thus the flow rate of the runway will be reduced.

The dual lane runway concept offers little or no increase in runway capacity in cases where an instrument landing is required to touchdown. The greatest increase in capacity under this concept is in cases where arriving aircraft are permitted to make a visual landing.

It should be noted that where parallel runways are separated at less than 2,500 feet, there may be a problem of wake turbulence due to the tendency of wake vortices, after sinking to the ground, to move laterally outward over the ground.

The Commission has a real concern for the risk to safety due to wake turbulence where parallel runways are separated at a distance of 2,500 feet or less. In addition, if a landing aircraft develops a flat tire, or some other control problem develops, the question arises as to how the aircraft is to be brought under control in time to avoid a collision with an aircraft in the adjacent storage taxi-way or waiting to take off on the inner runway when the total distance is only 2,500 feet or less.

RUNWAY CAPACITY AT MALTON

The existing runways at Malton are:

(a) Runway 14/32 which lies in a northwest-southeast direction is 11,050 feet in length;

(b) Two parallel runways, runway 05L/23R and runway 05R/23L which are in a southwest and northeast direction. Runway 05L/23R is 10,500 feet in length

and runway 05R/23L is 9,500 feet in length. The runways are separated by a distance of 10,000 feet.

(c) Runway 10/28 which is in an east-west direction and has a length of 4,500 feet. This runway intersects with runway 14/32 and runway 05L/23R. This runway is primarily used for general aviation.

All commercial aircraft flying into and out of Malton, as stated, are flown under instrument flight rule procedures. The aircraft fleet mix flying into and out of Malton consists of large jets, heavy jets, medium jets and general aviation aircraft. Under normal conditions, and having regard to the separation standards imposed by wake turbulence, the estimated capacity of runway 14/32 is 34 movements per hour and the estimated total capacity of the two parallel runways is 69 movements per hour. However, a preferential system of runway utilization for noise reduction purposes is employed at Malton which reduces the total capacity of the three runways to an estimated 59 movements per hour.

Excessive cross-winds on the parallel runways require runway 14/32 to be used exclusively 5% of the time on an annual basis. Marginal cross-winds on the parallel runways and air traffic control reasons make it desirable that runway 14/32 be used exclusively about 18% of the time on an annual basis. Part of the period that cross-winds dictate that runway 14/32 be used exclusively, or make it desirable that it be used exclusively, occurs in the scheduled peak hour.

It should be noted that wind velocity at Malton is less than 15 knots 80% of the time on an annual basis. Accordingly, wind velocity would not be a major factor in the break-up and dissipation of wake turbulence for at least 90% of the time. A low wind velocity would tend to keep the wake vortices along the runways.

Malton is presently at runway capacity when weather conditions dictate that runway 14/32 be used exclusively. Without an additional runway in the same direction, runway delay will become untenable.

The nearest that another runway could be constructed, at Malton, parallel to runway 14/32 would be 1,300 feet, having regard to present Ministry of Transport, Canada, separation standards centre line to centre line for parallel runways. In order to construct a parallel runway with this separation, the existing

airfield maintenance area, the remote receiving site and the control centre would have to be relocated. In addition, the existing general aviation area would have to be relocated in its entirety. Such changes would leave very little of the then unused land for possible future development.

In addition, such a parallel runway constructed at such a separation would only increase the capacity of runway 14/32 by about 10% having regard to separation standards imposed by IFR flight rules, mix of aircraft fleet and separation standards imposed by wake turbulence considerations. Even if such a runway were constructed, the new runway with existing runways, apart from weather conditions, would be inadequate to meet scheduled peak hour demand beyond the year 1985. As noted elsewhere in this report, runway 14/32 is the most noise sensitive runway of the three existing runways at Malton.

A runway parallel to runway 14/32 could be constructed at a distance of 4,400 feet west of runway 14/32. This would enable the two runways to be operated independently of each other and would permit the maximum possible future development of Malton. This is the maximum possible separation that can be achieved within the present existing boundaries of Malton. The runway would be 9,500 feet in length and would provide additional runway capacity to meet scheduled peak hour demand to the year 1990. To construct a runway with this separation, the culvert under runway 05L/23R would have to be relocated, and the existing terminal control radar, the ASR-5, would also have to be relocated. There is some doubt whether the ASR-5 can be relocated as studies on this aspect have not yet been completed. A fifth independent runway cannot be constructed at Malton within the present existing boundaries of the airport.

A new runway with a 4,400 foot separation from existing runway 14/32 would result in more of the Bramalea community and an increase in the areas of the Borough of Etobicoke being subjected to noise. It is estimated that at present, there is a total of 90,000 people in the communities around Malton living within 28 NEF to 30 NEF contours. It is estimated that even with all aircraft having the noise characteristics of a DC-10, which meets the requirements of FAR 36, there would be a total of 74,000 people, based on 1973 population, residing within the 28 NEF to 30 NEF

contours in 1985. It was also estimated, using the same assumptions, that there would be 95,000 people living within those contours in 1990.

The Commission concludes that the runways at Malton cannot be expanded, or reconfigured, within present boundaries of Malton, to meet all reasonable needs having regard to the number of people affected by disturbance from flight operations. Realistically, the Commission is of the opinion, as discussed under the heading "Noise Disturbance from Aircraft Operations", that the earliest probable date the entire aircraft fleet flying into and out of Malton will have the noise characteristics of a DC-10, which meets noise standards of FAR 36, will be about 1985. Under the circumstances, any expansion or reconfiguration now of the runways at Malton will result in an increase in the number of people affected by disturbance from flight operations to the year 1985. After the year 1985, there may be a reduction in the number of people affected by disturbance from flight operations notwithstanding such an expansion or reconfiguration. However, an increase will take place in the number of people so affected by the year 1990, as result of the projected increase in movements between 1985 and 1990.

On the basis of the evidence adduced, the Commission is of the opinion that a new runway parallel to runway 14/32 is probably required now at Malton, and that such a runway should be separated from existing runway 14/32 by a distance of 4,400 feet. Construction of such runway must take place even if there is a decision to proceed with the Pickering Airport as, realistically, the earliest date that Pickering Airport can be in operation is 1982 or 1984. Without such a runway, there could be a transportation breakdown at Malton until the Pickering Airport is in operation.

The residents of the Malton communities will have to accept that until the new Pickering Airport is in operation there will be an increase in the noise level to which they are presently subjected and that additional people will be affected by noise as a result of the construction of such a runway. Under the circumstances, the Ministry of Transport, Canada, must introduce all possible flight procedures that can be employed for the reduction of noise from aircraft operations in order to make the residents' situation as tolerable as possible.

6. Airspace

The airspace, or sky, around and in the vicinity of an airport may seem unlimited, but it is not. There is an ultimate limit as to the number of aircraft that can be accommodated in a particular airspace. The airspace of an airport may reach a saturation point before reaching its ultimate capacity depending upon a number of factors. If an airport does not have adequate runway capacity to receive and discharge all aircraft flying into and out of the airport, approaching aircraft will have to be held in the sky in and around the airport which leads to congestion of airspace. If the airspace does not provide for a multiple of arrival and departure airways, extensive queuing of aircraft will result which will lead to congestion of the airspace. A mix of high performance aircraft with general aviation aircraft, which usually have lower speed and descent capabilities, results in extra longitudinal separations and less than optimum descent profiles for carrier aircraft which contributes to the congestion of the airspace. However, the most important factor governing airspace capacity is the degree of efficiency and safety in which the airspace is managed. The management and organization of the airspace is the responsibility of air traffic control.

There are many navigational aids for the control and management of airspace. The basic aids are Airport Surveillance Radar (ASR) system, Secondary Surveillance Radar (SSR) system, Very High Frequency Omni Range (VOR) equipment and Distance Measuring Equipment (DME).

The ASR system usually consists of a radar antenna transmitter, receiver, performance monitor, video-processing assemblies and units that perform control and distribution functions. This equipment is installed at two sites, the transmitter or local site

which includes all the equipment except the video-processing and remote control equipment which are installed at the remote site. The two sites are connected to each other by means of an underground cable or a microwave data link.

The ASR system normally detects aircraft within 60 nautical miles of its location and permits air traffic control to issue instructions through radio communications and to direct flight patterns within the terminal area.

The SSR equipment comprises the same basic equipment as the ASR system but differs in a number of respects. However, it is normally operated in conjunction with the ASR system. The SSR antenna is mounted on top of the ASR antenna and rotates with it, so that both antenna beams are aligned.

The SSR system enables the air traffic controller to readily identify each aircraft on his display.

The VOR system is composed of ground station VOR equipment and a VOR antenna. The ground station of the VOR equipment is housed in its own building and the VOR antenna is normally mounted on the roof of the building.

The VOR is basically used as short range en route navigational aid. When the VOR is used in conjunction with the DME system on the ground and a course line computer in the aircraft, courses can be provided between any two points within the receiving ranges of the ground station. The basic purpose of the VOR system is to provide the pilot with a pre-determined course from his point of departure to his destination and to fix his geographic position.

AIRSPACE MANAGEMENT AND CONTROL

There are three basic areas or zones which are regulated or controlled to provide efficient and safe operation of aircraft at various speeds and various weather conditions namely; airport control, or positive control zone; terminal control; and area of central control. Fundamental to each control zone are navigational systems called airways which are comparable to highways in the sky.

The positive control zone, or airport control, regulates from the control tower of the airport all traffic in the manoeuvring area of the airport and all aircraft flying in the vicinity of the airport

having a radius of 11 nautical miles from the centre of the airport to an altitude of 5,000 feet above sea level.

Terminal control provides control service, by means of the VOR system, for arriving and departing aircraft and en route aircraft operating within a radius of 22 nautical miles of the airport at an altitude of 700 to 23,000 feet by means of the VOR system.

The area of central control provides control services to aircraft operating under VFR and IFR rules at various altitudes and separations. It directs aircraft from an extensive area into the control area of terminal control and receives aircraft for control from terminal control. It is composed of various sectors or compartments.

AIRSPACE MANAGEMENT AT MALTON

The primary traffic pattern in the Toronto area is in an east-west direction and in a to and from south direction. The present airway structure is based upon the use of point source navigational aids which provide only one direct track between adjacent navigational facilities, as result, congestion is a major problem. Some relief has been achieved by supplementing the existing airway with divergent tracks to the midpoint of the airway between adjacent navigational facilities, and then using converging tracks to the next facility. Aircraft flying these tracks are separated vertically by increments of 1,000 feet up to 29,000 feet, and beyond 29,000 feet by increments of 2,000 feet to the upper limit of the useable air space. Longitudinal separation is achieved by using specific time intervals between aircraft. Where radar control can be employed, the longitudinal and lateral separation requirements vary from 3 to 10 miles.

The structuring of these navigational routes or airways has developed to the extent that a majority of aircraft traffic now moves via a defined preferential airway system. As a result, traffic from the east, west and northern Ontario moves in and through the Toronto area on airways that converge on a navigational facility at Kleinburg, 15 miles north of Malton. Traffic from the south and southwest enter on the Toronto area and move on airways that converge on a navigational facility located at Malton. Almost all the aircraft departing from Toronto use a system of diverging airways based on the Malton navigational facility.

Severe air traffic congestion problems occur at both the Malton and the Kleinburg navigational facilities due to the converging of the navigational routes on these facilities. It is the convergence of the in-bound airways at these two facilities that has forced air traffic control to revert to vertical separation standards and in-flight altitude and airspace restrictions during peak hour operations. This has led to extensive queuing when air traffic control is required to use a radar controlled down-wind descent pattern in the immediate vicinity of the airport. The problem is further compounded when traffic consists of a mixture of both high performance air carrier type aircraft and smaller general aviation aircraft. The lower speeds and lower descent abilities of general aviation result in extra longitudinal separations for larger aircraft and less than optimum descent profiles for larger aircraft.

Evidence was adduced at the Malton hearing that the introduction of technological developments such as Area Navigation and Inertial Navigation Systems will permit a greater utilization of existing airspace, future navigational facilities already planned by the Ministry will improve the existing low altitude airway structure for Malton. New air traffic control procedures will increase the capability of air traffic control in the segregation and sequencing of air traffic prior to its arrival in the immediate vicinity of the airport.

The introduction of Area Navigation and Inertial Navigation Systems will provide increased accuracy in navigational capabilities which in turn will make possible the development of multiple parallel departure routes. As a result, aircraft with differences in performance capabilities can be assigned routings that are compatible with their operational characteristics, and thus reduce delays or operational restrictions now required when all aircraft are assigned a common departure route or initial low altitude airway. Similarly, it will be possible to develop multiple arrival routes which will reduce the amount of communication between air traffic control and the pilot, which is common to radar vectoring procedures, and thus give the air traffic controller more time for safety and control considerations.

The future planned air navigational facilities will result in a removal of the airway structures from the immediate vicinity of the airport with the result that the area in the immediate vicinity of the airport will be free for redevelopment of arrival and departure

patterns. A re-alignment of the low airway structures will alleviate present congestion problems in the Toronto terminal control area and will provide air traffic control with the increased ability for the segregation and sequencing of air traffic prior to its arrival in the immediate vicinity of the airport. As a result of the reduction in the terminal area airspace congestion, an increase in efficiency in terminal operations will be achieved. Radar arrival patterns will be shortened and an increased flexibility for departure procedures will be made possible.

The high altitude airway structure basically follows the same alignment as the low altitude airway structure; so no major relocation of navigational facilities or major restructuring of the high level airways patterns is foreseen. The new navigational facilities will enhance the high altitude airway structure.

However, wake turbulence considerations in respect to both arriving and departing aircraft will result in some limitation as to the maximum extent to which separation and sequencing for arrival aircraft will be increased, and as to the maximum extent to which flexibility for departing aircraft will be increased.

New air traffic control operational procedures are being developed to ease the control of air traffic in the Toronto area. The new procedures will be similar to those used in other parts of the world where high density air traffic has necessitated the introduction of specialized control procedures. These plans include the establishment of two sequencing or staging areas for arriving aircraft. This will alleviate traffic congestion in the terminal control area. By reconfiguring the airway structure, so that traffic convergence occurs outside the terminal control areas, air traffic control will be able to sequence the traffic to enter the terminal areas at predetermined altitudes, in trail, longitudinally separated and at designated speeds. Vertical separations will only be used where the flight performance capabilities of different aircraft require such a separation of aircraft.

The evidence before the Commission indicated that with the proposed introduction of the new navigational systems, the construction of new navigational facilities and the introduction of new air control operational procedures, the airspace at Malton will be sufficient to accommodate all forecasted air traffic movements to the year 2000.

PICKERING AND A TWO-AIRPORT SYSTEM

Seven potential sites have been determined as being suitable for installing a VOR facility on the proposed Pickering Airport site. As further airport facilities are developed for the proposed airport, further studies will be conducted to ensure that the sites remain suitable. A final study will have to be made to determine which of potential sites is preferable.

Six potential radar sites have been determined for Pickering. If it is decided to proceed with Pickering, further studies will have to be made for a final determination as to which site is most suitable. It is possible that the radar system may have to be located off the airport site if none of the potential sites is found to be operationally suitable.

In planning a two-airport system, consideration must be given to the availability, organization and use of associated airspace required to accommodate aircraft movements at each airport as as well as aircraft transiting the area of the two airports.

An important factor in ensuring a compatibility of airspace utilization is by having the runway alignment at each airport in the same approximate orientation. Other major factors are the configuration of the low altitude airway structure, the placement of terminal aids to navigation serving each airport and the desired traffic patterns of aircraft arriving and departing at each airport. The wind and weather conditions are basically the same for Malton and the proposed Pickering site which will enable a similar runway orientation.

The proposed Pickering site is compatible with the proposed restructuring of the low altitude airway structure for Malton.

The introduction of another airport in the Toronto area will require revision to the proposed new operational procedures for air traffic control. However, these changes will emerge as a natural progression to the procedures already being planned. It is anticipated that no major revisions will be required.

The shorter arrival patterns which will result from air traffic control plans to establish two sequencing or staging areas for arriving traffic, together with an increase in the airspace available

for departure routings, which will result from planned reconfiguration of low altitude airway structures, will permit a maximum independence of operations at both airports.

The Ministry plans a new area control centre for the Toronto area which will be designed to provide air traffic control services for the forecasted increase in air traffic movements by 1990. These plans took into consideration air traffic control requirements which would result by reason of changes in airspace usage. The present plans provide for an area control centre to be composed of individual terminal control areas for Malton and Pickering, with each terminal control area to be equipped with a separate terminal control unit. Each terminal control unit will regulate departures and arrivals operating at each respective airport. The traffic control units will be responsible for the coordination of final routings and altitudes with the appropriate sector of the area control centre.

The Commission concludes that from an airspace utilization point of view on the basis of changes to the present airway structures, planned navigational facilities and planned air traffic control procedures, the proposed Pickering Airport will not be incompatible with the airspace utilization of Malton or result in any unacceptable delays or conflicts in the utilization of the airspace at Malton.