THE MOUNT EREBUS TRAGEDY
Air New Zealand DC10-30 ZK-NZP, Flight NZ901
28th November 1979

A REVIEW

WAVERLEY PARSONS
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ABSTRACT

On the 28th of November 1979 an Air New Zealand DC10-30 ZK-NZP, Flight NZ901, crashed into the side of Mt Erebus killing all 257 people on board. A combination of administrative mistakes by Air New Zealand Ltd and a weather phenomenon known as sector whiteout meant the ill-fated flight was on a crash-course with the side of the Mt. Erebus on Ross Island. Following this tragedy was an in depth Aircraft Accident report by Ron Chippendale, blaming the pilot in command, Captain Jim Collins for the accident. Following this, a Royal Commission headed by Justice Peter Mahon found that the cause of the crash was not the Captain’s fault, but negligence on behalf half of Air New Zealand administration and procedures. Subsequently, all passenger flyovers where stopped in Antarctica.
**Introduction**

Antarctic has long been the fascination of many people and ‘flight seeing’ was a popular way for people to experience the great continent without having to land. The first tourist flight to Antarctica was arranged by a Chilean national airline. The flight in a Douglas DC-6B took place December 22, 1956 and 66 tourists made the trip. (National Academy of Science 1993). In the 1970’s, both Qantas Airways and Air New Zealand flew tourists over the continent at low altitude. Previously in 1968, Air New Zealand first proposed to land DC-8 aircraft on the ice runway at Williams Field however this did not occur. Before the 1979 Erebus tragedy, 44 flights with over 10,000 visitors enjoyed the over fly experience. (Crossley, 1995). However, after the accident it would be over twenty years would pass before the resumption of flight seeing.

The following paper reviews the lead up to Air New Zealand Flight 901, the accident itself and the aftermath including the inquires and the repercussions of the air disaster. It is written in the memory to all those who lost their lives whilst viewing Antarctica, their family and friends and to the search and rescue personnel both in Antarctica and New Zealand.

“*(Erebus)* We live beneath his shadow and have both admiration and friendship for him, sometimes perhaps tinged with respect”

Apsley Cherry-Garrard
Prelude: Before the Flight of NZ901

Diagram One- Picture of ill-fated DC10-30 ZK-NZP 1977

Originally, Air New Zealand planned to charter DC-10 flights over the south magnetic pole however flying over the McMurdo Sounds with views of Mt. Erebus and the Victoria Land glaciers was seen as more interesting. (Stewart, 1986).

Flight Preparation

Due to the many dangers associated with flight over Antarctica, meticulous planning and contingency plans were required. Considerations included-

- Maximum fuel had to be carried for the 11-hour flight as there was no opportunity to land;
- Potential pressurisation problems meant extra fuel would be carried if the plane had to fly back to NZ at low altitude.
- Flying through McMurdo Sound at high speed was required to stop aircraft flaps from freezing.
- Route structure, minimum safe altitudes within McMurdo area, sightseeing procedures, communications, whiteout phenomenon and grid navigation.

(Stewart, 1986).

Although all these considerations were taken into account, Antarctic ‘flight seeing’ still contained many risks and some of these risks were not catered for. For example, had there been malfunctions during flight, there was no place to land. None of the Air New Zealand flights carried any form of polar survival kits. Conventional navigation was not possible around the South Poe and a magnetic compass is unusable close to magnetic pole. And finally, on Flight 901, neither the Captain nor the First Officer
had flown the route before, adding to an already risky flight. (Beaty, 1995). At the 10th Antarctic Treaty Conference in Washington, only weeks before the ill-fated flight, it had been noted that flights such as the Air New Zealand flight seeing trips “operated in a particularly hazardous environment.” (Beaty, 1995). However, on the day after the crash, Minister of Transport, the Hon. Colin McLachlan said he was not aware the concerns the Treaty conference held regarding the flights and stated “All I am interested in is safety. If there is any doubt about safety then I put my foot down.” (Hickson, 1980).

The crew of NZ 901 were described as a very “experienced and competent crew” (Stewart, 1986). Out of the five crew members, only one had flown over Antarctic before however they were joined by Peter Mulgrew, a member of the TAE expedition and would be the commentator from the flight deck for the sightseeing proportion of the trip. (See Appendix One for full flight crew details.)

Captain Collins and First Officer Greg Cassin attended a route qualification briefing 19 days before the crash. This briefing included an audio-visual presentation, printed sheets and a 45-minute DC10 flight simulator practice for both pilots. (Hickson, 1980).

**The Flight Path**

*Diagram Two- DC10-30 ZK-NZP 1977 landing at Christchurch International Airport (Phillips, 2001)*

In 1978, Air New Zealand acquired a new ground computer that was programmed with the McMurdo Sound route. The programme was designed to overhead the Dailey Islands and this position was simply named ‘McMurdo’. (Stewart 1986). However,
when this programme was entered, a one-digit error entered incorrectly into the computer had the effect of moving the flight path 27 miles west. This mistake went unnoticed, however the flight path was still down the middle of McMurdo Sound. However, when Captain Leslie Simpson departed for Antarctic on the 14\textsuperscript{th} of November 1979 noted a discrepancy in distances expected in McMurdo Sound of 27 miles, he reported it to air authorities back in New Zealand.

On Tuesday the 27\textsuperscript{th} of November, Mr. L Lawton, navigation section superintendent, and Mr. B Hewitt, chief navigator, was updating the stored computer information. On hearing Captain Simpson observation, a seemingly insignificant change was made to the flight co-ordinates. Chief Inspector of Air Accidents, Ron Chippendale noted the computer flight plan had been in error for 14 months. However, the effect was to move the end waypoint of McMurdo 27 miles back east to the Williams Field waypoint (the original and incorrect path), moving the flight path over the top of Mt. Erebus. (Appendix two). The following morning, the ill-fated flight crew were not informed of the vital change of the end waypoint or the significance of the track change and were still expecting to fly down the middle of McMurdo Sound as shown in diagram three.
Coordinates of the route were manually inserted by the flight crew via a push-button keyboard into the three on-board area inertial navigation systems (AINS). These coordinates were carefully checked and crosschecked. Checking the digits of the computer generated flight plan was not part of crew’s procedures. “Commercial pilots have always been subject to ground control, they have neither been able to function as complete autocrats in the skies, much of this control has been taken from them and given to the computarised systems” (Deitz, 1991). Unknown to anyone aboard, the AINS was programmed to fly toward Erebus. (Stewart, 1986).

The Accident

After departing from Auckland via the South Island, Auckland Islands, Baleny Island and Cape Hallet to McMurdo, Flight 901 was given permission by the US Navy Air Traffic Control Centre (ATCC) “MacCentre” to descend down to 1500 feet during the aircrafts approach to McMurdo. A minimum safe altitude of 6,000ft was established within McMurdo Sound to allow for improved sightseeing. However, it was not uncommon for McMurdo Air Traffic Control (ATC) to grant pilots permission to descend below the minimum safe altitude if condition were good and visibility unrestricted.

However, the day Flight 901 flew to Antarctica, the weather deteriorated over McMurdo with a cloud base at 3,000ft and the flight crew had difficulties with communication between themselves and McMurdo. Appendix three shows the assumed flight path and orbiting sequence and the actual flight path and orbiting sequence. Diagram four shows the actual and expected flight path of Flight 901.
For the advance planning of flying operations it is advantageous to know in some detail the climatological frequency of adverse weather conditions at the destination. (Thompson, 1972). However, some climatic features, such as a sector whiteout, can trick even the most experienced of flight crew, as so happened on Flight 901. A conventional whiteout occurs when sunlight refracted through ice crystals turns the sky white and results in loss of depth perception and makes it impossible to separate sky form earth. A sector whiteout has been described as a “particularly insidious hazard” (Air Operations Manual 1990) where the pilot may have acceptable surface and horizon definition to the side and be flying into a whiteout area dead ahead. Chippendale, (1980) describes one of the most critical effects of a whiteout is a loss of height perception which is a problem for pilots during aircraft turns especially if there are marginally visible references. On the day of the ill-fated flight, a sector whiteout created the perception for all the flight crew that they were traveling down McMurdo Sound. However, this was not the case, they were in fact traveling straight toward Lewis Bay and Mt. Erebus. Diagram Five compares the entrance to McMurdo Sounds (Flight 901’s expected path) and the entrance to Lewis Bay (Flight 901’s actual path).
Diagram Five- Visual Models Presented to Royal Commission of view expected to be seen from cockpit. (Vette, 1983)- The left hand diagram shows the entrance into Lewis Bay in three types of conditions. The right hand column shows the entrance to the McMurdo Sound in three different conditions. These are explained in the table below.

<table>
<thead>
<tr>
<th>Entrance to Lewis Bay</th>
<th>Entrance to McMurdo Sound</th>
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<tbody>
<tr>
<td><strong>A:</strong> Entrance with no sea fog or cloud. Cape Tennyson on left, Mt Terror behind it, Cape Bird on right, Mt Erebus behind it.</td>
<td><strong>1:</strong> Entrance to McMurdo Sound with no fog or cloud. Cape Royds on left with Mt. Erebus behind it. Mt. Discovery rear centre, Cape Bernacchi on right.</td>
</tr>
<tr>
<td><strong>B:</strong> Lewis Bay with sea fog and cloud.</td>
<td><strong>2:</strong> Appearance of McMurdo Sound as crew would expect to see it without cloud.</td>
</tr>
<tr>
<td><strong>C:</strong> Sea fog and cloud present with addition of low overcast. This is the view the Captain Collins is suggested to have seen.</td>
<td><strong>3:</strong> Same as view 2, but with addition of stratus cloud base in far distant horizon. This is the view that Captain Collins would have expected due to the weather conditions in the McMurdo Sound on the 28th of November 1979.</td>
</tr>
</tbody>
</table>
With the weather deteriorating, the flight crew decided to descend in a clear area to the north of Ross Island in two descending orbits, the first to the right and the second to the left. (Chippendale, 1980).

Captain Collin’s decided to climb the aircraft out of the area when the ground proximity warning system sounds instructing the crew to “Pull up”. (Chippendale, 1980). This warning was given 6.5 seconds before impact and the flight crew responded quickly. At this stage Captain Collins disengaged the autopilot whilst the flight engineer called off the heights of 500 and 400 feet indicated on the radio altimeter and the captain called for “Go round power”. Chippendale (1980) suggests that as a result of the whiteout, the go-round attempt was procedural in response to the warning rather than a desperate attempt to avoid a readily apparent obstacle.

Air New Zealand Flight 901 crashed into the side of Mt. Erebus at 12.50pm, four minutes and 42 seconds after its last radio contact with McMurdo. It was flying at 257 knots or 404km/hr (Phillips, 2001).

**Discovery of Wreckage**

Air traffic controllers lost radio contact with the Flight 901 and hoped that it had made an emergency landing somewhere on the sea ice. No one knew for certain what had happened to the Flight 901. A rescue mission was organised and shortly thereafter, a U.S. C-130 spotted wreckage on the northeast slope of Mount Erebus. (Diagram Four). Unable to land, the C-130 crew reported their findings and soon a Huey helicopter put three New Zealand mountaineers from Scott Base, at the crash site. (Antarctic Explorers, 1999). They were Daryll Thompson, Hugh Logan and Keith Woodford. Due to bad weather, the helicopter was able to land 20 hours after the crash. (New Zealand Disasters, 2003). They found no survivors.
Diagram Six- Aerial shot of the spread of DC10 wreckage.

Diagram Seven shows the lower end of the crash site. Note clear impression (left) of aircraft belly, wings and engine pods left in the ice on impact. After the impact, the aircraft was propelled up the 13° slope with the number two engine mounted on the tail fin continuing to deliver full power. A fire was initiated on impact in the fuselage cabin after it can to rest. The wreckage was spread over an area of 570 by 120 metres. (Phillips, 2001).

Only 213 bodies out of the 257 people on board were recovered. For this reason, the site has been designated a Special Protected Area under the Antarctic Treaty. It has been preserved as a tomb for the 44 people whose bodies still rest on Mount Erebus.
A large amount of the bodies were collected from the area in diagram eight, the fuselage. It was suggested by the on-site recovery workers that the missing bodies may be located under the fuselage. (Hickson, 19080). However, there was no way of moving the large part of wreckage, which amounted to one third of the entire jet, therefore it was decided to leave the wreckage as it was, on the basis that every effort had been made to remove all traces of bodies and property from the site. (Hickson, 2001).

‘Operation Overdue’

‘Operation Overdue’ involved over 100 police and amassed 14,500 man-hours. (Hickson, 1980). Since no life could be saved, the purpose of ‘Operation overdue’ was to recover and identify the remains. “The operation was astonishingly successful considering the extreme geographical range and conditions on-site as well as the very limited communication possible with Scott Base.” (Police at Mount Erebus, 2003).

In conjunction with the pathologists, the police mortuary team successfully identified 83 per cent of the DC10 crash victims, a significant achievement at the time. (Hickson, 1980). This was a direct result of a ‘world-leading’ victim identification procedure- Disaster Victim Identification (DVI) that was used in ‘Operation Overdue’. With DVI, the disaster scene was marked out in a grid pattern and all body parts were numbered according to the square in which they were located. This remained their identify until a name was established. (Police at Mount Erebus, 2003).
Two positive forms of identification had to be employed for each victim. (Hickson, 1980). The following table gives summary of the means of identification of the victims.

<table>
<thead>
<tr>
<th>Means of Identification</th>
<th>No. Of victims this form of identification was used on.</th>
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<tbody>
<tr>
<td>Fingerprints</td>
<td>39</td>
</tr>
<tr>
<td>Dental records</td>
<td>115</td>
</tr>
<tr>
<td>X-ray records</td>
<td>11</td>
</tr>
<tr>
<td>Visually</td>
<td>51</td>
</tr>
<tr>
<td>With photographs</td>
<td>5</td>
</tr>
<tr>
<td>From documents with names</td>
<td>7</td>
</tr>
<tr>
<td>Jewelry</td>
<td>80</td>
</tr>
<tr>
<td>Clothing</td>
<td>60</td>
</tr>
<tr>
<td>Uniforms</td>
<td>16</td>
</tr>
<tr>
<td>Other property</td>
<td>12</td>
</tr>
<tr>
<td>Operations, scars, tattoos, missing limbs</td>
<td>23</td>
</tr>
<tr>
<td>Other scientific comparisons</td>
<td>5</td>
</tr>
<tr>
<td>Specific denture characteristic</td>
<td>3</td>
</tr>
<tr>
<td>Blood group</td>
<td>3</td>
</tr>
<tr>
<td>Hair comparisons</td>
<td>6</td>
</tr>
</tbody>
</table>

(Hickson, 1980).

All bodies were bought back to Whenuapai Airbase in Auckland. However, some relatives of the victims wanted the bodies left where they were and a memorial placed at the site. Pat Gilbert from Wellington wrote to the *Evening Post*: “As only a proportion of the bodies are recoverable, surely it is kinder for us all to leave them all there than to have to have the ordeal of identification.” (Guy, 1980).

Professor A.J.W Taylor of Victoria University of Wellington and psychiatrist studied the psychological effects of stress arising from the body recovery and victim identification work of Flight 901. (Taylor and Frazer, 1981). From their studies they established that personnel involved in the body recovery and identification, suffered trauma that entitled them to be included among the victims of the events and deserving of specialist support and treatment. “It is important to keep in mind the
human dimension of every disaster. If this is lost sight of, a disaster quickly becomes simply a matter of statistics, maps, charts and various calculations.” (Grollmes 1985).

From this study, it is known standard practice to have psychological support in the New Zealand police.

The Aftermath

“Aircraft accident, by their very nature, raise the interest and indignation of us all, the sudden and swift manner in which death can come to a large number of innocent people causes each of us to stop and ponder the causes of air tragedies.” (Cook, 1986). Because of the national and international concern into the Mt. Erebus disaster, the subsequent accident report and Royal Commission of Inquiry was of huge interest. Consequently, both these inquiries were lengthy and had mixed results.

The Official Aircraft Accident Report – ‘Chippendale’s Report’

The occurrence of the disaster was notified to the Chief Inspector of Air Accidents by Air New Zealand Limited at 2050 hour on the 28th of November 1979. (Chippendale, 1980).

Originally Chippindale had accepted the ‘flying in cloud’ theory in which Air New Zealand had claimed caused the crash. But on seeing passenger photo’s recovered from the crash site, he rejected this theory, as the photo’s showed clear skies, as shown in diagram nine.

Diagram Nine- Passenger photo, taken to the west, towards Victoria Land coast showing well defined cloud-base. (Vette, 1983).
The chief inspector of air accidents, Ron Chippindale, attributed blame to the decision of Captain Jim Collins to descend below the customary minimum altitude level, and continue at that height when the crew was unsure of the plane's position.

“The probable cause of this accident was the decision of the captain to continue the flight at low levels toward an area of poor surface and horizon definition when the crew was not certain of their position and the subsequent inability to detect the rising terrain which intercepted the aircraft’s flight path”

(Chippindale, 1980)

Chippendale’s conclusion of pilot error was based on five points:

a) The change in the computer flight path from McMurdo Sound to Lewis Bay did not mislead the crew;

b) The crash was caused by the pilots descending beneath 16,000ft contrary to the airlines instructions;

c) The crew was not certain as to their position;

d) The aircraft’s radar would have depicted the mountain terrain ahead; and

e) The captain headed the aircraft toward cloud-covered high ground appearing to the pilot as an area of limited visibility or whiteout.

(Chippendale, 1981).

While the inquiry investigated human errors and computerised data, this accident was caused by a combination of both. As is noted by Dietz, (1991) technology and aviation personnel go hand in hand “Some experts have indicated that as many as two thirds of all aviation accidents result from pilot error- errors in judgement, failures in concentration, deficits in communication, and the possible impairment in emotional and physical functioning of the pilots themselves.” (Deitz, 1991).
The Royal Commission of Inquiry

Due to the high degree of public interest and the size of the disaster, the Government appointed High Court Judge Peter Mahon as a one man Royal Commission of Inquiry to investigate the cause and circumstances of the accident. In any other circumstances, inquiry into the aircraft accident would have ceased at the official accident report. However, the Mt Erebus tragedy was unique and wide spreading.

During the course of the Inquiry, Chippendales report and Air New Zealand Ltd came under much scrutiny. These criticisms include:

- The material of the airline briefing was considered inadequate and ill-informed and contained a number of mistakes;
- The flight crews were never warned of the dangerous effects of whiteout conditions;
- The decision to excuse captains from previous Antarctic visits before their own flight was considered wrong;
- Liaison between Air New Zealand and the USATC at McMurdo was found to be inadequate;
- The airline did not supply charts with the actual route marked thereon;

(Stewart, 1986)

After a long and lengthy inquiry, Justice Mahon concluded,

“393- in my opinion therefore, the single dominant and effective cause of the disaster was the mistake made by those airline officials who programmed the aircraft (i.e. inertial navigation system) to fly directly at Mt. Erebus and omitted to tell the aircrew. That mistake is directly attributable, not so much to the persons who made it, but to the incompetent administrative airline procedures which made the mistake possible.”


Justice Mahon’s findings completely exonerated the crew of any blame for the accident and were welcomed by the public and many in the industry. (Phillips, 2001).
Justice Mahon controversially accused airline executives of cover-up, disposal of evidence and subterfuge, famously stating, “I am forced to reluctantly to say that I had to listen to an orchestrated litany of lies”. (Stewart, 1986).

Air New Zealand’s Chief Executive, Morrie Davis, later resigned from his position and challenged the report in New Zealand’s Court of Appeal.

**The Appeals**

On the release of Justice Mahon’s decision, Air New Zealand decided to challenge some aspects of his finding in the New Zealand High Court. The hearing lasted only six days and it was recognised, given the extent of the disaster, that complaints be adjudicated on “as soon as reasonably practicable” because the early resolution of any doubts as to the validity of the report was a matter of great public concern. (Judgement of Court of Appeal, 1981). The High Court subsequently found that Justice Mahon, as Royal Commissioner, had acted in excess of his jurisdiction and contrary to natural justice regarding those allegations. However, they did not disagree with his main findings as to the cause of the accident. (Phillips, 2001).

Justice Mahon, disappointed, later resigned from the New Zealand High Court to lodge his own counter-appeal with the Privy Council. Five leading British Law Lords reviewed the case and found Mahon’s report to be “brilliant and painstaking investigative work” and stated “it is a understandable human weakness on the part of individual members of the airline management to shrink from acknowledging, even to themselves, that something they had done or failed to do might have been the cause of so horrendous a disaster.” The Law Lords however felt very reluctantly compelled to find that he had been excessive in his accusations of conspiracy and that the witness in favour of the airline had not been presented with the case of conspiracy, and on these grounds Mahon’s appeal was dismissed. (Stewart, 1986).
**Miscellaneous Discrepancies**

*Search and Rescue*

It took 11 hours for Flight 901 to be discovered on Mt. Erebus. Increasing tourism and private expeditions at the time, and also nowadays, has created the need for the development of international search and rescue co-operation. In 1988 the US Antarctic Program Safety Review Panel stated the need for an international clearinghouse of information indicating the location of each nation's aircraft and ship. They later stated that the “lack of co-ordination can cause disastrous consequences as well as impose unnecessary large costs and disproportionate burdens to the US Antarctic Program” (USAPSRP, 1988).

*Law Suits*

In the days after NZ901’s crash, allegations of air traffic control negligence at McMurdo as a contributing factor to the crash were prevalent. (Burke, 1994). As a result of these allegations and lawsuits, the U.S government formulated a policy in which American bases in Antarctica refuse all but the most basic help to non-government travelers. A statement by the U.S Antarctic Research Program (USARP) claims “the United States Government must limit assistance…in Antarctica to cooperative programs between USARP and the Antarctic programs of other governments. (Burke, 1994).

*Evidence*

It was noted in the Royal commission, that the file started by the airline to collect documents relevant to the accident was remarkably slim, and by ‘coincidence’ seemed to contain only data in support of Air New Zealand’s and Chippendale’s case (Stewart, 1986). Captain Collin’s black ring-binder folder turned up to the Inquiry with no pages it. (See diagram ten.) It was well known that Collins meticulously wrote in the folder and it wasn’t until two policemen admitted finding the document full of pages that questions were asked.
Similarly, a bizarre burglary at the Collin’s family home saw only documentation between Mrs. Collins and her lawyers stolen, even though they were in the same drawer as valuable jewelry.

Lessons Learnt

“In aviation, the consequences of normal human slip-ups take on meaning far beyond the event themselves. An event...can play a huge role in improving safety.” (CAA, 2000).

Hickson (1980) summarises the lessons learned from the Mt. Erebus tragedy as the following:

1. Human factors were inherent in the causes of Flight 901 crashing, and they provide one of the prime areas for lessons to be learnt. These areas include training, briefing, attitude and performance.
2. Introduction of flight training utilizing the knowledge and experience of New Zealanders in the aviation areas well as latest research from around the world is needed for Antarctic aviation.
3. The New Zealand Government needs a thorough assessment of navigation and communication facilities in the Ross Dependency.
4. All crews must be adequately briefed with the best weather and topographical information.
5. The need for Civil Aviation to meet its regulatory and policing obligations concerning all flying that involve New Zealand licensed pilots, operators and airports.

6. The appropriate authorities e.g. Police, need to establish clear guidelines for news media access to accident sites in consultation with news media organizations.

7. The need for the development of effective contingency plans and coordinated programmes to cope with major aviation and civil disasters.

8. All crew and passengers on Antarctic tourist flights should be equipped with survival gear and trained for any special emergency situation.

9. The need for commitment to aviation safety at all levels of the industry in New Zealand.

“No one knows what the future in Antarctica holds, but aircraft and aviation will be intertwined with that future, tempered and balanced by the hardy souls of pilots and crewman who challenge Antarctica constantly.” (O’Leary 1979, written one month before the Erebus crash- cited in Hickson 1980).

**Conclusion**

The day Flight NZ901 flew into the slope of Mt Erebus is a day that is etched into New Zealand’s history forever. The degree in which this tragedy hit New Zealander’s is multidimensional and intergenerational. Antarctic is our backyard, New Zealand holds a relationship with Antarctica that few countries have. The sheer amount of deaths on the plane meant that no New Zealander escaped the tragedy.

The immensity of the crash suddenly saw New Zealand hosting the most deaths on the continent in history and Air New Zealand now being in the top four worst air disasters in the world. A mean feat for such a small, nation. It was only natural then that such public concern and interest resulted, as did the lengthy inquires and often heated debate. The whole concept of flight seeing over Antarctica was riddled with risk and it still is. In the 1970’s, these risks were simply glazed over with a glass of champagne in one hand and breathtaking views by the other.
Many lessons were learnt from this tragedy. The environmental effects alone of having the wreckage still remain on the slopes of Mt Erebus is, as I believe, enough to warrant serious reconsiderations of future ‘flight seeing’. However it is part of human nature to forget and move on. ‘Flight seeing’ restarted with Qantas in 1995. Let us hope complacency is not a factor and the lessons have lead to positive changes to ensure passenger and crew safety.

Antarctica is a continent that demands knowledge and experience and with this comes respect for the continent. The passenger and crew of Flight 901 unfortunately learnt that lesson the hard way, as did Air New Zealand and the rest of world. However, if we build on these lessons, a situation like on the November 28th 1979 should never have to be experienced again.

“Death was a chapter of life…Mount Erebus was the last port of call on an adventurous journey to eternal life…we must now accept their deaths. We must now let them go…they have moved to a higher life and handed the torch on to you...now let us leave the mountain.”

Appendix

Appendix One- Flight Crew

Captain Jim Collin

First Officer Greg Cassin
First Officer Graham ‘Brick’ Lucas
Flight Engineer Gordon Brooks
Flight Engineer Nick Maloney
Peter Mulgrew- official Flight commentator.

Appendix Two

Computer Flight Plan- Left column is flight plan distributed to the crew at briefing. These plans run down McMurdo Sound, close to Dailey Islands. Collins based his flight on this flight plan. The right column is the flight plan given to the crew just before their flight and in which the crew inserted into their navigation computer. An alteration of the left hand column to the right hand column had the effect of moving the flight plan 27 miles east and flying on a navigational track on a course intercepted by Mt. Erebus. (Vette, 1986, Mahon, 1984). Note: variation of McMurdo positions highlighted.

<table>
<thead>
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<th>McMurdo</th>
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<tr>
<td>155.9 34 054 517 337 40</td>
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</tr>
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<tr>
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<td>7220.05178113.06 177.4</td>
<td>7220.05178113.06 177.4</td>
</tr>
</tbody>
</table>
Appendix Three
Assumed flight path and orbiting sequence and the actual flight path and orbiting sequence.

(Vette, 1986).
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