been disclosed by the chief inspector in his report dated 31 May 1980, 6 months after the disaster. But it was not until the Commission of Inquiry began sitting that the airline publicly admitted that this had occurred. Hence the tactics adopted by the executive pilots and by the Navigation Section witnesses which were designed to prove, if they could, that the computer mistake and its consequences could and should have been avoided by the crew, and that Captain Collins and his co-pilot had committed that very long catalogue of aviation blunders and malpractices to which I have previously referred. I can visualise without difficulty not only the extent but also the nature of the managerial pressure exerted on these witnesses. They all declined to admit that there had been any mistake or omission on their part which could have been a material cause of the disaster.

375. The adoption of such tactics led to the inevitable result. These witnesses were cross-examined with skilled persistence by counsel assisting the Commission, by counsel for ALPA, and by counsel appearing for the passenger's consortium. There were documents produced to the airline witnesses in the course of cross-examination, and there were facts extracted from them, which had very clearly in a number of cases not been revealed by the airline to the highly competent and distinguished counsel whom the airline had retained. In the end, these tactics of attributing everything to pilot error came to nothing, and counsel for the airline adopted, in the course of their detailed and exemplary final submissions, the very proper course of not attributing blame to any specific quarter but leaving it to me to assemble such contributing causes as I thought the evidence had revealed.

376. But I cannot let pass the nature of the evidence which the airline witnesses tried to persuade me to accept. There were aspects of that evidence which I have been obliged totally to reject, namely the assertion by the executive pilots that they had no specific knowledge of antarctic flights operating under the minimum safe altitude specified by the Civil Aviation Division, and this was also asserted by the chief executive—the allegation by Captain Johnson that he believed Captain Simpson had told him that the McMurdo waypoint was incorrectly situated—allegations by Navigation Section witnesses that they believed that the alteration to the co-ordinates only amounted to 2 miles—the explanation by a highly skilled navigational expert that he drew an arrow on a meridian of longitude so as to remind himself that the meridian pointed north—the allegation by Navigation Section witnesses that the misleading flight plan radioed to McMurdo on the morning of the fatal flight was not deliberate but the result of yet another computer mistake. These particular assertions and allegations I have been obliged to reject.

377. No judicial officer ever wishes to be compelled to say that he has listened to evidence which is false. He always prefers to say, as I hope the hundreds of judgments which I have written will illustrate, that he cannot accept the relevant explanation, or that he prefers a contrary version set out in the evidence.

But in this case, the palpably false sections of evidence which I heard could not have been the result of mistake, or faulty recollection. They originated, I am compelled to say, in a pre-determined plan of deception. They were very clearly part of an attempt to conceal a series of disastrous administrative blunders and so, in regard to the particular items of evidence to which I have referred, I am forced reluctantly to say that I had to listen to an orchestrated litany of lies.

WHETHER CIVIL AVIATION DIVISION COMPLIED WITH ITS STATUTORY OBLIGATIONS IN RESPECT OF THE ANTARCTIC FLIGHT OF 28 NOVEMBER 1979

378. Pursuant to the Civil Aviation Act 1964 the Civil Aviation Division of the Ministry of Transport has the responsibility to administer the provisions of the Act which relate to the safety of air operations. It was the view of the chief inspector, after examining the part played by the division in the planning for and the supervision of antarctic flights, that the division had been at fault in certain respects. In addition, there were other areas suggested by counsel during the hearings of the Commission where it was claimed that the division had not effectively complied with its statutory obligations relating to air safety. Some of the criticisms against the division are, to my mind, purely technical and I am not concerned with that type of suggested default because, in terms of paragraph (h) of my terms of reference, I am asked to report whether the practice and actions of the division in respect of flight TE 901 were such as might reasonably be regarded as necessary to ensure the safe operation of aircraft on flights such as TE 901.

379. The conduct of the division seems also to be relevant under paragraph (g) of my terms of reference, which relates to the question whether the disaster was caused or contributed to by an act or omission in respect of any function which any person had a duty to perform or which good aviation practice required that person to perform. The function in question must be one which relates to all aspects of the operation of the aircraft, and I am not sure whether it was intended that the division, even though theoretically within paragraph (g), was intended to have its conduct considered in that context. I shall proceed, however, on the basis that its conduct is relevant under both paragraphs (g) and (h).

380. Having studied all the allegations made against the division I propose to exclude those of a nature which are purely technical and not directly related to the safety of this particular air operation. I will discuss what I think are the relevant allegations in the paragraphs which follow and will express my conclusion as to each.

381. (a) It was contended that the RCU briefing conducted by the airline contained omissions and inaccuracies which had not been detected by the supervising airline inspectors.

The airline inspectors had in fact approved the audio-visual part of the RCU briefing for the fatal flight, and one of the inspectors had witnessed a normal audio-visual briefing for an antarctic flight, this having occurred on two occasions, but no amendments to the audio-visual briefing had been required and errors contained in the briefing (to which I have previously referred) were evidently not detected.

Conclusion

It was the responsibility of the airline to procure compliance by its pilots with regulation 77, which requires a pilot to satisfy the operator that he is familiar with the flight route. It is the responsibility of the division to take reasonable steps to see that the airline is observing regulation 77 and, in my opinion, the division failed in one material respect to comply with its duty in respect of this regulation. I do not hold any airline inspector accountable for not detecting certain descriptive errors in the RCU briefing, but I think that there was a breach of statutory obligation on the

part of the division in that it did not ensure that there was presented at the RCU briefing a topographical map upon which was accurately plotted the track and distance formula for the flight. The antarctic route involved air crews travelling to a distant, hostile terrain, and the aircraft would be navigated to its destination by its highly accurate inertial navigation system. In my view, the failure of the division to ensure that antarctic crews were aware of the exact topographical location of the nav track was a major omission.

(b) It was alleged that the airline inspectors had been at fault in not ensuring that there was a better explanation of the whiteout phenomenon at the RCU briefings.

I do not believe that the division was at fault in this respect because that phenomenon was given special attention by the United States Navy and Australian and New Zealand Air Force commanders by reason of the fact that in their case the aircraft would land on the ice. On the other hand, if the division became aware, as I think it did, that DC10 aircraft were operating in the McMurdo area at flight levels of about 1500 feet, then perhaps further attention might have been given to the dangers presented by occasional absence of surface and horizon definition in the antarctic region, but primarily this was a matter for attention by the airline.

Conclusion

In my opinion, the division was not at fault in failing to examine more closely that aspect of the RCU briefing which dealt with visual difficulties in Antarctica.

(c) It was alleged that the division had been at fault in not ensuring that the airline carried out its obligation (as required in its own operations specifications) to see that the pilot-in-command had previously carried out a previous flight in the region.

Apart from the first two flights in 1977, the airline had never complied with this obligation. I should have thought that the division would have made some enquiry as to whether this part of the operations specifications was being complied with, particularly in view of the fact that the obligation was of general application. It applied to all the airline's flights, wherever conducted. But in October 1979 the airline applied for exemption from the provision in view of the RCU briefings and flight simulator training, and the division accepted without demur the proposed deletion of this provision and after the disaster, namely on 5 December 1979, approved the appropriate deletion from the operations specifications.

I regard this failure by the division to monitor the "flight under supervision" requirement as being a serious breach of its duty. There was no evidence that it ever made any inquiry. The provision had been disregarded by the airline for 2 years before it applied for exemption and, as I say, the exemption was granted in October 1979 without demur. I can see the reasoning behind the decision to approve the airline's application. It was evidently thought that the RCU briefing was an adequate substitute, and in addition, there had been a series of successful flights to Antarctica and no landing on the ice was contemplated. However, both the Director of Civil Aviation and Captain Spence, the airline inspector, had been to Antarctica and I should have thought that these experienced pilots would have been struck by the complete lack of similarity between

the actual terrain and its appearance upon a topographical map, and that only a previous flight to Antarctica could educate the pilot-in-command as to the physical and meteorological features of the region.

It is, in my view, very probable that this disaster would not have occurred had Captain Collins flown to Antarctica on a previous occasion. Had he done so, he would have flown at some altitude between 1500 feet and 3000 feet along McMurdo Sound, depending upon whatever clearance was given by Air Traffic Control, this being in conformity with authority given to the pilot by Captain Wilson. However, the entrance to Lewis Bay and the appearance of Cape Royds and Cape Bernacchi would be very similar, as already indicated by the pictorial representations in figs. 5, 6 (pages 72-73), prepared by Captain Vette. But a previous flight under supervision would have almost certainly resulted in Captain Collins noting the distinctive feature of Beaufort Island which would have been apparent as the only identifiable island in the area. Fig. 16, page 154 consists of prints developed from passengers' cameras, in which Beaufort Island is clearly visible. The film in each case was slightly damaged, and the actual view of Beaufort Island would have been more distinct than the view displayed on the prints. Had Captain Collins seen Beaufort Island previously, and identified it on the fatal flight, he would certainly have realised that his nav track had been changed.

All inquiries which I made in connection with this particular point of a previous flight under supervision produced the same answer. The military people could not understand how a pilot-in-command could have been sent into the strange and unfamiliar area of Antarctica without having flown there before.

Conclusion

There was an omission on the part of the airline inspectors to inquire whether the familiarisation flight provision was being complied with, and apart from that, the division should not have acceded to the request made of it by the airline in 1979.

(d) It was contended that the division should not have agreed with the route selected by the airline, involving an approach to McMurdo over the top of an active volcano, and that the division should have insisted upon a route to McMurdo following the normal approach path of military aircraft.

This point was answered by counsel for the division in the same manner as so many points were answered, namely, by insisting that the defined minimum safe altitude was 16 000 feet and therefore the selected route was perfectly safe providing that the 16 000 feet, and the special conditions applying to the 6000 feet, were complied with.

Conclusion

Approval of a flight path over the top of Mt. Erebus could not be justified under any circumstances. In my opinion the division took no steps about this because it was aware that pilots were not required to follow this flight path. Nevertheless, I think it would have been more prudent for the division to have insisted upon a flight path which followed the military track and which had the advantage of allowing a DC10 aircraft to take early advantage of the NDB (when it was operating), the DME function of the TACAN, and the radar facilities at the Ice Tower.

FIGURE 16

(e) It was alleged that the division had not implemented effectively that section of the ICAO standard, detailed in Annex 6 of the Convention, which requires appropriate life-sustaining equipment to be carried on flights across terrain such as this.

The answer to this allegation is that the division had raised this point prior to the fatal flight and was still in the course of discussing the point with the airline at the date of the disaster.

Conclusion

The practical situation is that life-sustaining equipment would have been of very little use in the event of a DC10 aircraft being obliged to make a forced landing at McMurdo or in the event of it having to ditch in the antarctic waters off Ross Island. In the former event, having regard to the season of year in which the flights were being carried out, there would be no accommodation for the 260 people on the aircraft after it had landed. I do not regard this omission (if it was one) on the part of the division as involving any substantial breach of obligation on its part.

(f) It was alleged that the division had failed to re-assess the antarctic operations upon the withdrawal of the McMurdo NDB prior to the commencement of the 1979 flights.

It is correct that the withdrawal of the NDB now meant that a DC10 aircraft did not have available any means of getting a radio bearing from McMurdo. But no landing was intended, any descent to low altitude would be in VMC, and the AINS capabilities of a DC10 represented the most advanced navigation system in the world. In these circumstances the absence of a non-directional beacon was irrelevant.

Conclusion

I do not believe that this amounted to an omission on the part of the division.

(g) It was further alleged that the division failed to ensure that the airline was organised in such a way as would ensure safe antarctic flights.

Whilst accepting that there was some degree of responsibility upon the division to ensure that there was a command structure within the airline capable of administering safe flying operations, I do not think that there was any responsibility upon the division in the present case to make any investigation along the lines suggested. It was aware of the general nature of the establishment and mode of operation of the Flight Operations Division. I cannot see that it had any cause to suspect that the internal administration of this division was defective in the ways which I have previously enumerated. Further, active intervention by the Civil Aviation Division would look very like interference by a Government agency with the internal administrative structure of an airline with a perfect safety record.

Conclusion

I do not believe that the division was at fault in this suggested respect.

(h) It was alleged that the division had failed to ensure observance of the specified height restrictions comprised in the MSA conditions.

Although the division relied, as its first and paramount defence to almost all allegations against it, on the breach by the pilot of the specified

minimum safe altitude provisions of 16 000 feet and 6000 feet, I find myself unable to accept that there were not some responsible officers of the division who were aware of the actual flight levels at which these flights were being conducted in McMurdo Sound. The flight levels were a matter of common knowledge. I have already gone through all the evidence on the point. These MSA conditions of 16 000 feet and 6000 feet were quite unrealistic and, as I have said before, I consider that the airline was perfectly entitled, in terms of practical considerations, to authorise pilots to descend to whatever flight level was thought appropriate by McMurdo Air Traffic Control, providing that flight at such levels was in VMC. It is impossible to infer that McMurdo Air Traffic Control would ever suggest to any pilot that he let down to altitudes like 1500 feet or 2000 feet unless visibility at that altitude was perfectly clear for many miles. Nor would any pilot of the airline consider descending to any such level unless he was satisfied, by information from McMurdo Air Traffic Control and by his own observation, that he would be flying at such levels in VMC.

Conclusion

The division may be entitled to assert as against the airline that the official MSA figures should not have been varied by the airline without the division's consent. But in the context of the present inquiry, I am satisfied that there were responsible officials of the division who were well aware of the actual flight levels being maintained by pilots in McMurdo Sound. What the division should have done was to consult with the United States authorities in Antarctica, and with the airline, and then set new flight levels on realistic terms. The minimum safe altitudes thus adopted for VMC conditions should not, on any basis, have been different from those set for general aircraft operations by regulation 38 of the Civil Aviation Regulations. Within the context of this inquiry, the failure by the airline to enforce the official minimum safe altitude conditions has no relevance and the division, in my opinion, is not at fault in the manner suggested.

382. I have now concluded my appraisal of what in my view were the substantial allegations against the division, and I have expressed my conclusions. There are two respects in which, in my opinion, the Civil Aviation Division contributed to this disaster by an omission in respect of a function which it had a duty to perform, and the omission in each case also related to a duty of which the execution was necessary in order to ensure the safe operation of flights such as TE 901. These two omissions are those to which I have referred in subparagraphs (a) and (c) above.

383. When I consider all the evidence relating to Civil Aviation Division participation in these antarctic flights, it seems to me that the division was always too ready to approve whatever proposal was put to it by the airline. It seems as if the division adopted as its controlling policy the opinion that the operational proposals of Air New Zealand would always be satisfactory and did not require close scrutiny. I believe that the adoption of such a policy on the part of the division was unwise.

384. I have no doubt that in the great majority of cases any operational proposal placed before the division by Air New Zealand would be totally sound, having regard to the very experienced and skilled operational personnel who are employed by the airline. But, as this Inquiry has shown, there were substantial defects in the administration and communication procedures of the Flight Operations Division, and one of the reasons for the continuation of this loose system of administrative

control within the Flight Operations Division might well have been the failure of the airline inspectors to examine in detail the proposals made to it in respect of this very unusual and unscheduled series of flights. It is even possible that the sheer size of the airline has come to overshadow and dominate the personnel of the division.

THE CAUSE OF THE DISASTER

385. The occurrence of any accident is normally due to the existence of a variety of factors. Sometimes the factors are co-existent, sometimes they occur in sequence. In that sense the existence of any one factor can be described as a "cause" of the accident, because were it not for the existence of that factor at a particular time or in a particular locality, the accident could not have occurred. It is therefore not quite right to refer to each and every contributing factor as a "cause", even though its existence was a necessary pre-condition of the occurrence of the accident. In the field of negligence litigation, this problem of identifying and assessing causative factors leading up to the event constantly presents a problem, and leading textbooks which refer to the legal elements of causation tend to classify co-existent causes into two categories. The first category involves those causes which only bear that name because without their existence the accident could not have occurred. The second category consists of what lawyers describe as "effective" or "contributing" causes, meaning thereby those factors which are to be taken into account when assessing legal responsibility for the event which occurred.

386. In the case of this Royal Commission, I am required to report as to whether the disaster was "caused or contributed to" by any person as the result of an act or omission in respect of any function in relation to the flight which that person had a duty to perform, or which good aviation practice required that person to perform. Therefore, although I am not concerned in any way with legal responsibility for the disaster, I am required to identify any culpable act or omission which in my view was either a cause or a contributing cause of the disaster.

387. For the purposes of determining whether there was a culpable or blameworthy act or omission, I must take into account the existence of the following factors or circumstances which preceded the occurrence of the disaster:

(1) Captain Collins had complete reliance upon the accuracy of the navigation system of his aircraft. He had a total flying time of 2872 hours in DC10 aircraft and the AINS had demonstrated to him its extreme accuracy on countless occasions.

(2) There was not supplied to Captain Collins, either in the RCU briefing or on the morning of the flight, any topographical map upon which had been drawn the track along which the computer system would navigate the aircraft.

(3) Captain Collins plotted the nav track himself on the night before the flight on a map or maps and upon an atlas.

(4) The direction of the last leg of the flight path to be programmed into the aircraft's computer was changed about 6 hours before the flight departed.

(5) Neither Captain Collins nor any member of his crew was told of the alteration which had been made to the computer track.