

ZK-HTF SEARCH AND RESCUE OPERATION INDEPENDENT REVIEW



Commissioned by the New Zealand
Search and Rescue Council

Written by Paul Fitzharris
28 April 2006

Executive Summary

1. This Independent Review was directed by the Search and Rescue Council¹ following an official and private search for a missing Eurocopter EC 120B helicopter ZK-HTF, in November 2005. The Review aims principally to seek improvements in current search and rescue arrangements and not to allocate fault. It does not cover the cause of the crash or duplicate any other enquiry that may be undertaken in respect to this incident. The Review interviewed 82 persons and resulted in 41 recommendations.

2. The helicopter piloted by Michael Erceg and his passenger Guus Klatte took off from Papakura at approximately 0945 hours on Friday 4 November 2005 with the intended destination of Queenstown. The intended flight path was to travel to Wanganui, Rangiora and then to Queenstown. The weather in the Waikato region was described as having strong on shore winds, low cloud with poor visibility.

3. The pilot had submitted a flight plan that indicated a SARTIME² of 1600 hours. At 1615 hours Airways NZ informed the Rescue Coordination Centre New Zealand (RCCNZ) that the helicopter was overdue. The last known radar position monitored by Airways NZ was near Raglan Harbour, Waikato on the slopes leading towards Mt Karioi.

4. The RCCNZ coordinates searches involving missing aircraft or vessels, the activation of emergency beacons, and searches that require greater resources than can be provided by Police. These are described as SAR Class III searches.

5. The RCCNZ in its present form with 17 staff operates 24 hours a day and is managed within Maritime New Zealand. It was established in July 2004. From its opening to June 2005 it coordinated 871 SAR incidents. Prior to July 2004 the management responsibility was with the Civil Aviation Authority of New Zealand.

6. The RCCNZ was responsible for this search and once notified immediately began coordinating enquiries to locate the helicopter. The search escalated through varying stages per RCCNZ Standard Operating Procedures including nearly 400 hours of aerial searches (mainly helicopter) and land searches over six days covering significant parts of the west coast and inland North Island from

¹ *The Search and Rescue Council consists of chief executives or senior level executives of:*

- *The Ministry of Transport (Chair)*
- *New Zealand Police*
- *New Zealand Defence Force*
- *Civil Aviation Authority of New Zealand*
- *Maritime NZ*

² *A time nominated by the pilot after which Airways NZ will notify RCCNZ that a search should commence for them. Airways allow 15 minutes after the SARTIME before calling RCCNZ*

Raglan to Wanganui. The weather during the first days of the official search was far from ideal for searching. The unusually large search area was necessary and appropriate due, at one level, to the paucity of definitive information (i.e. nothing beyond the last known position near Mt Karioi), but on the other hand innumerable reports of alleged sightings and other seemingly credible public leads. The actual area of the crash site had been RCCNZ's highest predicted location of the helicopter and was searched by air on at least four occasions during the official search. In total the search covered approximately 16,000 sq km. Costs for the aerial search amount to around \$815,000. This was considered to be amongst the largest and most complex search for some years and the first of this magnitude for the RCCNZ. The last search of this type was in January 2004 for a missing helicopter in Fiordland.

7. After an extensive review of the SAR response to date by Maritime NZ (non RCCNZ staff), RCCNZ, NZ Police, LandSAR and Civil Aviation Authority, on 10 November 2005 in accordance with their standard operating procedures the RCCNZ recommended to the Director of Civil Aviation that the search be suspended. The advice to the Director of Civil Aviation was that the search had been extensive including several aerial searches at the point of the last radar track for the aircraft. The highest probability was that the aircraft had suffered a high impact crash, most probably in hostile terrain, resulting in the death of the two persons on board. The conclusion therefore was that further air search effort was unlikely to find survivors. The Director prior to suspending the search exercised his prerogative to direct further searches of two areas, one of which contained the crash site. Both of these searches failed to provide any further information. Accordingly the search was suspended. When a search is suspended activity ceases until new information comes to light which indicates a "reasonable probability of survivors"³ – at which point the search would be re-activated by RCCNZ or by Police in the event of body recovery. In this case the suspension decision was criticised by the family as being premature and the Review makes several recommendations to improve search suspension methodology.

8. The family began a private search on 5 November 2005 using 11 helicopters. When the official search was suspended on 10 November 2005 they continued their search. They based themselves at Taupo and used LandSAR technology to store, analyse and direct their search effort. The family sought to obtain experienced pilots and SAR personnel and co-opted many of the personnel used in the official search for the private search. They used a total of 31 helicopters to fly 975 hours and expended approximately \$1.5 million. The RCCNZ passed all their information (except official logs) to the private search once the official search was suspended.

³ (IAMSAR Manual – this is also reflected in RCCNZ SOPs paragraph 8.1. see also Appendix 10 for extracts from IAMSAR Manual and RCCNZ SOPs regarding search suspension)

9. On 19 November 2005 the helicopter was located in a gully on the slopes of Mt Karioi just south of Raglan. This was adjacent to the initial point indicated by the radar track and had been searched aerially several times by the private and official searches. The small steep gully in an open paddock contained a small patch of bush 13 metres wide and 120 metres long (note that the diameter of the helicopter's rotor blades is approximately 10 metres) yet the helicopter was completely hidden within it. If it had crashed a metre either side it was likely to be readily seen in pasture. Upon impact part of the bush was cut and enveloped the helicopter which did not become readily apparent until some bush 'die back' occurred several days later. Local farmers, land searchers and several searching helicopters landed adjacent to the crash site and did not detect it. Given the adjacent bush clad Mt Karioi and the very small area of the gully this may have appeared a most unlikely place for the helicopter to be located.

10. The impetus to re-search the area where the helicopter was located on 19 November resulted from a helicopter pilot used on the official search who conducted his own analysis of the radar track and concluded that it was 693 metres in error, and the pilot was in trouble due to changes in air speed and direction. Once his analysis was understood a 'forward looking infra red' (FLIR) equipped helicopter flew over the site, noticed bush 'die back' and was able to visually detect the crash site. The weather conditions in the early days of the search had been unfavourable for FLIR and the bush 'die back' would only have become apparent some days after the event.

11. ZK-HTF carried a modern Kannad 406 distress beacon. It appears that it was serviceable at the time of the incident but on impact, the aerial attached to the fuselage snapped off and no discernable signal emitted. While beacons remain an important safety device for aircraft, this incident has heightened interest in aircraft of this type having a flight tracking system installed. Systems of this type are currently under evaluation as a flight safety device by CAA and the Aviation Industry Association.

12. The RCCNZs ability to cope with the 'surge' of information this incident generated proved difficult. Given that this was one of the biggest operations in New Zealand's SAR history, coming within 18 months of the inception of RCCNZ, this is at one level understandable. Nevertheless, given the rare but not discountable probability of a similar event in future years, the Review recommends a 'whole of government' approach to utilise the skills and experience of other organisations that are involved in SAR work such as CAA, Police, Defence, LandSAR, Maritime NZ and other transport sector staff. These organisations can help in areas such as searching, enquiries, intelligence collection and analysis, media liaison, resource supply and communications. Protocols and exercising have been recommended to develop a cohesive approach.

13. During this incident the RCCNZ appointed two On Scene Coordinators. One was an experienced police LandSAR coordinator and the other an experienced pilot with SAR coordinator experience. Issues regarding conflicts of interest were alleged against the experienced pilot because of his ownership of helicopter companies. The Review did not find he acted improperly. Nonetheless the Review recommends that those with a commercial interest should not be involved in this role because issues relating to conflicts of interest can arise.

14. Police are the key agency to liaise with relatives. With many searches this liaison can be accomplished by the Police liaison officer attached to the RCCNZ, however in prolonged and complex searches such as this incident a significant part should be undertaken by local police at a personal level. The Review makes recommendations that would alleviate many of the concerns expressed by the next of kin in this instance.

15. A brief overview of the developments in the New Zealand SAR system since 2001 has been provided by RCCNZ and is included at Appendix 11.

16. The Erceg family have been consulted regarding this report and have provided a summary of their views at Appendix 11.

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Glossary of Terms

AREC	Amateur Radio Emergency Communication
BOP	Bay of Plenty
CAA	Civil Aviation Authority
CIMS	Coordinated Incident Management System
COSPAS-SARSAT	Search and Rescue Satellite Aided Tracking
DF	Direction Finding
ELT	Emergency Locator Transmitter
FLIR	Forward Looking Infra Red
GMT	Greenwich Mean Time
GPS	Global Positioning System
IAMSAR	International Aeronautical and Maritime Search and Rescue
ICAO	International Civil Aviation Organisation
IMO	International Maritime Organisation
LandSAR	Land Search and Rescue
MFAT	Ministry of Foreign Affairs and Trade
NRCC	National Rescue Coordination Centre
NZDF	New Zealand Defence Force
ODESC	Officials Committee for Domestic and External Security Coordination
OSC	On Scene Coordinator
PLO	Police Liaison Officer
RCC	Rescue Coordination Centre
RCCNZ	Rescue Coordination Centre New Zealand
SAR	Search and Rescue
SARO	Search and Rescue Officer
SMC	SAR Mission Coordinator
TOR	Terms of Reference
UTC	Coordinated Universal Time

Introduction

1. On 5 December 2005 I was contracted by the Chair of the Search and Rescue Council (Secretary for Transport) to undertake an “Independent Review” in respect to the search to locate a Eurocopter EC 120B helicopter ZK-HTF piloted by Michael Erceg and his passenger Guus Klatte (a Dutch national). This privately owned helicopter had taken off from Papakura with the intention of flying to Queenstown on Friday 4 November 2005. The helicopter was reported missing that day and not located until Saturday 19 November 2005 at a point just south of Raglan on the slopes leading to Mount Karioi. (Location: S37 degrees 51 minutes .171, E174 degrees 49 minutes .757).
2. The Search and Rescue Council (the Council) was established by Government in 2003 and currently comprises:
 - a. Secretary for Transport (Chair);
 - b. Commissioner of Police;
 - c. Air Component Commander, New Zealand Defence Force;
 - d. Director of Civil Aviation; and,
 - e. Director of Maritime New Zealand.
3. The Council provides high level strategic governance to all search and rescue agencies and its functions are to:
 - a. Provide strong strategic coordination for all search and rescue in New Zealand;
 - b. Provide strategic policy advice to government;
 - c. Be responsible for developing and maintaining a New Zealand search and rescue plan; and,
 - d. Be responsible for establishing a New Zealand search and rescue vision, mission and goals.
4. The Council is supported by a Secretariat, located at the Ministry of Transport, Wellington.
5. The responsibility for the coordination of land based and inland waters and inshore searches and rescues rests with NZ Police. Searches of this type are classified: Class I or Class II searches.
6. SAR incidents involving activated emergency locator transmitters; missing or distressed aircraft; and missing or distressed surface vessels or aircraft requiring the use of national and international civil and/or military resources, or coordination with other states are termed Class III incidents.

7. Class III incidents are co-ordinated from the Rescue Coordination Centre New Zealand (RCCNZ) based in Avalon, Lower Hutt. The operating mandate is contained in an extract from the Civil Aviation Act and is attached at Appendix 1 (It should be noted that the legislation was amended in 2004 to allow the Minister of Transport to enable the RCCNZ to be managed within Maritime NZ).

8. The RCCNZ coordinated the search for this missing helicopter.

9. Since July 2004 the RCCNZ has been managed by Maritime NZ and operates a 24 hour service 365 days a year. Prior to July 2004 a centre was managed by the Civil Aviation Authority that did not give the same 24 hour manned service, but provided an 'on call' service for part of the day.

10. Following the location of the missing helicopter on 19 November a debrief conducted by Maritime New Zealand and chaired by Chris Raley the General Manager of the RCCNZ was held on 7 December 2005. I was able to attend the Operational Debrief and from it I gained insight into the events that had occurred. This considerably aided my subsequent review work.

11. I have read a range of documents containing the operating procedures for SAR internationally and within New Zealand as well as the minutes of the Operation Debrief and several reports related to the management of SAR in New Zealand.

Approach Taken

12. The approach I took to this Review was to initially speak to Michael Erceg's family and close business associates. The family had been referred the Terms of Reference (TOR) and had responded with comments which once seen I felt could be incorporated into this report. These comments are attached at Appendix 2. I have also had limited contact with Guus Klatte's next of kin through email and telephone.

13. It was expected that I would commence my work following the Christmas 2005 break. By coincidence I travelled at that time to Canberra, Australia to visit my daughter. Canberra is the headquarters of the Australian Maritime Safety Authority who operate the Australian Rescue Coordination Centre (Australian RCC) and is responsible for the reception of COSPAS-SARSAT distress beacon system. This system is an international satellite aided tracking system which through polar orbiting satellites is able to detect distress signals from radio beacons. Michael Erceg's helicopter ZK-HTF carried the advanced 406 MHz beacon which when activated was intended to alert this system. On 21 December 2005 I visited the Australian RCC and was briefed on the system and information regarding the search for ZK-HTF by senior officers of that organisation.

14. On 10 January 2006 I commenced interviewing persons that I considered pertinent to this inquiry. I started with family, although did not see Ivan Erceg until 20 January due to his being out of the country. I made

contact with the deceased Klatte's next of kin and business associates by phone and email.

15. Following speaking with connections of the Erceg family I began a series of interviews of pilots and observers in Auckland, Taupo, Wanganui and Palmerston North who had been involved in the search so that I could get an appreciation of how the operation unfolded. I also spoke to officers of the New Zealand Police Air Support Unit at Auckland (known as Operation Eagle - who were not involved in the search).

16. I interviewed Maritime New Zealand Senior Management, Police, Defence, Civil Aviation Authority, Airways NZ and LandSAR personnel who could provide specialist advice or participated in the search. There were two On Scene Coordinators (OSC) involved in this operation and I have spent time discussing this operation with them. Headquarters Joint Forces New Zealand (New Zealand Defence Force) gave me advice regarding new SAR technology that was not already available for SAR in NZ. They indicated to me that it had potential as being useful in locating persons or the aircraft subject of this search.

17. In Taupo I was able to discuss aspects of the search and in particular, the beacon distress system with Tom McCready, the CAA Safety Investigator responsible for investigating this accident. On 20 January 2006 in the company of the Safety Investigator I visited the site of the accident just south of Raglan. We were grateful for the Police Operation Eagle helicopter for ferrying us to the site. This enabled me to appreciate the site of the crash as well as gain an appreciation of the terrain and ground cover that the searchers were confronted with in their search. A further understanding of the search area was gained by speaking with the owner of the property and his farm manager.

18. As I progressed the Review I was urged to speak to other helicopter operators who had wished to express a view regarding this search. Much of what they told me has been incorporated into my comments in this report. Whilst I spoke to all those that sought an interview and those said to have something to offer, I was not able to speak to all involved in the search. However, I feel I have spoken to sufficient numbers to represent a general view of suggestions and comments within the industry. I noted that the industry operates within a highly commercial environment and as a consequence there is some disharmony resulting in various views being given on the same topic.

19. The terms of my contract in conducting this Review included the following:

"The purpose of this review is not to allocate any fault or to pre-empt or duplicate any other inquiry into this incident. Specifically, the review will not cover the cause of the crash. Rather, it is to provide a prompt investigation of the organisation and execution of the search

to enable implementation or any improvement in current arrangements and procedures that may be necessary.”

20. Therefore the focus of my review was more to develop improvements in searches of this nature rather than seeking and allocating fault. The Erceg and Klatte connections in my discussions approved this approach to my work.

21. In total I spoke to 82 persons. A full list of those interviewed is included at Appendix 3.

22. Everyone I spoke to was very co-operative and special thanks must go to Ivan Erceg, Floor Heering, Roger Smith and Tony Wenlock of Independent Liquor for their frankness and co-operation in passing to me their information of the private search. Chris Raley and his staff at the RCCNZ were totally open and gave me all the information that I requested which was greatly appreciated. Thanks also to Duncan Ferner of the SAR Secretariat, for his administrative support.

Structure of Report

23. This report has been structured to reflect the requirements of the Terms of Reference (TOR) which for clarity is set out here and further outlined at Appendix 4:

1. To gain an understanding of the sequence and times of events relating to the incident between 4 and 19 November 2005.
2. To ascertain whether the current search and rescue arrangements and procedures were followed by RCCNZ and the other government agencies that were involved.
3. To ascertain whether the current arrangements and procedures are appropriate for an incident of this nature.
4. To comment on the role of the On Scene Coordinators, their training, experience, and relationship with the Search and Rescue Mission Coordinator, their ability to implement the RCCNZ SAR action plan and any conflicts of interest that may have arisen.
5. To review the effectiveness of the search and detection of the missing Helicopter including the suitability of the SAR units tasked.
6. To review the facts regarding the role of the distress beacon in this incident.
7. To review current arrangements regarding RCCNZ's SAR mandate in accordance with the Performance Agreement and search suspension criteria and its application in this incident.

8. To review the interaction between the official search and that arranged privately and recommend mechanisms for the future.
9. To review family liaison and support arrangements and recommend methods for their effective management.
10. To make recommendations to the New Zealand Search and Rescue Council, as appropriate, by 31 March 2006.

Terms of Reference Item 1. To gain an understanding of the sequence and times of events relating to the incident between 4 and 19 November 2005.

24. **4 November 2005.** ZK-HTF a late model Europter 120B with the owner and pilot Michael Erceg and a passenger Guus Klatte (a business colleague from Grolsch Brewery Holland) took off from Michael Erceg's home at Papakura at around 0945 hours on Friday 4 November 2005 for a scheduled trip to Queenstown. The weather on part of this route near Raglan was described as having strong off shore winds with low cloud and poor visibility.

25. **Flight Plan.** Michael Erceg filed a flight plan with Airways at 2210 hours on Thursday evening the day prior to his intended departure. The flight plan indicated his intended route as Papakura to Wanganui taking 2 hours. 30 minutes on the ground at Wanganui. Wanganui to Rangiora taking 2 and half hours with 30 minutes on the ground at Rangiora. His intended travel time from Rangiora to Queenstown was indicated as 2 hours. This is a total time of 7 and half hours.

26. The flight plan indicated a SARTIME⁴ of 1600 hours. The flight plan does not include any departure time and in this case Michael Erceg commenced his journey at 0945 hours on Friday 4 November and if he followed his flight plan would not arrive in Queenstown until 1715 hours, some one and a half hours after his nominated SARTIME. There is an element of confusion in this process.

27. Flight plans should include a departure time to rectify this, so as to remove any ambiguity in SARTIMEs and actual intended times of arrival.

28. It is to the credit of RCCNZ that they picked this discrepancy up early, but still maintained their impetus with enquiries to locate the helicopter.

29. During this flight Michael Erceg did not communicate with Airways NZ Flight Information Service. If he had, progress on his journey would have been monitored and made subsequent rescue procedures more precise. It is suggested that flight planning procedures should include regular verbal progress reports to the Flight Information Service whilst en route.

30. **Communications Search.** At 1613 hours on Friday 4 November 2005 the RCCNZ was informed by Airways NZ that this aircraft had passed its SARTIME. The RCCNZ immediately put their processes into place for an overdue aircraft and commenced what is termed a 'communication search'. This entailed telephoning Rangiora and Wanganui, the two refuelling stops indicated in the flight plan, and Michael Erceg's wife. These calls generated further telephone calls from RCCNZ of potential refuelling stops which may

⁴ A time nominated by the pilot after which Airways NZ will notify RCCNZ that a search should commence for them. Airways allow 15 minutes after the SARTIME before calling RCCNZ

have been made by Michael Erceg. This included enquiries through fuel suppliers using Michael Erceg's fuel account numbers. Calls to Michael Erceg's and his passenger's cell phones brought no result.

31. The Australian Rescue Coordination Centre was contacted at 1719 hours and asked to attempt to trace the helicopter through the COSPAS-SARSAT distress beacon system. There was no detectable signal after considerable work to trace any signal from ZK-HTF.

32. **Distress Phase.** At 1851 hours on 4 November 2005 the RCCNZ described the search as being in the 'Distress Phase'. This phase *'exists where there is reasonable certainty that an aircraft is in danger and requires immediate assistance.'*⁵ Whilst telephone enquiries continued, the Police were notified and requested to physically check the Queenstown Airport for the aircraft. Radar checks were sought through Airways NZ at 2034 hrs. Throughout the evening there were various calls to the family and interaction between the RCCNZ and search and rescue personnel who were preparing to commence a search the next morning. The RCCNZ plan was to search the areas of highest probability between Ardmore and Wanganui early next morning. During the evening the RCCNZ with the assistance of their media officer issued press releases and gave several radio interviews seeking information on ZK-HTF.

33. Various calls were received from helicopter companies and fixed wing pilots on Friday evening offering their support and several of these were tasked by RCCNZ to commence flying at around first light on the Saturday morning.

34. **Saturday 5 November 2005.** Early on the Saturday morning RCCNZ tasked a fixed wing aircraft to search from Raglan to Wanganui to listen for beacon signals and conduct a visual search. Helicopters were tasked to saturate the area around the Mt Karioi area near where the last radar plots were recorded.

35. The Erceg family chartered helicopters and they were in the Raglan area joining the official search and conducting their own search in the area. There was concern by some pilots that there appeared to be little coordination of the private and official helicopters on this day creating safety issues. RCCNZ, realising this, appointed John Funnell of Taupo as an 'On Scene Coordinator' late in the day.

36. On 5 November 2005, a Police SAR group from Hamilton was contacted through RCCNZ by the Police Liaison Officer and told of the last radar sighting near Raglan and asked to attend. They deployed to Raglan and took up a headquarters position in the Raglan Fire Station. They took direction from RCCNZ Police Liaison Officer and acted independently of the air search. They were deployed to conduct ground searches in the area around Mt Karioi and various sites that had been identified by air as having

⁵ RCCNZ Operations Manual.

broken foliage. They commented that they spent considerable time 'waiting around for things to do', and were not briefed on the overall scope or history of the search effort.

37. **Sunday 6 November 2005.** Early in the morning John Funnell and the Taupo LandSAR management group (Taupo Group) arrived at Raglan and put some order to the search by directing aircraft to search specific areas. They based themselves at the Raglan Camping Ground. RCCNZ defined a wide area for search and the Taupo Group divided this into smaller blocks for aircraft to search. Pilots joining the search were given a defined area and a GPS device and tasked to search that area. Upon return they would download their GPS track to a mapping data base and be tasked with another area to search.

38. Concurrently, Sergeant Bill Nicholson, the SAR Coordinator for the Palmerston North Police, was appointed the On Scene Coordinator based at the Wanganui Aero Club. His task was to conduct a search 'in the high country' to the north of Wanganui. Following planning searching commenced with five helicopters at 1500 hrs until dark, generally using the same process as that of the Taupo group.

39. **Monday 7 November 2005.** The Taupo group based at Raglan moved their search south to the Mokau river area and further south towards Wanganui. They moved their base from Raglan to New Plymouth. It seems that there may have been an overlapping of search areas from the Funnell group with that of the group lead by Bill Nicholson. The group based at Wanganui increased their search area to Patea Dam/Hawera and from north Raetihi to Wanganui.

40. **Tuesday 8 November 2005.** The Taupo group relocated to Raetihi continuing to increase the range of their search. The Wanganui based team was tasked to prepare for a search of a straight line track from Patea Dam to Wanganui (9 nautical miles either side) but was stood down whilst a reassessment of the search was made.

41. **Wednesday 9 November 2005.** Searching by official aircraft was suspended while RCCNZ conducted a comprehensive review of the information they had to hand, the effectiveness of the search which resulted in a decision to search again the area around Mt Karioi with Forward Looking Infra Red (FLIR) equipped aircraft and if that was unsuccessful to search an area of interest west of Ohura.

42. **Thursday 10 November 2005.** Following the RCCNZ review, the Director of the Civil Aviation Authority (CAA) directed a further search in the Mt Karioi area around the last known radar plot and the area about Mokau where enquiries indicated sighting of the missing helicopter. Further searches were conducted about Mt Karioi and inland towards Ohura and an area about the Mokau river.

43. Following these searches the Director CAA, on advice from the RCCNZ, suspended the search.

44. Throughout this time the RCCNZ were receiving reports from the public of helicopters in various parts of the North Island and these tended to generate particular searches. The RCCNZ struggled with the amount of information that was being received, but it was these enquiries that began to drive some of the search effort. A particular sighting, from several differing sources and considered reliable was that of an identical helicopter which was seen at the mouth of the Mokau river. This sighting was given particular emphasis.

45. **Thursday 10 November - Saturday 19 November 2005 – Private search.** The family generated enquiries through this time to obtain technology that might be helpful in identifying the whereabouts of the helicopter or its occupants. They established that there was available technology in The Netherlands that might identify the location of cell phones. Their enquiries indicated that if New Zealand Police asked for this equipment then it would be provided through a Memorandum of Understanding between the two Police agencies. Consequently telephone discussions were held between Dutch and NZ Police resulting in two Dutch Police Officers arriving on 10 November 2005 with equipment described as a mobile cell site capable of communicating with particular cell phones. The intention was to place this equipment in an aircraft and fly over areas where the crashed helicopter was thought to be.

46. This equipment was effectively placed under the control of the private search and the Police Officers. This equipment made sweeps over the area of Raglan to Wanganui over the next several days in an effort to locate the cell phones of the two missing persons. This did not result in finding them. I am advised that to be successful, the cell phones would be required to be turned on and the battery having some charge left. Modern cell phones apparently have mechanisms to conserve battery power and could remain with some power for up to a week.

47. With the official search being suspended the private search continued. The search was principally led by Roger Smith, a director of Independent Liquor. It was based at Taupo and utilised experienced aviation operators and LandSAR personnel. They used LandSAR information and mapping technology.

48. RCCNZ passed over all their information (except the incident log) to the private search and this was downloaded into the LandSAR technology. The private search continued to share their information with the RCCNZ. Whilst the official search was suspended the RCCNZ continued to consider their options regarding locating the missing aircraft including holding discussions with other government agencies. This also included discussing various aspects with Roger Smith of Independent Liquor. Police also appointed a Liaison Officer to the private search headquarters who maintained regular daily contact.

49. The private search had their day to day operation based at the Raglan Motor camp. Both ground and air searches were managed through this site. A person responsible for the ground search was linked to the air search controller. When the ground search required the use of air support, it was provided. An example of the type of air support is ferrying ground search personal to the site of enquiry, and removing ELT tracking personnel from mountain tops.

Radar Tracking

50. The RCCNZ concentrated their initial search on the point where Airways NZ indicated the missing helicopter had last been tracked through radar. Throughout the search both official and private groups did their own analysis of data and information that came to hand. For some of the searching this was the catalyst that took them to particular areas. There were also individuals who undertook to analyse data of their own accord, and in their own time.

51. Significant amongst them was Darryl Sherwin, a pilot for Helilink and the Westpac Trust Rescue Helicopter based in Auckland at Mechanics Bay. In Mr Sherwin's words his motivation "was to help locate a pilot in need". He is an experienced helicopter pilot as well as a fixed wing pilot and is undertaking studies towards a Bachelor of Aviation Management, including completed papers in air accident investigation. He is a keen aviator.

52. On 9 November the Westpac Rescue Helicopter piloted by Mr Sherwin along with the crew was tasked to fly to the last known radar position of ZK-HTF at Mt Karioi whilst being tracked on radar by Airways NZ to establish the radar coverage at that location. Further tasking required the crew to carry out an aerial search of the area as well as uplift and transport SAR members from Mt Karioi.

53. It was the following day that Mr Sherwin requested and was faxed copies of ZK-HTF and the Westpac Helicopter radar tracks from RCCNZ. Armed with this information he studied this data over a period of days (including working till early hours of the morning some days) and concluded that

- a. the radar track was in error by 693 metres to the East: and
- b. the pilot was in trouble due to erratic changes in airspeed and headings.

54. Mr Sherwin marked out a small area of potential search on the slopes of Mt Karioi. This information was conveyed by email to the RCCNZ at 0939 hrs and at 1024 hrs on 15 November, who then passed it onto the private search organisation. Later that afternoon at 1727 hrs Mr Sherwin returned a missed cell phone call to a member of the private search team and explained his calculations.

Location of missing persons

55. It seems that this information was not well understood until Saturday 19 November at approximately 1630 hrs when Mr Sherwin and John Funnell spoke to each other by telephone. Mr Sherwin explained his data, reasoning and search area location. When Mr Funnell and others put this information together with their analysis of apparent emergency beacon signals, it became clear that the precise area was highly likely to contain the crashed aircraft. (Warren McKay an experienced fixed wing pilot of Taupo worked with the private search examining and mapping beacon intermittent 121.5 signals over a number of days – it is possible that some of these signals were faint signals emanating from ZK-HTF). Immediately Mr Funnell now employed by the private search, with LandSAR and Police personnel flew to the area. A FLIR device was deployed and when they flew over a small gully on the south side of Mt Karioi the Police observer noticed dying bush and a small amount of wreckage protruding. Simultaneously the FLIR detected some wreckage. The weather on this day was fine and more conducive to effective use of the FLIR. They landed in the adjacent paddock and the missing persons were located at about 1830 hours.

56. It is clear that many searching aircraft over-flew this area. It was in the designated search area nominated by the RCCNZ and reports were received by them that the area had been searched. It is logical that many of those involved would have concluded that the small amount of bush would be unlikely to have concealed the missing aircraft and the focus would have been on the nearby large tract of bush on Mt Karioi. Indeed, many of those involved in the aerial search commented to me that the mindset of the searchers regarding the location where ZK-HTF was eventually found was that it was an open area and any wreckage ought to be easily observed.

57. The actual bush was only 120 metres long and 13 metres wide. The rotor span of ZK-HTF was 10 metres. If ZK-HTF had landed a metre either way it is likely its protrusion would have been very noticeable. The photographs in Figures 1 and 2 depict the site (circled) and visually display this. I have been informed that the area suffers from poor radar contact.

Figure 1 Location of ZK-HTF



Source: NZ Police

Figure 2 Location of ZK-HTF Closer View.



Source: NZ Police

Terms of Reference Item 1. Recommendations

- a. Flight plans should include a departure time so as to remove any ambiguity in SARTIMES and actual intended times of arrival.
- b. Flight planning procedures should include regular verbal progress reports to the Flight Information Service whilst en route.

Terms of Reference Item 2. To ascertain whether the current search and rescue arrangements and procedures were followed by RCCNZ and the other government agencies that were involved.

58. Following procedures will assist in achieving a methodical, structured and successful operation, but it is to be stressed that merely following procedures laid out in a manual may not result in an efficient and effective search.

59. The principle arrangements for conducting a search of this nature are contained in the "RCCNZ Operations Manual". The Manual details the management structure, responsibilities and operating procedures for the delivery of Class III SAR Services. It indicates that it is a dynamic document needing to be regularly and or frequently updated. An important feature is that it contains the following statement:

*"It is important to note the various aide memoirs are **not** checklists to be blindly followed but rather guidelines to assist the SAR Mission Coordinator (SMC) and Search and Rescue Officer's (SARO) in their duties. Because no two searches are ever the same it is acknowledged that actions may be carried out in different sequences to that set out in this manual and aide memoirs depending upon circumstances of the moment."*

60. The document is comprehensive and has been drawn up from manuals used by the previous National Rescue Coordination Centre, the Maritime Safety Authority's Maritime Duty Officers manual and the current ICAO/IMO⁶ IAMSAR⁷ manuals. It seems to me that much is drawn from the latter document which consists of several volumes and appears highly detailed in nature.

61. I have examined these documents and it appears to me from the very detailed RCCNZ log and interviewing those involved, that the procedures were generally followed.

62. The other document giving guidance in this matter is the Police Manual of Best Practice, Chapter Search and Rescue. This document is somewhat outdated being published in 1994, but the parts relevant to Class III searches are more general and remain relevant. (Police intend to update this document in the near future) The procedures outlined appeared to have been followed.

63. The RCCNZ Operations Manual inherently suggests good co-operation and communication with all government and non government agencies involved in the management and execution of searches and this should be given a high priority.

⁶ International Civil Aviation Organisation/International Maritime Organisation

⁷ International Aeronautical and Maritime Search and Rescue

Terms of Reference Item 2. Recommendations

Nil

Terms of Reference Item 3. To ascertain whether the current arrangements and procedures are appropriate for an incident of this nature.

64. As indicated the current arrangements are outlined in some detail in the RCCNZ manual. This manual is copious and in danger of being overly prescriptive in nature. The section related to Incident 'Termination or Suspension' however, gives good guidance in the vexed and difficult question of suspending searches.

65. **RCCNZ Image, Branding and Skill Set.** The RCCNZ is responsible for coordinating major aviation and maritime Search and Rescue operations in New Zealand's SAR Region which stretches from mid-Tasman sea to halfway to Chile, and from Antarctica almost to the Equator. It provides coverage 24 hours a day, 365 days a year. It is managed by Maritime New Zealand and is located at Avalon, Lower Hutt. The RCCNZ in its present structure is relatively new having opened in July 2004. The management responsibility for this role was previously with the Civil Aviation Authority (CAA). The management role of Maritime NZ has resulted in some misperceptions by persons who are not familiar with it. A frequent comment was that 'they are all mariners and would know nothing about aviation'.

66. I sought to establish the experience and skill sets of the staff in RCCNZ. RCCNZ has 17 staff. They have extensive knowledge and experience of the aviation, land, maritime, medical and search and rescue environments. Regardless of their prior experience in search and rescue, all of them completed a three month long, purpose designed, course on Search and Rescue Mission Coordination plus extensive introductions to the maritime and aviation sectors. A brief background on the staff is attached at Appendix 5.

67. In this operation they additionally called upon an experienced rotary wing pilot to provide advice in this aspect of aviation.

68. The RCCNZ has a good mix of staff with an aviation, maritime and policing background, but the perception exists that they are maritime focussed and because of this, Maritime NZ should give consideration to rebranding the RCCNZ to signify their wider role of aviation, marine and land based searches.

69. **Coping with large searches.** Searches of this magnitude occur infrequently, at indeterminate times and with unpredictability. The most recent comparable incident occurred in January 2004 relating to a missing helicopter in Fiordland which remains missing. The RCCNZ needs to be able to cope with surges of effort to accommodate searches of this nature.

70. The model of operating to withstand surges of activity exists already in the New Zealand public sector. Examples occur in civil defence, counter terrorism and for significant health threats. Government, through its many

agencies, has a capacity to come together when required to cope with larger incidents. This is practised on a routine basis. At the top end of this structure is a group known as ‘The Officials committee for Domestic and External Security Coordination’ known more commonly as “ODESC”. The SAR Council is the basis for this form of liaison and signals the potential for the provision of additional resources if required in the event of major searches.

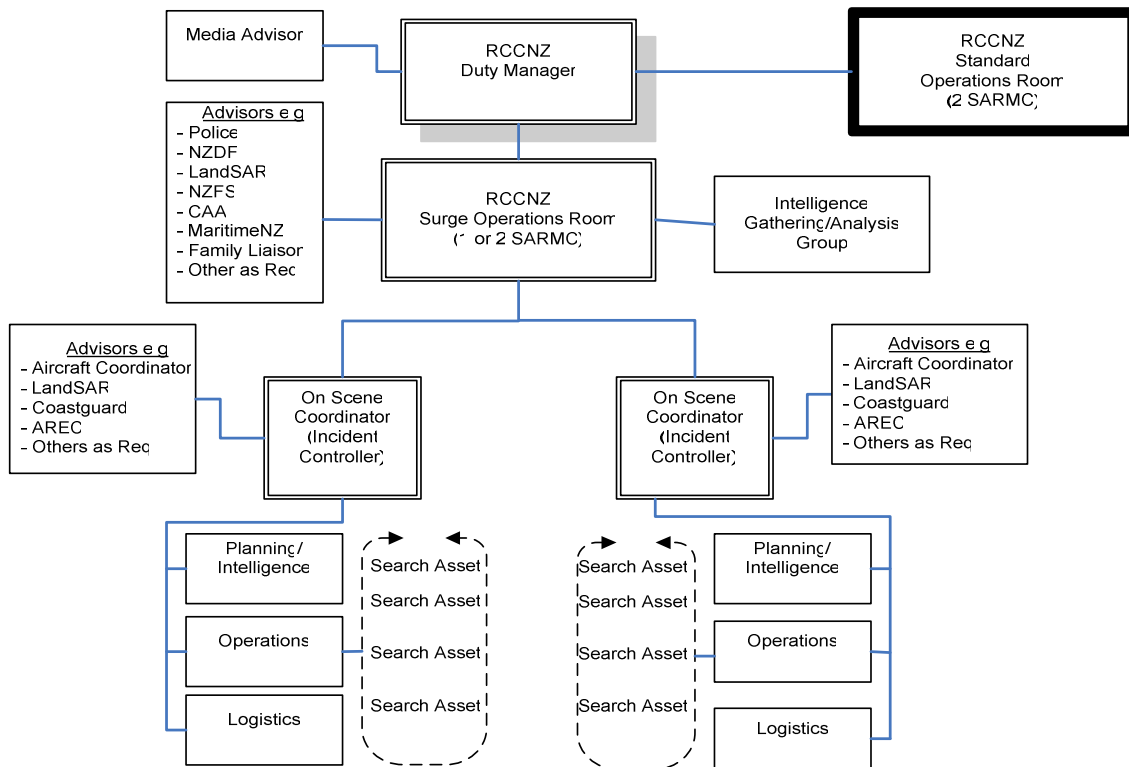
71. From talking to the various police and defence personnel that work in the RCCNZ for major operations, I gained the impression they act like liaison officers and are not involved in the decision making process or the management and analysis of the data being received. I feel that the RCCNZ would gain by involving them more in the entire planning and management of a major search and they should be seen and utilised as a conduit for drawing on the resources of their parent organisation. Police and Defence personnel are routinely called to the RCCNZ for searches, however consideration should be given to training and maintaining a small group of qualified Air Directing Officers selected from suitably qualified CAA staff. They could be utilised in any significant searches involving large numbers of aircraft or missing aircraft. Various aspects of management are discussed below.

72. **Management of large searches.** This search was principally led by RCCNZ in their main operations room. This room contains all the equipment to manage the day to day business of the RCCNZ. Throughout this search they conducted their normal business including other searches, beacon distress calls and other general administrative tasks whilst at the same time, managing and leading the ZK-HTF operation.

73. The role of the Search and Rescue Mission Coordinator would have been made easier had the control for this search been moved to other rooms, which could be made available, adjacent to the general RCCNZ operations room. Staff could have been left to concentrate solely on this search and not be distracted by the other day to day business of RCCNZ. Staffing for this arrangement may be seen as a major impediment, but this can be alleviated by drawing on the resources of the other agencies that routinely join the RCCNZ for significant operations i.e. Police, Defence, LandSAR, CAA, etc as discussed above. A suggested structure to enable effective surge capacity is shown below in figure 3.

Figure 3 Search and Rescue Large Search Organisation

Search and Rescue Large Search Organisation



74. **Relationships.** Search capability cannot be managed by a strict hierarchy of orders and compliance. It is entirely dependent on prior planning, cooperation and negotiation. This requires that effective and practised relationships be developed amongst the various groups that are involved in SAR operations. It is apparent that tensions currently exist between various government and non-government agencies concerned with SAR in New Zealand. I perceive that some tend to be overly focussed on their own activity to the detriment of the wider SAR community. All however, profess that they are keen to resolve any issues and wish a collaborative and effective SAR organisation to result. I understand the SAR Council is aware of these issues and is taking steps to effect a more cohesive SAR organisation for New Zealand. Confidence in the RCCNZ is low amongst the general aviation community that I spoke to, especially in the Auckland area and work needs to be done to raise these confidence levels.

75. Good relationships do not happen merely because of legislation or procedural decree. Each group involved has its own history, culture, codes of practice and ways of doing things. These factors need to be taken into account and respected while at the same time developing effective, sustainable relationships and working procedures. Routine exercises both real and 'table top' are necessary to develop systems and relationships. I

note that in the RCCNZ regular exercises are planned and these should be supplemented by regular (less costly and resource hungry) 'table top' exercises that include external supporting agencies.

76. **Coordinated Incident Management System and International Aeronautical and Maritime Search and Rescue.** Within New Zealand the Coordinated Incident Management System (CIMS) model of operating has been developed to allow organisations to come together and work on a common objective. It is a system that is used by a range of organisations involved in SAR, emergency service, Maritime New Zealand in Oil Pollution response and those involved in civil defence. The CIMS system is taught at tertiary level for LandSAR at a management level at the Tai Poutini Polytechnic, West Coast.

77. RCCNZ operates under the International Aeronautical and Maritime Search and Rescue (IAMSAR) model which is approved by the IMO and ICAO. It is recognised that when dealing with international groups that the IAMSAR system is appropriate. However, for NZ land based searches where several local organisations are used, then RCCNZ should adopt the CIMS model when relating to external organisations to avoid ambiguity and confusion. For Police, LandSAR and other local agencies to adopt IAMSAR systems would be overly complicated and likely to create misunderstandings. (For instance adopting universal time coordinated (UTC) or GMT would create major difficulties). RCCNZ is moving towards this model when dealing with NZ based external New Zealand SAR Agencies while retaining its international obligations to maintain the IAMSAR model.

78. **Data Capture and Analysis.** A key area of criticism of RCCNZ (which they have identified themselves) was in the area of managing the large amounts of data and information that came quickly into the RCCNZ. Following the initial media releases, information began flowing into the RCCNZ in relation to the search. Enquiry results and information from the OSC was fed directly back to RCCNZ which had little capacity to manage the quantity of information being delivered.

79. Both Police and LandSAR have personnel and procedures to deal with such situations. LandSAR have developed software for managing information flows and analysis specifically for search and rescue. These systems have the support of Police involved in SAR. LandSAR have indicated to me their willingness to assist the RCCNZ with data capture and analysis for future searches.

80. Police also has considerable experience in dealing with large amounts of information and its analysis. Systems and software have been developed to manage and analyse this. Many local Police SAR incident controllers use mapping and other technology such as LandSAR developed software IMAN and GMAN and encouragement is being given for all police districts to migrate to these systems. Police involved in SAR have not generally turned their minds to use of other investigative tools for SAR work. These are used on a daily basis for complex enquiries such as homicides and incidents and could

be usefully deployed in SAR work. I understand that the NZDF also has a number of skilled intelligence operators who may be made available in times of crisis.

81. I believe that the RCCNZ should evaluate options regarding a data capture and analysis (or intelligence) system and train staff in its operation. The RCCNZ should also develop protocols with Police, LandSAR and perhaps the NZDF which would enable the rapid expansion of their intelligence capacity on an as required basis. This should also be practised through table top exercises to develop common understanding and build relationships.

82. It should also be noted that the eventual successful location of ZK-HTF and its occupants was the result of persistent expert analysis of available technical information associated with favourable weather conditions for FLIR, and 'die back' of bush where the helicopter crashed. It is entirely possible that future searches would benefit from such an approach.

83. **Mapping.** Effective searches require the availability of common high quality maps. The lack of consistent interchangeable maps by RCCNZ and the OSCs created some difficulties. Searching aircraft using GPS⁸ technology were able to show the tracks they searched by downloading onto mapping software held by the OSCs. But because the RCCNZ lacked a complementary mapping system, they were unable to receive these reports electronically. This technology is relatively inexpensive and appears to be highly effective but it does need to be standardised throughout the NZ SAR community to enable interoperability.

84. While I am loathe to recommend any particular mapping system, the SAR Council/SAR Secretariat should evaluate the competing products and RCCNZ purchase a mapping system that meets their needs and the needs of the various NZ based SAR agencies. This product could then be commended to the various agencies as the standard SAR mapping software.

85. **Funding.** The relatives of the missing persons queried whether this search was constrained by financial considerations. The Performance Agreement between the Minister of Transport and Maritime New Zealand in relation to the provision of Class III search and rescue contains the following clauses:

- a. *If at any time during the year the authority becomes aware that it may incur an operating or cash flow deficit the Authority shall immediately advise the Minister.*
- b. *Where the deficit is the result of unavoidable or uncontrollable expenditure or extraordinary expenditure arising from an abnormal number or size*

⁸ Global Positioning System

of Class III Search and Rescue operations, the Authority shall apply to the Minister for additional funding from the Crown.

- c. *The Minister acknowledges that the demand for search and rescue services cannot be accurately predicted and that the provision of the services specified in Schedule One must not be constrained through any lack of funding. The Minister therefore undertakes to use his best endeavours to obtain additional Crown funding to cover exceptional operating costs associated with Class III Search and Rescue operations, specifically those operating costs that may necessarily be incurred and are significantly higher than budgeted in Schedule Six.*

86. In practice, the Agency directed to manage Class III search and rescue has always made a case to the Minister when it has experienced greater than normal costs associated with the provision of SAR rescues. I understand that funding has always been provided in such circumstances.

87. The budget for the year ended 30 June 2006 allocated \$366,000 to SAR rescue costs. I am aware that costs beyond budget have likely been incurred on this search. When the final costs of the ZK-HTF search are known, a paper will be prepared seeking reimbursement from the government for the additional costs incurred.

88. This is a common governmental process and is a satisfactory manner of dealing with such contingencies. In this case however, the family was able to expend considerable resources in the search for the missing helicopter (estimated at \$1.5 million) which is likely to be more than was expended by the official search. Invoices for \$815,000 have been received by the RCCNZ for helicopter hire to date. This accounting of the money spent takes no account of the many voluntary hours and resources that were incurred in both the official and private searches.

89. The RCCNZ has a responsibility to manage searches in an efficient manner including managing the cost of searches. In this case, much of the cost of the search related to the hire of helicopters. As will be seen later in this report, much of a helicopter search can be wasted effort unless pilots, type of aircraft and the quality of observers are managed properly. Helicopter searching is a very expensive option for searching (from \$1,000 to in excess of \$2,000 per hour) Hindsight makes solutions to these issues easy, however I believe that improved information gathering systems and better analysis of the information plus better planning may have led to reduced helicopter flying hours.

90. **Media.** An important but often underrated aspect of operations of this type is appropriately dealing with the media. It requires considerable sophistication and planning. Maritime NZ media advisers are used by RCCNZ

and were engaged early in the operation, initiating media releases which in turn generated considerable public interest and response. The media advisers felt under undue pressure because of the intense media interest generated by the search, which in turn put pressure on the overall management of the operation.

91. With respect to resources available to the RCCNZ and Maritime NZ, extra media/communications personnel are available under existing protocols. Transport sector media advisers already meet on a regular basis to prepare for oil spill crises. This group of experts or a similar one created for large SAR events could be used in a case like this if a future need arises.

Terms of Reference Item 3. Recommendations:

- a. Consideration should be given to implementing a program with SAR system participants to educate them on the RCCNZ and its procedures. Consideration should also be given to rebranding of the RCCNZ to signify and emphasise their role and expertise in aviation, marine and land based SAR.
- b. RCCNZ should adopt a philosophy and the relevant protocols of utilising staff and resources available through Police, NZDF, CAA and LandSAR as surge capacity for major searches.
- c. The CIMS model should be considered by RCCNZ when dealing with complex land SAR operations of this nature.
- d. More 'table-top' exercises using CIMS with other agencies such as Police, Defence and LandSAR should be included in RCCNZ plans.
- e. NZ electronic mapping systems need to be evaluated and a suitable application selected for NZ SAR practitioners. It should be complementary to mapping systems used by Police and LandSAR.
- f. RCCNZ should evaluate and implement a data analysis system complementary to that used by LandSAR and Police for search operations.
- g. Transport sector and other relevant media advisers should be available to augment Maritime NZ media advisers in the event of future major searches
- h. RCCNZ should evaluate options regarding data capture and analysis for complex searches and arrange protocols with relevant agencies to ensure they can be augmented rapidly as appropriate.

Terms of Reference Item 4. To comment on the role of the On Scene Coordinators, their training, experience, and relationship with the Search and Rescue Mission Coordinator, their ability to implement the RCCNZ SAR action plan and any conflicts of interest that may have arisen.

92. This operation had two On Scene Coordinators appointed by the RCCNZ. They were:

- a. **John Funnell**, Chief Executive Helicopter Services B.O.P Ltd, Chief Pilot - Philips Search and Rescue Trust. John has been a pilot both with fixed wing and rotary for 35 years with in excess of 18,000 hours flying. For 30 years he has been involved in search and rescue.
- b. **Sergeant Bill Nicholson**, NZ Police LandSAR coordinator with 8 years SAR in Taupo and Manawatu. Bill is also a fixed wing pilot.

93. Within RCCNZ an operational manual gives guidance to who should be called in the event of aerial searches. Raglan was the initial start point for this search and the manual indicated that the Philips Trust was the air asset to be called. Hence John Funnell was contacted. Because of his known experience, RCCNZ had considerable confidence in his ability. On Saturday 5 November it became clear through discussions with Mr Funnell that some degree of control was required over the numbers of aircraft that had arrived to participate in the search. It was agreed that John should coordinate this. Accordingly John was appointed an OSC for what was to become the northern search area.

94. Mr Funnell's analysis was that the best persons/aircraft for the task were those that had experience in low flying over bush and that their crew and observers were skilled. His personal knowledge of those that he had previously worked with in SAR guided him in his choice of aircraft to use in the search. In the absence of any other knowledge I believe this was a perfectly reasonable approach to take.

95. There is no doubt that Mr Funnell is a very highly skilled, competent and capable pilot who operates an extensive business operation. His experience in SAR work is extensive. At the time of the search, he had not sighted the RCCNZ Manual and did not know of the specific duties assigned to an OSC in the Aide Memoir. However, when we went through this document I concluded that he accomplished the tasks relevant to aerial searches through his extensive SAR experience and the application of good sense. Indeed he was commended for his initial tasking and briefings by most of the helicopter pilots.

96. Mr Funnell did not think his role included coordinating the activity of the LandSAR personnel that gathered at Raglan. Consequently he took little interest in them apart from when they may have boarded a helicopter to be dropped into an area for search. As a result the LandSAR component of the search acted independently of the air component and felt at times isolated

and not aware of the total search plan. They eventually became critical of the overall search. I accept John's view that he didn't think it was part of his role to coordinate the ground searchers or any enquiries they may have involved themselves with. He saw his direction coming from the RCCNZ.

97. **Conflict of Interest.** Throughout this Review it was commented by many operators that John's role as an owner of a helicopter company created a conflict of interest. Owning and operating helicopters has been described to me as 'a high cost, high risk and small margin' operation generating caustic comments amongst competing businesses. I experienced this when interviewing various operators. Much of it was built around second hand comment and typical was "I don't know for sure, but have heard..."

98. I have spoken to John regarding this issue and I do *not* accept that he acted improperly in this matter. It became clear to me that he worked conscientiously in his own time in respect to the search and has been hurt by these allegations.

99. Nonetheless there is a conflict of interest by having a commercial operator acting as an OSC. When they have a role in selecting aircraft operators to participate in a search where public funds are being expended, it places them in an untenable position and open to the type of comment outlined above.

100. When discussing his role it was clear he took direction from the RCCNZ, and whilst generating some local enquiries and initiatives did not have input into the overall plan that I might have expected from a key player in the search.

101. For future searches, it is recommended that OSCs not have a commercial role regarding assets that may be used in a search. This avoids issues and perceptions regarding conflicts of interest that arose in this search. Persons such as John Funnell, however can be valuable expert advisers to On Scene Coordinators.

102. Sergeant Bill Nicholson was appointed on 6 November to be the OSC to organise an air search in the high country to the north of Wanganui. Sergeant Nicholson was well qualified to undertake this task with his Police management training as well as his experience and qualification as a fixed wing pilot.

103. It appeared from the persons I spoke to that worked with him on this operation that he was well respected and he had an appreciation and knowledge of the area that he was searching.

104. There were no conflicts of interest issues that surfaced when discussing his role in this search. His position as an experienced and relatively senior police officer gave him a credibility amongst others working on the search. He has regular operational and training contact with the

LandSAR personnel that were deployed in this search so that each had confidence in the work of each other. Sergeant Nicholson was careful to select observation crew that had training or experience in the role. As a Police SAR coordinator he naturally had experience as a controller of ground searches and a relationship to Police SAR and enquiry staff who may have been involved in the search. This enabled an easy and comprehensive leadership and oversight role of the entire local operation.

105. I believe that local Police SAR Coordinators could make ideal OSCs as they have knowledge of the area, access to Police staff for additional searching, enquiries and trained observers. They have an existing relationship with LandSAR personnel who are particularly knowledgeable about the area that they operate. Many local police SAR incident controllers use the mapping and other technology developed by LandSAR in operations. They can provide advice to RCCNZ about the local helicopter and fixed wing assets that operate in the area.

106. The OSCs communicated with the RCCNZ by phone landline and cell phone. They were not consulted adequately in respect to the decision to suspend the search. They were key management positions in the search and I believe that they should have been more involved in the key decisions that were taken regarding it. In an extended search of this type a visit by a senior member of the RCCNZ to the OSC would assist in the management of the incident. Additionally, they ought to receive relevant training in their expected duties prior to appointment as an OSC with these skills being exercised occasionally. This training should include familiarisation with RCCNZ procedures. Consideration should also be given to making available to OSCs a transportable communications package including cell phones, SAT phones, laptops (with appropriate applications installed), printers, several GPS receivers, 2 way radios and other such technology.

Terms of Reference Item 4. Recommendations:

- a. OSCs should not have a commercial role regarding assets that may be used in a search. Aviation operators and other experts however can be valuable specialist advisers to OSC regarding technical matters.
- b. The SMC should consider local Police SAR Coordinators, who have received agreed training, for the role of OSC in SAR operations in which the role is deemed necessary. In searches for missing aircraft and/or searches using large numbers of aircraft the OSC needs to be assisted by a trained, experienced management team including Air Directing Officer (ADO) or experienced local pilots.
- c. OSCs are key management positions in any SAR activity. Mechanisms need to be developed to include them in key decision making processes. This is likely to be best achieved by establishing prerequisites for the OSC role which includes training to agreed

standards, visits to the RCCNZ and opportunities to work with the SMCs and the development of common procedures and protocols.

- d. Consideration should be given to the provision of technical and communications equipment to support OSCs in the conduct of their duties.
- e. In extended searches involving OSCs, a senior member of the RCCNZ should visit the scene to appraise themselves of the operation.

Terms of Reference Item 5. To review the effectiveness of the search and detection of the missing Helicopter including the suitability of the SAR units tasked.

107. When advised that ZK-HTF was missing the RCCNZ immediately put in place the procedure outlined as a Communications Search. This was done competently. The Civil Aviation Authority (CAA) Safety Investigator initiated enquiries from aviation fuel suppliers. It would be useful if RCCNZ had aviation fuel suppliers' after hours numbers for future searches and routinely made these enquiries.

108. These initial enquiries also sought radar plots for the missing aircraft. It is evident from this Review that these plots can provide considerable information that is not evident at first sight. Airways NZ will raise the alarm when the SARTIME has passed and provide details of the flight plan, but many of their operators are not trained to provide further information. Airways NZ state that RCCNZ should take a more active role in seeking information regarding the radar plots, flight plans and other information that Airways NZ may have. If this were done in this instance then the radar plot may have been obtained some hours earlier than it was. It should be a matter of routine for the RCCNZ to obtain and interrogate this information.

109. This Review also established that analysis of radar is an important part of the enquiry to trace missing aircraft. As Airways stated 'we don't fly planes – we just watch them', indicates that this analysis should be carried out by specialists in radar engineering in conjunction with an experienced pilot of the relevant aircraft type. In this case the excellent work and analysis of pilot Darryl Sherwin showed that a greater emphasis should have been given to the search around the last known radar position of ZK-HTF. RCCNZ should utilize radar engineers in conjunction with experienced pilots when crash sites are not detected early.

110. **Helicopters – Fixed Wing – Air Observers.** This operation principally used helicopters to search a large land area that may have hidden a crashed helicopter. In total RCCNZ currently have invoices for \$815,000 for aircraft use. The day ZK-HTF went missing the weather for the aerial search was poor with strong on shore winds, low cloud and poor visibility. A plan was developed overnight to search around the last radar position with four helicopters, plus to have a fixed wing aircraft to fly a direct track from Raglan to Wanganui listening for beacon signals. This was an appropriate use of the aircraft. During that day the family of the missing persons had tasked additional helicopters to supplement the search. An On Scene Coordinator was appointed as a result of the significant numbers of helicopters in the air and this resulted in the area being systematically searched.

111. One of the issues constantly referred to in this Review was that the quality of the searching was variable. From the air it is extremely difficult to see through the bush canopy to determine if anything lies beneath it. I viewed a large number of maps where GPS had been used to show where helicopters had tracked. In some instances these tracks were up to a

kilometre apart and it would not have been impossible to state that a crashed helicopter could not be in those areas covered. Additionally, comments were made to me that some helicopters' observers were not appropriately trained for the task they were given. Some observers were accused of 'sightseeing' and others were so unfamiliar with aerial searching that pilots needed to land because their observer was ill. The area around Wanganui, which was coordinated by OSC Bill Nicholson, had helicopters that were manned by trained observers. Despite this, the assessment was made that even with trained observers the probability of detecting ZK-HTF was less than 10%. Effective intelligence and planning is a necessary precursor to expensive aerial searching which is likely to improve the efficiency of this type of searching.

112. Police conduct air observer courses annually which are attended by Police SAR squad members and Coast Guard members. All Police SAR squad members (280) are trained, but beyond that, lists are not kept as to who has been trained. RCCNZ should, where possible, ensure that observers on searching aircraft are appropriately trained.

113. Aerial searches over land in New Zealand can be dangerous. The terrain is often steep and wires of various types can be strung across gullies. For this reason it is best to use local pilots who know the area and where wires and other obstacles are. Also it is best to use pilots who have experience in low level flying in these areas such as agricultural or venison recovery pilots. The RCCNZ either through their OSC or in their absence should consult with local pilots who can provide useful information for searches relating to the terrain and prevailing weather conditions.

114. I was surprised that the NZ Police Air Support Unit was not used in this operation. This Unit is described by Police as a national unit, but with a focus on the Auckland area. It however is available and has been used extensively in SAR work throughout NZ. Indeed, they were closer to the initial search site than some helicopters used. They are based at Mechanics Bay, Auckland and are equipped with specialist equipment and staff suited to a search of this nature. They operate two Aerospatiale AS355F1 Twinstar Squirrel helicopters and they are very well equipped for SAR operations. A list of their equipment is contained at Appendix 7. I was informed that the RCCNZ were unaware of this assets availability and assumed they were not available for SAR work or work beyond Auckland. Police have informed me they are available for deployment in SAR work coordinated by the RCCNZ.

115. My analysis indicates that the SAR Council/SAR Secretariat should implement an audit across the country of air assets that are available for SAR work. This audit should include the type, cost of hire, equipment (esp. FLIR and direction finding equipment) and location of aircraft as well as the experience of pilots and their crew. This audit should be managed through the SAR Council/SAR Secretariat and regularly updated. The updating of this list is an issue of concern and some arrangement with the Aviation Industry Association may be able to accomplish this. I suggest that this could be

arranged through seeking an 'expressions of interest' process followed up with a simple service level agreement.

Technology

116. Throughout this inquiry, suggestions were made for the use of various pieces of military equipment and 'cutting edge' technology. These included:

- a. **RNZAF Orion aircraft.** These aircraft are principally designed for military use and not best suited for SAR work over land. They have FLIR and direction finding equipment that are useful for the location of objects over water, but are not suited for detecting items over land and bush. The NZ Police and private operators FLIR are currently more capable for this work. As the Air Force upgrades then the capability may be more suitable. The size of the aircraft necessarily requires it to travel at speeds that makes it impractical to use a FLIR over land.
- b. **Radar.** Foliage Penetrating Radar and Synthetic Aperture Radar were mentioned as possibilities to quickly locate the missing aircraft. I sought the assistance of NZ Defence Force to investigate these technologies. I was informed that:

'The radar is unlikely to be of significant value in trying to find the wreckage of a small helicopter that is primarily built of composite (rather than metal) materials, following an accident. There would simply be too many false alarms generated from the foliage itself and other metallic objects that are inevitably strewn through our forested areas. The radar is designed to find recognisable objects such as medium-to-large vehicles that are moving through the undergrowth, not less recognisable and smaller pieces of wreckage.'

The NZDF has no intention at this time of acquiring radar of this type, as they do not have an operational requirement for monitoring vehicle activity through the jungle or forested areas. The NZDF does, however, continually monitor new technologies that are being developed.' (See also Appendix 8)

- c. **Cell phone Detection Equipment.** The families established that there was available technology in both Holland and Australia that might identify the location of cell phones. Their enquiries indicated that if New Zealand Police asked for this equipment then it would be provided through a Memorandum of Understanding between the Dutch and NZ Police agencies. Consequently discussions were held between them and two Dutch Police Officers arrived on 10 November with equipment which is described as a mobile cell site capable of communicating with particular cell phones. The intention was to place this equipment in an aircraft and fly over areas where the

crashed helicopter was thought to be. This equipment was effectively placed under the control of the private search. The Dutch Police Officers and this equipment made sweeps over the area of Raglan to Wanganui for several days in an effort to locate the cell phones of the two missing persons. This did not result in finding them. To be successful the cell phones would be required to be turned on and the battery with some charge left in it. Modern cell phones apparently have mechanisms to conserve battery power and could remain with some power for up to a week. I understand that this equipment does not exist in New Zealand.

117. It is clear that there have been considerable advances in technology that could be put to use in searches of this type. The families, with little experience in these matters, were able to quickly establish the existence and location of advanced search technology. They indicated to me that they were disappointed that the RCCNZ did not appear to be able to respond quickly to the availability of this technology for this search. RCCNZ through its link to the SAR Secretariat, Defence, Police and other government agencies should make themselves aware of relevant technological advances in searching equipment and techniques. This could include the use of aerial photography and the potential use of satellite imaging.

Briefings

118. Throughout the official search many of the persons tasked with searching did so with very little information other than they were looking for a particular helicopter. Several expressed the view that they would have liked to have been briefed on the totality of the search. They had little idea of the overall plan for the search or issues that caused the search strategy and tactics to change. If they had been more comprehensively briefed then they would have likely been able to provide further information or ideas that may have been useful through greater situational awareness. Regular, proper and comprehensive briefings are a valuable tool for an operation of this nature. These briefings should be initiated by the RCCNZ and be at least a daily occurrence. Comprehensive briefings would no doubt also be of benefit to those participating in a search.

Terms of Reference Item 5. Recommendations

119. It is recommended that:

- a. The RCCNZ should establish the after hours contact details for aviation fuel suppliers and routinely make enquiries of them when appropriate.
- b. RCCNZ should initiate enquiries with Airways NZ regarding radar plots, their implication and flight plans when aircraft are reported overdue. They should not expect that Airways NZ would automatically develop these enquiries.

- c. Radar engineers and experienced pilots should be consulted in respect to radar when missing aircraft are not detected early
- d. An audit ought to be conducted to ascertain the location, experience and equipment of aviation operators that are prepared to assist in SAR work. The particular operators considered suitable for SAR work should be contracted through a simple service level agreement. This list of appropriate aviation operators should be regularly updated and the Aviation Industry Association may be able to play a role in this update. Work on the development of service level agreements is already well advanced.
- e. When they are required, the RCCNZ should attempt to employ local aviation operators who are generally the best to conduct searches of their area. Emphasis should also be given to operators experienced in low level flying and preferably with SAR experience.
- f. Comprehensive briefings, on at least a daily basis, should be given to all those involved in the search.
- g. The RCCNZ should consider the Police Air Support Unit based in Auckland as a useful resource that can be used for search and rescue work.
- h. Only trained observers in aircraft should be used in aerial searches – when circumstances arise when only untrained observers are available then a training/briefing session should be conducted by a suitably qualified SAR management team member prior to their deployment.
- i. RCCNZ through its partner agencies such as the SAR Secretariat, Police and Defence should keep themselves and the wider SAR Community apprised of new developments and technology for use in searching and rescuing.

Terms of Reference Item 6. To review the facts regarding the role of the distress beacon in this incident.

120. The helicopter involved in this incident was a late model Europter EC 120 B (a photograph of which appears in figure 4 below) It was fitted with a Kannad 406 AF-H Beacon ID C0064931FA58761. It is considered to be amongst the most advanced of its type for this aircraft.

Figure 4. ZK-HTF Photographed on a pre delivery test flight, 20 November 2004



Copyright: Air2Air, Source: Neville Dawson

121. This automatic fixed COSPAS-SARSAT⁹ Emergency Locator Transmitter (ELT) has been specifically developed to be installed on board helicopters. The manufacturers say that it has:

- a. global coverage;
- b. precise pinpointing (< 1 nautical mile);
- c. identification of the aircraft in distress – the ELT transmits a unique aircraft identification number; and,
- d. automatic activation by an integrated shock sensor (G Switch), manually or remotely from a remote control panel in the cockpit.

122. ELT's are designed to locate and enable the rescue of survivors in the event of emergencies. It is mandated by Civil Aviation Rules for certain

⁹ Search and Rescue Satellite aided tracking

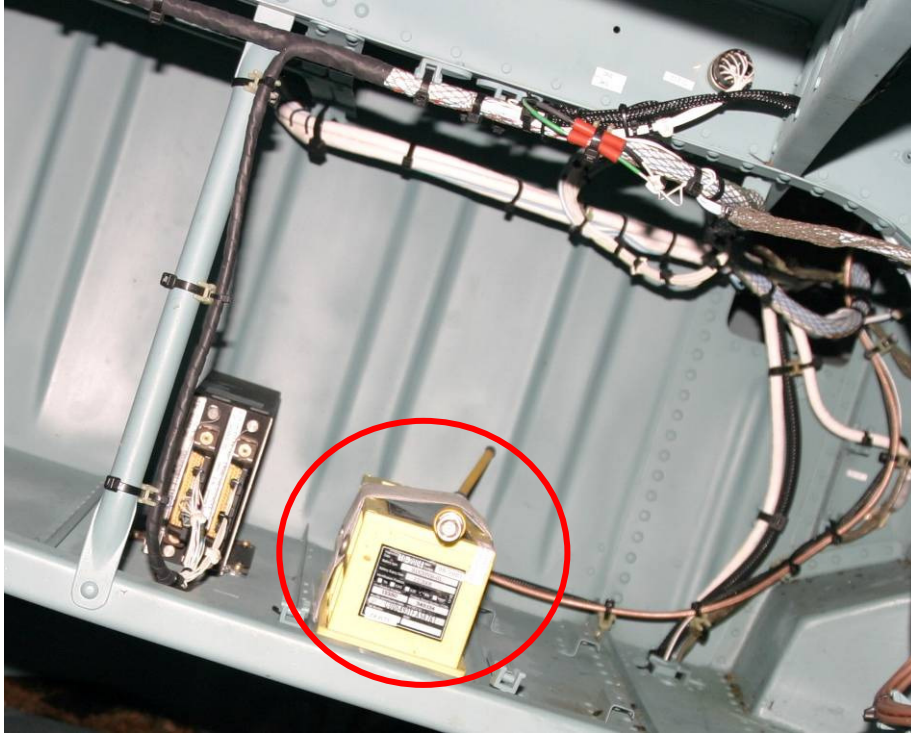
aircraft to carry an ELT (Part 91 – General Operating Flight Rules). The NZ Rules comply with international codes on the topic.

123. There are two models of Distress Beacons: '121.5 MHz' and '406 MHz'. 121.5 MHz beacons tend to be more popular and operate on an analogue signal type. They are anonymous and don't tell rescue authorities who's in trouble, or even what's in trouble. 406 MHz beacons have a unique identification code which is part of its signal and operate on a digital signal type. Their unique code provides information about the aircraft including the owner's emergency contact and country of residence. This allows false alarms to be resolved with a radio or phone call.

124. Due to the limitations of the 121.5 MHz characteristics together with a high number of false alerts, the international agencies involved in search and rescue – the IMO, ICAO, and the providers of the COSPAS-SARSAT system – have agreed that satellite monitoring and processing of 121.5 MHz will cease from 1 February 2009. The ICAO standard now requires ELTs to operate on 406 MHz and 121.5 MHz with the 406 MHz signal providing the initial alert and location via the COSPAS-SARSAT system and the 121.5 MHz signal used for final homing by search aircraft. This change is currently being consulted with the industry.

125. ZK-HTF was fitted with the new type of ELT, and Michael Erceg's family being aware of this, expected that in case of an emergency the helicopter could be traced rapidly. In this case the ELT was contained within the fuselage of the helicopter and required an external antenna. It is apparent that the antenna upon impact snapped off its base severely degrading the quality of the signal that it may have emitted. (See figures 5 and 6 below)

Figure 5. ELT within ZK-HTF



Source: NZ Police

Figure 6. Snapped ELT External Aerial on ZK-HTF



Source: NZ Police

126. During the course of my enquiries I visited the Australian Rescue Coordination Centre in Canberra which operates a 24 hour service. They are responsible for the management and operation of the ground segment of the COSPAS-SARSAT distress beacon detection system. The Australian RCC were notified of the missing helicopter and I was able to speak to the search and rescue officer who was on duty at the time and searched for any possible signal emanating from ZK-HTF. He told me he was unable to find any signal and described the nature of potential signals appearing on his screen. I am satisfied that no detectable signal was received through satellites from ZK-HTF.

127. The CAA Safety Investigator arranged a test to establish if the ELT was functioning following the crash. EMC Technologies (NZ) Limited of Auckland carried out radiation emission tests. Their report is attached as Appendix 9. In summary the tests showed that the ELT functioned normally when an antenna was attached, but with the antenna broken as occurred in this crash the signal was seriously degraded.

128. With the CAA investigator it was intended to test the amount of signal emanating from the ELT with its broken antenna from the crash site. Time has precluded this test occurring. However the considered opinion of experts is that very little, if any, signal would have been detected even at close range.

129. Anecdotal comment in Australia and New Zealand suggests that over 50% of aircraft crashes result in the antenna being broken or disconnected. However this is not supported by the information provided to the New Zealand CAA and recorded on its safety management system database. Since 1 January 1999 the CAA has been advised of 15 fatal and serious injury accidents where the signals from an ELT were **not** detected by the COSPAS-SARSAT satellite or by an aircraft. In the same period there have been 160 fatal or serious injury accidents recorded on the CAA data base.

130. The CAA recognises that ELT aerials can be vulnerable in a crash. In the cases where the signals were not detected it was determined that the ELT failed to work because of high impact, fire, damage to the antenna or cabling, or the ELT itself. The CAA database records three instances of aerials breaking off and three instances of aerial cables being severed in a crash. In each of the 15 crashes when no signal was received no one survived the crash. Anecdotal comment from NZ CAA Safety Investigators suggests that in recent years a higher proportion of ELTs have failed to activate due to crash damage. However this is not currently supported by the data held on the CAA database.

131. The CAA advises that any ELT installed under New Zealand civil aviation rules must meet the equipment and design standards of the appropriate Federal Aviation Administration (FAA) Technical Standard Order (TSO), which in turn incorporates a foundation Requirements and Technical Concepts for Aviation (RTCA) document. Any modification or redesign of ELT aerials would need to be undertaken by the RTCA and the TSO amended. The RTCA has formed a Special Committee to address design, performance,

installation and operational issues for the 406 MHz ELT. The CAA, as a member of the RTCA, is maintaining contact with the Special committee.

132. As part of work being undertaken on a 406 MHz ELT Rules Project, the CAA conducted an informal workshop in March 2006 with Licenced Aircraft Maintenance Engineers (LAME) to review the practical aspects of installation and maintenance of ELTs including the placement and fittings of aerials. It is planned that any recommendations arising from this workshop will be incorporated into the ELT Advisory Circulars.

133. While conducting this review, a number of people expressed the view that because the ELT fails to signal then the presumption is that all aboard the aircraft have not survived. (It should be pointed out this is not the view of the RCCNZ or other SAR agencies that commonly deal with ELTs). This view is dangerous in my opinion as the ELT could fail for the following other reasons such as:

- a. An electronic malfunction;
- b. Antenna or cables breaking off on impact, but passengers remain alive;
- c. The ELT being inadvertently turned off; and,
- d. The impact is insufficient to activate the 'G switch'.

Distress Beacon Alerts

134. The RCCNZ routinely deals with distress beacon alerts. Between 5 July 2004 to 30 June 2005 they dealt with a total of 621 alerts of which only 7.7% were found to be real. 30.4% were determined to be false and 61.8% remain undetermined.

135. Against this background the RCCNZ were receiving beacon reports which could have related to the missing ZK-HTF helicopter. Naturally the family held hope that each reported signal was that of ZK-HTF. Reports of signals were heard intermittently, often for fleeting moments, from other searching helicopters and from passing commercial jet airliners as they passed over head. There is evidence that all the soundings were investigated.

136. Helicopters with Direction Finding (DF) equipment were tasked by the RCCNZ and the private search to investigate these soundings. It has however become clear to me that as with all technology of this type, operators need to be properly trained and experienced to obtain the best results. Mr Warren McKay, pilot of Taupo, is experienced in this technology and his work was a contributor to locating of the missing helicopter. There are a number of aircraft that are fitted with DF equipment and the RCCNZ does not hold a comprehensive list of those aircraft with this capability.

137. Comment was made by several I spoke to that the Air Force Orion would hold the best DF equipment for this task. The Air Force has advised,

as earlier discussed, that the Orion in their view was not the optimal aircraft to use when signals were of short duration as was frequently the case in this incident.

Potential solutions

138. When discussing the topic of beacons, many of the persons spoken to proffered solutions to the issue of beacon antenna being made redundant upon impact in an accident. Amongst those were:

- a. inbuilt antenna;
- b. dual antenna so that if one was damaged the other might survive; and,
- c. aircraft having a dye capsule within part of the fuselage that would explode upon heavy impact in a crash, thus making the resultant wreckage highly visible even within bush.

139. The CAA continues to look to minimise the probability of damage to the transmitter and the antenna and their becoming separated in a crash. To this effect they have mandated that the ELT installation be such that:

- a. *'The location of the transmitter and antenna will minimise the potential for damage in accidents by impact or fire;*
- b. *The transmitter and external antenna (if used) are mounted as close to each other as possible;*
- c. *The attachment of the transmitter and external antenna (if used) to the airframe can support a 100g load applied through their respective centres of gravity in the plus and minus directions of the three principal axes of the aircraft;*
- d. *The coaxial cable between transmitter and antenna has vibration proof RF connectors on each end and when installed is secured to the aircraft structure leaving some slack at each end.'*

140. The CAA is referring this issue to the relevant manufacturers with a view to enhancing the survivability of ELT antennas.

Flight Tracking Systems

141. Many in the industry have suggested that the solution of 'flight tracking systems' is an answer to the location of aircraft that crash. Instead of a system that is triggered once an emergency occurs, this system works on the basis that it shows the whereabouts of aircraft at all times and may cease to operate upon an aircraft crashing.

142. Several versions of flight tracking currently exist in NZ today. Larger commercial operators such as Air New Zealand are continuously tracked

through Airways New Zealand. Smaller companies involved in commercial work use GPS technology to monitor their aircraft. A small device on the aircraft receives GPS signals and transmits them over cellular networks (and or satellite phone if out of range) to a computer. Using mapping software the position of an aircraft can be tracked and plotted in real time. This data can be archived and viewed historically.

143. I am aware that since this crash this technology and its application has received heightened interest from the aviation industry. On 25 January 2006 the Aviation Industry Association hosted a meeting of interested parties on the topic. The meeting amongst other things resolved to increase their understanding of such systems and recommended that CAA continue to evaluate.

144. This Review was not in a position to evaluate flight tracking systems except that their continued trial and evaluation will hold considerable value to aircraft safety in the future.

Terms of Reference Item 6. Recommendations:

- a. ELTs remain a valuable part of aviation safety and need to be retained.
- b. In order for ELTs to remain in a working order in the event of an accident, the potential for ELTs to have inbuilt antennas, and/or multiple antennas should be explored.
- c. Flight tracking systems may have considerable value as an aircraft safety device. The CAA should give consideration as to their applicability to the NZ aviation environment.

Terms of Reference Item 7. To review current arrangements regarding RCCNZ's SAR mandate in accordance with the Performance Agreement and search suspension criteria and its application in this incident.

145. The RCCNZ's SAR mandate (attached at Appendix 1) is contained in 'An Agreement between the Minister of Transport and Maritime New Zealand – Performance Agreement 2005/2006. Output Class 3: Search and Rescue Operations is described as follows:

"This output class covers the delivery of national and international search and rescue operations. The objectives of this output class are to provide an immediate response to all notified distress alerts within the New Zealand Search and Rescue region: to co-ordinate searches to locate persons in distress; and to render appropriate assistance to ensure the safety of all persons concerned."

146. The part of the Output related to search suspension merely states:

"Description: Under this output, Maritime New Zealand provides the following services:

Completion of a report for each suspended Search and Rescue operation and such other reports as are requested by stakeholders"

147. The RCCNZ Operations Manual at Section 8 contains comprehensive guidance and instructions for the termination or suspension of searches. The checklist and extracts from the International Aeronautical and Maritime SAR Manual (IAMSAR). The RCCNZ Operating Procedures relating to Incident Termination, and the document recommending suspension of the search are attached at Appendix 10.

148. The authority for search suspension lies with the Director or Deputy Director of Civil Aviation in the case of missing civil aircraft (and this occurred on this occasion), the Chief of Defence Force for missing military aircraft, naval vessels or personnel, and the Director of Maritime Safety or appointed Acting Director of Maritime Safety in the case of missing marine vessels. For Class II search suspension the authority is the Police Incident Controller.

149. Prior to search suspension, consideration is to be given to the probability of survivors, prospects of success and that the area has been exhaustively searched. In this case the Director of Civil Aviation exercised his prerogative to direct further searches of two areas (In the Mokau river area and at the end of the last radar track for the missing aircraft). Whilst technically the requirements of the Manual were complied with, there has been criticism from the family and others that the search was suspended prematurely. Several persons involved in the search expressed surprise that the search was suspended at the time it was.

150. In this case the family were concerned that the search was suspended prematurely especially because the weather had been poor in the first few days of the search and the technical equipment such as FLIR may not have been at its most effective. They point to the Search Suspension criteria at 8.1.6 where compensation is required for search degradation caused by weather. Similarly, the Operations Manual makes reference under 'Search Termination Considerations' to there being 'no longer any probability that survivors might still be alive'. The families were concerned that their loved ones might have survived the crash. There is no definitive guide to the time of survival of lost persons but the RCCNZ should take into account the survivability of missing persons for each search and seek relevant expert medical opinion as part of the search termination considerations.

151. Whilst the family were consulted by telephone at a senior level within Maritime NZ, I accept their point regarding this and feel they should have been brought into the decision more regarding search suspension. A greater degree of consultation with the family and a face to face consultation regarding search suspension may have alleviated much of this concern.

152. As indicated I find the guidance and instructions contained in the RCCNZ Operations Manual to be comprehensive and sufficient for its purpose. It is a matter of judgement as to whether all its requirements are met in any particular instance.

Terms of Reference Item 7. Recommendations:

- a. Each case to suspend or terminate a search will vary depending on the particular circumstances of each search. On some occasions the decision to suspend or terminate a search should be conveyed to the next of kin personally.
- b. Every consideration in the guidelines to suspend or terminate a search contained in the RCCNZ Operations Manual should be taken into account.
- c. The search termination or suspension considerations should include the need to seek expert medical advice regarding the potential survivability of missing persons.

Terms of Reference Item 8. To review the interaction between the official search and that arranged privately and recommend mechanisms for the future.

153. The official search commenced on 4 November 2005 at 1613 hours when ZK-HTF was declared overdue. The RCCNZ began their communications search, their search planning and later, implementation of a physical search.

154. Virtually simultaneously, the Erceg family began their search. This is normal and to be expected in circumstances where a private search is possible and the family have the capacity to do so. In few cases can it be expected that next of kin would merely sit passively by when they have the resources and ability to pursue their objective of finding their loved ones alive.

155. In this instance it seemed the start point for a physical search was near Raglan where the last radar sighting was made. It was thought by the RCCNZ and family, not surprisingly, the initial best option was a concentrated search of the surrounding area. The family wished to help and could source a number of helicopters to put to the task. Those helicopter pilots that arrived on the scene at Raglan quickly concluded that some degree of order was required for reasons of proper search coordination and safety.

156. The family initially tasked 12 helicopters which was considerably more than the number on the official search. It was their feeling that, whilst they wished to be inclusive of the official search they didn't feel as if they were fully accepted. On Sunday 6 November 2005 John Funnell was appointed the On Scene Coordinator and began tasking helicopters to search various areas. This developed some cohesion and order about the search which led on the Monday to the family feeling more involved in the overall search effort.

157. The On Scene Coordinator tasked those deployed to the official search and gave some direction to those in the private search to ensure safe flying methods were used. They became complementary to the official search and their results of searching were forwarded to the RCCNZ through the OSC. The RCCNZ were careful to ensure the official and private searches were separate for costing purposes. In the meantime the family pursued options regarding technology initiatives to locate the missing aircraft.

158. On 10 November 2005 the official search was suspended. The private search with many of the same participants continued. Initially the family co-opted John Funnell, the On Scene Coordinator and key members of LandSAR to continue the search. They based themselves at Taupo and essentially used experienced aviation operators and techniques for capturing data developed by LandSAR personnel. This operation continued for a

further 9 days until the helicopter was located on 19 November 2005. They linked their land and air searches by operating out of the same premises.

159. **Use of private resources.** For the private search there were a total of 31 helicopters used to fly 975 hours. The cost for the private search amounted to approx \$1.5 million. RCCNZ has invoices of \$815,000 to date for helicopters for the search.

160. In this instance, helicopters and observers turned up to help in the search. They were not seeking reimbursement from the official search. In some cases they were not suitable or experienced in searching. Their offers should have been politely declined or deployed to tasks that suited their skills. To deploy them in low level searching can be dangerous and counterproductive to the search effort, as it cannot be guaranteed that their search will be as effective as experienced and trained operators.

161. Where the next of kin deploys its own resources (helicopters in this case) then it is preferable that they operate under the control of the official search. Not to do so creates significant safety and search contamination issues.

162. Clear delineation relating to costs must be conveyed to the aviation operators used. They must clearly know whether their costs will be met by the official search or by private means.

163. It is common for members of the public and the family volunteers to participate in ground searching. This is sometimes welcomed where the area and terrain is not hostile. However in this case, some areas of the search were dangerous for those not experienced or trained. On Scene Coordinators must be careful to only deploy persons on a search that are competent for the task. Not to do so places the official search liable in the event of injury or death.

164. My experience informs me that field controllers in searches are adept at finding tasks for enthusiastic volunteers which does not compromise, but is useful to, the overall search effort. This allows for concerned individuals to feel they are making a contribution and lessens the risk of them undermining the public confidence in the search effort.

165. **Information Accessibility.** After the official search was suspended on 10 November 2005 the RCCNZ passed all their information (except the incident log) to the family over several days. This required the family formally seeking the information in writing and in order to obtain it expeditiously they flew a helicopter from Auckland to Wellington to uplift it. From that point on although the official search was suspended, information was passed back and forth between the family operation and the RCCNZ. On two occasions, even though the official search was suspended, the RCCNZ responded to information provided.

166. The family felt a reticence of the RCCNZ to initially give them information especially regarding tactics and availability of equipment. Once the decision was taken to hand over the RCCNZ files the exchange of information appeared to be satisfactory.

167. As a general rule all information held by the RCCNZ relating to a particular search is discoverable. The RCCNZ should have a policy to be open and transparent in dealing with the next of kin. Information should be freely given when requested.

168. **Liaison.** When an official search is suspended or terminated liaison should be maintained by the RCCNZ with the private search so that if fresh information is discovered then the official search can be resumed without difficulty.

Terms of Reference Item 8. Recommendations:

- a. Private components of searches will happen, and they should be integrated and placed under the control of the official search.
- b. Clear delineation in respect to cost should be made between official and private resources deployed on searches.
- c. Only suitably qualified and experienced personnel and resources should be deployed to search – not to do so poses danger to other participants in the search and themselves as well as creating a liability for the RCCNZ.
- d. Should a private search continue beyond the termination or suspension of an official search, the RCCNZ should maintain a liaison so that the official search can be resumed in the event of fresh information being discovered.
- e. In the event of a private search continuing then it is likely that resources used in the official search will continue to be used. That should not be of concern to the RCCNZ.

Terms of Reference Item 9. To review family liaison and support arrangements and recommend methods for their effective management.

169. The RCCNZ Operations Manual stipulates that the Police Liaison Officer is to “be responsible for liaison with, and notification of next-of-kin, of subjects of SAR operations,” (Annex PO12-1C)

170. Additionally at section 8.2 “Incident Termination or Suspension” states:

“8.2 Dealing with Relatives

8.2.1 Briefing Relatives During a Search

8.2.1.1 The SMC/PLO should advise the relatives and/or Next of Kin (NoK) of missing persons that the search has been suspended. Relatives and NoK are normally more willing to accept the decision to suspend operations if they have been allowed to follow the progress of the search. The SMC should maintain contact with relatives during the search to provide information and outline RCCNZ’s plans.”

171. The Police procedures are set out in their “Manual of Best Practice - Volume One” which sets out the tasks of the “Police representative at the NRCC”.

172. This document merely states:

“Tasks: Keeping next of kin advised”

173. In this incident the provisions of the RCCNZ Operations Manual and the Police ‘Manual of Best Practice’ were followed, but that is no indicator of the quality of how this task was completed.

174. It is clear from the RCCNZ log that there were several telephone calls to Mrs Erceg to ascertain travel plans and fuel arrangements established by her husband on Friday 4 November 2005, the day he was reported overdue. The brother of Michael Erceg also called the RCCNZ that day seeking updates on the search.

175. In the early hours of following day (Saturday 5 November 0623 hrs) the RCCNZ became aware through Mrs Erceg of the identity of Guus Klatte’s partner who at 0652 hours made contact and was advised that she would be kept apprised as to the progress of the search. She was concerned that it took that long for her to be contacted.

176. The Police Liaison Officer, whilst apprised of the search on the Friday, was not asked to attend the RCCNZ until Saturday 5 November at

0823 hours. It was at this time that he assumed his role of dealing with the family by telephone.

177. He contacted Victim Support (Counties-Manukau) to undertake this role at a local level. They made contact with the family but were unable to establish the rapport they wished. Whilst Victim Support found the family polite and courteous they were looking for more information than Victim Support could supply.

178. Victim Support was asked by Police to obtain dental records for Michael Erceg and they found this not an easy task under the circumstances. Although Victim Support did their best this was an inappropriate task for them and one that the Police should have undertaken themselves.

179. Victim Support were later usefully used to offer support and facilitate the entry into New Zealand of Klatte's partner and her parents.

180. The family, who of course were distraught, sought to obtain information about the search and help in its execution. They were keen to assist in whatever way possible. The families of the missing men had considerable resources available to them and were keen to put them to good use. They are intelligent people with enquiring minds and plenty of energy. They applied these attributes to the search and intended to obtain the best resources/technology and equipment available locally and internationally to assist. Through their own contacts and those of the company of Guus Klatte they were able to make contact with governments in New Zealand, United States of America, France, Sweden and the Netherlands. Through this they identified 'leading edge' technology in respect to radar and satellite imaging to identify aircraft concealed in bush and equipment to trace cell phones, all of which might have been useful in tracing the missing helicopter. The family were disappointed that the RCCNZ did not have access to some of this equipment and were not as proactive in seeking it. They felt that they were always ahead of the RCCNZ in measures to trace and locate the missing helicopter.

181. It is recognised that the next of kin, because of anxiety and keenness to locate their loved ones, will be very emotional in dealing with those involved in the official search. It is important that the RCCNZ display transparency to the next of kin from the outset of a search. Their requests will be demanding but need to be accommodated, at the same time ensuring the search continues in an efficient and effective manner.

182. The family initially accepted that the Police Liaison Officer was the person they should deal with, but it quickly became apparent to them that he was not the person 'calling the shots'. He did not have all the facts of the search and could not answer some of the queries they had regarding the search. They wanted to speak to a person who was able to answer directly any questions and not wait to receive them through an intermediary. They ultimately spoke to the General Manager of the RCCNZ, but had the

impression that requests for information were initially delayed. As a result they lost confidence in the RCCNZ which prompted them to develop a search base of their own and continue a search using their own resources. Once the official search was suspended the family indicated that the flow of information from the RCCNZ was considerably better. The RCCNZ management for their part expressed that they found the pressure from the family intense and extremely demanding.

183. A source of considerable distress to the family was what they interpreted as a statement in the media that the RCCNZ were 'not in the business of locating bodies or wreckage'. In the words of one of the family's representatives they 'were gutted' by these comments. To be fair to the RCCNZ they have recognised that words to this effect are insensitive and do not properly reflect the meaning and import of the RCCNZ Operations Manual. RCCNZ representatives should be aware that next of kin will take extra special note of any comments made to the media and will take offence to any element of insensitivity.

184. The family interacted with members of the search teams in the field and Guus Klatte's partner especially signalled out the On Scene Co-ordinator John Funnell as doing:

"an outstanding job and we could not have wished for anyone more capable. He took time to update me regularly and joined in efforts in making phone calls to the Netherlands, to explain the sequence of events to Guus' family."

185. **International Issues.** Families of missing persons that live overseas are more difficult to communicate with. In this instance, the overseas next of kin were initially kept apprised by telephone through the RCCNZ but when some of them arrived in New Zealand, this became haphazard. It is appropriate to contact the embassy/consulate/high commission of the relevant country to assist in the facilitation of this liaison.

186. **Procedure.** Whilst the procedures of the RCCNZ and Police were followed in this incident, further initiatives should have been taken to reduce some of the anxiety and distress by the family and to provide a better flow of information to both parties. The RCCNZ needs to gain the confidence of the next of kin and those dealing with the family require having the best information available to develop that confidence.

187. The RCCNZ Operations manual at para 8.2.2 states:

"Providing Access to Coordination Centres

8.2.2.1 Providing access to the coordination centre during search is discouraged. When terminating or suspending a search it may be appropriate to enable relatives and/or NoK

to see the RCCNZ Operations Room and be shown the Search Plans. These steps may assist relatives and NoK in accepting the SMC's decision to conclude search operation in the event that the missing persons are not located."

188. Well into the private search a visit by a family representative to the RCCNZ was planned but the helicopter was found prior to this happening. Whilst visiting the Australian RCC this issue was discussed. They have the relatives visit their centre to dispel doubts about the quality of searches and to gain their confidence. In their view this is a good practice to observe along with a 'very open attitude to families' which I endorse. Consideration should be given to altering the Operations Manual to reflect this.

189. The Police should be the key agency to deal with the family and next of kin. I understand that with many searches the initial contact with the family is by telephone by the Police Liaison Officer in the RCCNZ. Most searches are concluded relatively quickly and local Police are deployed in the event of a recovery, serious injury or death is established. In this case, once it was likely the search was to continue, then local police should have undertaken dealings with the family at a local level. Victim Support is an appropriate resource to use in conjunction with local police.

190. When death occurs, the Police have a role in coronial enquiries and early contact assists in the facilitation of these enquiries.

191. It is important that when a search carries on over several days or longer, the Police can build an ongoing relationship with the next of kin and appointing local police can ensure continuity and a likely confidence with them.

192. The local Police undertaking this role with the family by necessity need to be fully appraised of the search planning and tactics. Close contact with the RCCNZ needs to be maintained. To augment this and to maintain the next of kin's confidence in the search on prolonged searches, a senior officer in the RCCNZ should speak (say daily) to a family representative and if this from time to time were accomplished face to face considerable anguish is likely to be avoided. To avoid miscommunication and misunderstanding it should only be one member of the RCCNZ that undertakes this task.

Terms of Reference Item 9 Recommendations:

- a. Police should be the key agency to liaise with relatives and next of kin.
- b. The Police Liaison Officer at the RCCNZ can initiate contact with the family by telephone, but in prolonged searches this should be undertaken by local police and at a personal level.

- c. Consideration should be given when suspending a search for this to be communicated to families personally by a senior member of the RCCNZ or the person taking the decision.
- d. Consideration should be given in some searches for regular updates on the search by a senior officer in the RCCNZ directly to the next of kin, in conjunction with the Police.
- e. Consideration should be given when a search is prolonged for the next of kin to be invited to the RCCNZ to obtain a first hand briefing of the search or an appropriate RCCNZ staff member travel to meet with the family.

Terms of Reference Item 10. To make recommendations to the New Zealand Search and Rescue Council, as appropriate, by 31 March 2006.

193. A summary of recommendations is contained below.

Terms of Reference Item 1

- a. Flight plans should include a departure time to rectify this, so as to remove any ambiguity in SARTIMES and actual intended times of arrival.
- b. Flight planning procedures should include regular verbal progress reports to the Flight Information Service whilst en route.

Terms of Reference Item 2

Nil

Terms of Reference Item 3

- c. Consideration should be given to implementing a program with SAR system participants to educate them on the RCCNZ and its procedures. Consideration should also be given to rebranding of the RCCNZ to signify and emphasise their role and expertise in aviation, marine and land based SAR.
- d. RCCNZ should adopt a philosophy and the relevant protocols of utilising staff and resources available through Police, NZDF, CAA and LandSAR as surge capacity for major searches.
- e. The CIMS model should be considered by RCCNZ when dealing with complex land SAR operations of this nature.
- f. More 'table-top' exercises using CIMS with other agencies such as Police, Defence and LandSAR should be included in RCCNZ plans.
- g. NZ electronic mapping systems need to be evaluated and a suitable application selected for NZ SAR practitioners. It should be complementary to mapping systems used by Police and LandSAR.
- h. RCCNZ should evaluate and implement a data analysis system complementary to that used by Police and LandSAR for search operations.
- i. Transport sector and other relevant media advisers should be available to augment Maritime NZ media advisers in the event of future major searches.

- j. RCCNZ should evaluate options regarding data capture and analysis for complex searches and arrange protocols with relevant agencies to ensure they can be augmented rapidly as appropriate.

Terms of Reference Item 4

- k. OSCs should not have a commercial role regarding assets that may be used in a search. Aviation operators and other experts however can be valuable specialist advisers to OSC regarding technical matters.
- l. The SMC should consider local Police SAR Coordinators, who have received agreed training, for the role of OSC in SAR operations in which the role is deemed necessary. In searches for missing aircraft and /or searches using large numbers of aircraft the OSC needs to be assisted by a trained, experienced management team including Air Directing Officer (ADO) or experienced local pilots.
- m. OSCs are key management positions in any SAR activity. Mechanisms need to be developed to include them in key decision making processes. This is likely to be best achieved by establishing prerequisites for the OSC role which includes training to agreed standards, visits to the RCCNZ and opportunities to work with the SMCs and the development of common procedures and protocols
- n. Consideration should be given to the provision of technical and communications equipment to support OSCs in the conduct of their duties.
- o. In extended searches involving On Scene Coordinators a senior member of the RCCNZ should visit the scene to appraise themselves of the operation.

Terms of Reference Item 5

- p. The RCCNZ should establish the after hours contact details for aviation fuel suppliers and routinely make enquiries of them when appropriate.
- q. RCCNZ should initiate enquiries with Airways NZ regarding radar plots, their implication and flight plans when aircraft are reported overdue. They should not expect that Airways NZ would automatically develop these enquiries.
- r. Radar engineers and experienced pilots should be consulted in respect to radar when missing aircraft are not detected early.
- s. An audit ought to be conducted to ascertain the location, experience and equipment of aviation operators that are prepared to assist in SAR work. The particular operators considered suitable for SAR work

should be contracted through a simple service level agreement. This list of appropriate aviation operators should be regularly updated and the Aviation Industry Association may be able to play a role in this update. Work on the development of service level agreements is already well advanced.

- t. When they are required, the RCCNZ should attempt to employ local aviation operators who are generally the best to conduct searches of their area. Emphasis should also be given to operators experienced in low level flying.
- u. Comprehensive briefings, on at least a daily basis, should be given to all those involved in the search.
- v. The RCCNZ should consider the Police Air Support Unit based in Auckland as a useful resource that can be used for search and rescue work.
- w. Only trained observers in aircraft should be used in aerial searches – when circumstances arise when only untrained observers are available then a training/briefing session should be conducted by a suitably qualified SAR management team member prior to their deployment.
- x. RCCNZ through its partner agencies such as the SAR Secretariat, Police and Defence should keep themselves and the wider SAR Community apprised of new developments and technology for use in searching and rescuing.

Terms of Reference Item 6

- y. ELTs remain a valuable part of aviation safety and need to be retained.
- z. In order for ELTs to remain in a working order in the event of an accident, the potential for ELTs to have inbuilt antennas, and/or multiple antennas should be explored.
- aa. Flight tracking systems may have considerable value as an aircraft safety device. The CAA should give consideration as to their applicability to the NZ aviation environment.

Terms of Reference Item 7

- bb. Each case to suspend or terminate a search will vary depending on the particular circumstances of each search. On some occasions the decision to suspend or terminate a search should be conveyed to the next of kin personally.

- cc. Every consideration in the guidelines to suspend or terminate a search contained in the RCCNZ Operations Manual should be taken into account.
- dd. The search termination or suspension considerations should include the need to seek expert medical advice regarding the potential survivability of missing persons.

Terms of Reference Item 8

- ee. Private components of searches will happen, and they should be integrated and placed under the control of the official search.
- ff. An open, frank and transparent approach should be taken by the RCCNZ when dealing with the family.
- gg. Clear delineation in respect to cost should be made between official and private resources deployed on searches.
- hh. Only suitably qualified and experienced personnel and resources should be deployed to search – not to do so poses danger to other participants in the search and themselves as well as creating a liability for the RCCNZ.
- ii. Should a private search continue beyond the termination or suspension of an official search, the RCCNZ should maintain a liaison so that the official search can be resumed in the event of fresh information being discovered.
- jj. In the event of a private search continuing then it is likely that resources used in the official search will continue to be used. That should not be of concern to the RCCNZ.

Terms of Reference Item 9

- kk. Police should be the key agency to liaise with relatives and next of kin.
- ll. The Police Liaison Officer at the RCCNZ can initiate contact with the family by telephone, but in prolonged searches this should be undertaken by local police and at a personal level.
- mm. Consideration should be given when suspending a search for this to be communicated to families personally by a senior member of the RCCNZ or the person taking the decision.
- nn. Consideration should be given in some searches for regular updates on the search by a senior officer in the RCCNZ directly to the next of kin, in conjunction with the Police.

- oo. Consideration should be given when a search is prolonged for the next of kin to be invited to the RCCNZ to obtain a first hand briefing of the search or an appropriate RCCNZ staff member travel to meet with the family.

APPENDIX 1

Summary of RCCNZ Operating Mandate

Extract from Civil Aviation Act

14B Search and Rescue Operations

- 1) The Minister
 - (a) must establish, maintain, and operate a search and rescue co-ordination centre to co-ordinate and conduct-
 - i. an aviation search and rescue operation, and
 - ii. a maritime search and rescue operation; and
 - iii. any other search and rescue operation that the Minister considers appropriate; and
 - (b) may exercise any powers that may be necessary or desirable-
 - i. for the effective co-ordination and performance of a search and rescue operation specified in paragraph (a); and
 - ii. to implement any international convention or agreement relating to search and rescue to which New Zealand is a party; and
 - (c) may appoint persons to, either generally or in any particular case, participate in or co-ordinate a search and rescue operation specified in paragraph (a).

Appendix 2: Comments on the Terms of Reference by Ivan Erceg

Thank you for the opportunity to review and comment on the draft Terms of Reference for the review into the search and rescue operation involving my brother's helicopter, ZK-HTF.

As you will appreciate, there are a number of issues that I have been thinking about following my intensive introduction into search and rescue operations. I have briefly set out these issues below.

While I have no doubt that the points set out below are likely to be encompassed by the 10 point Terms of Reference you have provided, I had thought it may be of benefit to you if I set out my thoughts in any event as it may give the independent reviewer an idea of the areas I would like to canvas when I have an opportunity of speaking with him (as indicated in your email of 9 December 2005).

With RCCNZ now being run by Maritime NZ is there sufficient focus/funding available for land based Class III searches. For example, is the funding of say New Zealand Land Search and Rescue Inc (NZLSAR) similar to the funding available for equivalent Maritime bodies.

Review the identification and coordination of appropriate expertise (nationally) for the task at hand. That would include access to resources from either local areas (such as local branches of NZLSAR) or having centrally controlled resources and equipment. An example might be access to handheld GPS and equipment to assist in the coordination of the search.

Examination of the suitability of emergency equipment and in particular the distress beacon (Emergency Locator Transmitter) fitted to the helicopter.

Review of the consultation and coordination role played by RCCNZ in relation to specialist aviation, defence force and SAR advisers.

Review search suspension criteria and its application given the availability of privately funded resources. Also to include review of access to Government resources (such as the P3K Orion) where private funding is available.

Review the provision of and adequacy of information to the next of kin. That is, responsibility for the decision to hold back or delay information. That is particularly relevant where there are private resources assisting with the SAR.

Review of interview techniques for eye witnesses. That should include review of the training for the interviewer, on-scene coordinators etc.

Review of coordination and lines of communication between available resources such as the Police, RCCNZ, NZLSAR.

Review of "best practice" SAR techniques/equipment and applicability to the implementation of the RCCNZ SAR action plan. To encompass examination of new technology, equipment and SAR techniques.

I am happy to clarify or expand on any of the points I set out above should you need me to.

Yours sincerely

Ivan Erceg

Appendix 3: Interview Schedule

Australian Maritime Safety Authority, Rescue Coordination Centre

- Steve Langlands, Planning and Coordination Adviser Emergency Response
- David McBrien, Aviation Adviser Emergency Response
- Colin Barr, Manager Planning and Business Support Emergency Response
- Mal Bettenay, Search and Rescue Officer, 21 December 2005 1000 hours
- John Young, Manager Search and Rescue Operations, 21 February 2006, 1520 hours.

Ministry of Transport

- Robin Dunlop, Secretary for Transport, 13 December 2005 1645 hours

Erceg and Klatte Family/Representatives

- Roger Smith, Asia Pacific Director, Independent Liquor
- Tony Wenlock, Group Technology Manager Independent Liquor, 10 January 2006 1110 hours
- Ivan Erceg, Managing Director and brother of Michael Erceg, 20 January 2006 1050 hours
- Floor Heering, Amsterdam Holland via telephone/email at various times
- Rob Snel, Grolsch, Holland various times by email

Auckland Helicopters

- Geoff Foster, Operations Manager/Chief Pilot, 10 January 2006 1450 hours

NZ Police

Office of the Commissioner

- Acting Commissioner Steve Long
- Detective Superintendent Nick Perry, National Manager Crime, 25 February 2006, 7pm.
- Superintendent Tony McLeod, National Manager Operations, 26 January 2006 1600 hrs (by telephone)
- Inspector Gerard Prins, Manager: Emergency Management
- Senior Sergeant Geoff Logan Co-ordinator Search and Rescue, 17 January 2006 0930 hours
- Inspector Ian Manawaitai, Manager Border Security Planning and Liaison Officer RCC, 25 January 2006 1430 hours
- Maarten Kleintjes, Manager Electronic Crime Laboratory, 3 February 2006 1430 hrs

Palmerston North Police

- Sergeant Andy Brooke, 2nd in Charge SAR Manawatu Police, 27 January 2006 1350 hrs
- Sergeant Bill Nicholson, SAR Coordinator Manawatu, 7 February 2006 1300 hrs

Police Air Support Unit (Eagle)

- Sergeant Colin Weir, Officer in Charge
- Scott Long, Pilot

Auckland Police Maritime Unit

- Senior Sergeant Martin Paget, 11 January 2006 0900 hours

Hamilton Police

- Sergeant Steve Hayman, Officer in Charge SAR
- Sergeant Bruce Bogun, Search team
- Constable David Pitchford, Search team
- Constable Mark Walker, Search team
- Constable John Dawson, Search team
- Sergeant Dave Newland, Officer in Charge Enquiry Office, January 2006 0900 hours

Police Taupo

- Senior Constable Barry Shepherd Search and Rescue, 19 January 2006 1530 hours

Auckland Wespac Trust Rescue Helicopter

- Darryl Sherwin, Pilot
- Mark Connell, Crewman, 11 January 2006 1045 hours

Helilink Auckland

- Dean Herrick, Pilot, 11 January 2006 1250 hours

Airwork (NZ) Ltd

- Mark Hayward, Avionics engineer/QA Auditor, 11 January 1450 hours

Advanced Flight Helicopter Charter and Management

- Keith Stephens, Pilot, Tony Milligan, Pilot, 11 January 2006 1530 hours

Ardmore Helicopters

- Roger Cole, Instructor/Commercial Pilot, Rianne Cole Instructor/Commercial Pilot, 11 January 2006 1715 hours

Hill Country Helicopters Wanganui

- Peter Robb, Pilot, 2 February 2006 1910 hrs (by telephone)

South Pacific Avionics

- Ross Osborne – Director at Ardmore, 16 January 2006 1100 hours (by telephone)

Maritime New Zealand

- Russell Kilvington Director, 17 January 2006 1200 hours
- Cath Taylor, Deputy Director Development and Business Services, 26 January 2006 1400 hrs
- John Seward RCCNZ Operations Manager
- Rodney Bracefield Training Officer
- Roger Brimacombe Search and Rescue Officer
- Neville Blakemore Search and Rescue Officer
- Ramon Davis Search and Rescue Officer, 17/18 January 2006
- Heidi Brook, Communications Officer
- Lindsay Sturt General Manager Strategy and Communications, 25 January 2006 0930 hrs
- Chris Raley, General Manager, Safety Services, 8 February 2006 1230 hrs

Civil Aviation Authority

- John G Jones Chief Executive Director, 17 January 2006 1300 hours
- Tom McCready Safety Investigator – Central North Island, 19/20 January 2006
- John Fogden, Manager Rotary Wing and Agricultural Operations, 26 January 2006 1000 hrs
- Peter E Williams, Rules Project Specialist, 26 January 2006 1045 hrs
- Terry Knight, Senior Co-ordinator Government Services, 26 January 2006 1130 hrs
- Toby Farmer Air Traffic Systems Engineer, 3 February 2006 1030 hrs (by telephone)

Phillips Search and Rescue Trust, Helicopter Services BOP Ltd

- John Funnell Chief Executive, 19 January 2006 1145 hrs
- Warren McKay, fixed wing pilot, 10 April 2006 1730hrs (by telephone)

Land SAR

- Dave Comber Taupo , 19 January 2006 1530 hrs
- Dr Thomas Clarkson, Wellington (Director SARINZ)
- Matthew Nolan, Wellington, 25 January 2006 1600 hrs
- Tony Groome, Fielding, Search Manager Adviser Manawatu Region, 27 January 2006 1100 hrs
- Barry Were, Trustee SARINZ, Adviser Waikato Region, 8 February 2006 1015 hrs

NZ Defence Force

- Air Commodore Dick Newlands, Air component Commander, 24 January 2006 1300 hrs

- Squadron Leader Dave Forrest, Air Force Liaison Officer to RCC, Squadron Leader Grant Waring, Air Force Liaison Officer to RCC, 24 January 2006 1500 hrs

The Aviation Industry Association of New Zealand (Inc) (AIA)

- Irene King, Chief Executive, 25 January 2006 1100 hrs

Airways New Zealand

- Phil Peguero, Manager System Safety, 25 January 2006 1230 hours

Legal

- John Marshall, Barrister Wellington

Helipro

- Regan Graham, Base Manager Palmerston North, 27 January 1500 hrs

Victim Support

- Ngaruawahia, Karen Evans Coordinator
- 1 February 2006 1130 hrs (by telephone)
- Counties Manukau, Donna Jepson Service Coordinator, 1 February 2006 1215 hrs

Raglan Farmers

- David Peacock, Farmer, 2 February 2006 1930 hrs (by telephone)
- Trevor Benseman, Farm Manager, 2 February 2006 1950 hrs (by telephone)

SAR Adviser

- Lloyd Matheson, Te Anau, 2 February 2006 2030 hrs (by telephone)

Wanganui Aero Work

- Richmond Harding Manager Fixed wing Pilot
- Rick Harding, Chief Pilot Helicopter
- Don Judd, Operations Manager, 7 February 2006 1030 hrs

Lakeland Helicopters Taupo

- Peter Bradley Chief Executive , 8 February 2006 1315 hrs (by telephone)

Ministry of Foreign Affairs and Trade

- Rosemary Paterson, Director: Consular Division 16 March 2006 (by telephone)

EMC Technologies (NZ) Ltd, Auckland

- Murray Burr, Chief Technical Officer 17 March 2006 (by telephone)

Appendix 4:

TERMS OF REFERENCE

1. To gain an understanding of the sequence and times of events relating to the incident between 4 and 19 November 2005.
2. To ascertain whether the current search and rescue arrangements and procedures were followed by RCCNZ and the other government agencies that were involved.
3. To ascertain whether the current arrangements and procedures are appropriate for an incident of this nature.
4. To comment on the role of the On Scene Coordinators, their training, experience, and relationship with the Search and Rescue Mission Coordinator, their ability to implement the RCCNZ SAR action plan and any conflicts of interest that may have arisen.
5. To review the effectiveness of the search and detection of the missing Helicopter including the suitability of the SAR units tasked.
6. To review the facts regarding the role of the distress beacon in this incident.
7. To review current arrangements regarding RCCNZ's SAR mandate in accordance with the Performance Agreement and search suspension criteria and its application in this incident.
8. To review the interaction between the official search and that arranged privately and recommend mechanisms for the future.
9. To review family liaison and support arrangements and recommend methods for their effective management.
10. To make recommendations to the New Zealand Search and Rescue Council, as appropriate, by 31 March 2006.

Appendix 5

RCCNZ Staff Backgrounds

- a. A Merchant marine officer with experience of a wide range of vessels, including bulk carriers, plus ten years with the UK Maritime Coast Guard Agency (MCA) as a Search and Rescue Officer (SARO), Search and Rescue Mission Coordinator (SMC) and in SAR management.
- b. A former air force navigator with 25 years of experience in aviation search and rescue before joining Civil Aviation Authority where duties included 16 years of managing New Zealand's National Rescue Coordination Centre.
- c. A former UK based commercial fisherman who has spent 16 years with the UK MCA as a SARO and SMC. This SARO has operated in very busy regions and less busy sectors where an event, when it occurred, was a big one.
- d. A former police officer who had 25 years in sole charge of a country area with typical mountainous features and an extensive, rugged coastline. Extensive experience in aviation, land and coastal marine SAR. A member of NZ's Coastguard and manages the local marine VHF network. A Civil Aviation Authority approved crew member for police helicopter operations.
- e. A master mariner (UK) who spent three years as a NZ based marine accident investigator.
- f. A UK trained air traffic controller who has worked in that role in the UK and NZ.
- g. A former air force Air Electronics Operator who has brought 20 years knowledge of P3K Orion search and rescue operations and techniques to the RCCNZ.
- h. A master mariner of 30 years, followed by three years duties as a Marine Duty Officer with the Maritime Safety Authority – now titled Maritime New Zealand.
- i. A former member of the air force's medical branch who, after 20 years service, worked as a manager in the boat building industry. A long time member of NZ's Coastguard (management) and an active pilot (aviation) who holds a commercial licence.
- j. A former member of the Royal Navy's submarine service who subsequently served for 20 years with the UK MCA as a SARO and SMC.

- k. An air traffic controller from Fiji who brings knowledge of the South Pacific region and has experience of SAR operations in that region.
- l. A former employee of CAA, subsequently a businessman (electronics) and a long time member of the NZ Coastguard (including operations and management). Has extensive experience in marine SAR, plus some aviation and LandSAR experience. Joint instigator of NZ Coastguard's Air Patrol and also creator of the NZ Police Air Observers' Course.
- m. A former police officer with experience in managing SAR events. Subsequently managed a division of a government agency.
- n. A former commonwealth air force radio operator who subsequently served for nine years as an operator in the Maritime Operations Centre (MOC), NZ's marine equivalent of Air Traffic Services. As a Senior Operator, brought a wealth of experience as a result of handling the full range of maritime events, including communications with distressed vessels, to the RCCNZ team. Also adds value from an in-depth knowledge of the incident management software currently in use.
- o. A former mariner with extensive experience in New Zealand's region. First Mate qualified.
- p. A former air force officer with extensive experience of operating in NZ's Search and Rescue Region (SRR), aviation and marine SAR operations in NZ's SRR and overseas, management of aviation resources in SAR incidents, Search and Rescue Mission Coordinator (SMC, formerly titled SARMC) with the National Rescue Coordination Centre (NRCC), public relations with NRCC and New Zealand Defence Force, aviation and management covering air transport and air combat flight operations, aircrew training, aircrew and aircraft scheduling, financial and human resources management, joint exercise planning, intelligence, technology, inter-departmental, inter-agency and inter-government liaison and co-ordination, administration and technical disciplines. Commercial pilot qualified.

Appendix 6

Equipment carried by Police 'Eagle' helicopters.

- a. Infrared FLIR 8500 (possibly the most modern in the country)
- b. Spotlight Nitesun SX16
- c. Radios UHF Marine VHF
- d. Cellphone Kyocera Ccom027
- e. Camera EOS auto 200mm zoom
- f. Binoculars Stedi-eye 14X14
- g. Mapping 'Quikmap' integrated with 'Wises' (GPS linked)
- h. Computers Panasonic 'Toughbook' laptops

Appendix 7

Radar

Source: Air Commodore RJ Newlands, Air Component Commander, Joint Force Headquarters, New Zealand Defence Force.

1. “Background: *The concept of the Foliage Penetrating radar was first developed during the Vietnam Conflict to assist in the defence of American firebases surrounded by dense bush. The concept was proven and several sets were successfully deployed until the withdrawal of American troops in 1973. You should note that this was a ground-based radar, with no application to the SAR task because of the static nature of the radar.*
2. *In 1987, the concept was revisited when successful trials of Synthetic Aperture Radar systems were completed. The idea was to provide a high definition radar that could penetrate dense foliage and look below the earth’s surface. This application was particularly useful when looking for underground bunkers and ammunition dumps. The radar was trialled on a C-12 (Beechcraft King Air) aircraft, and then later successfully in a US P3 Orion. In 2000, DARPA (the US Defence Advanced Research Projects Agency) began developing advanced algorithms for an integrated, library-based automated target recognition system. This system began trials with the US Air Force in 2002.*
3. *DARPA have also developed a Moving Target Indicator (MTI) radar with FOPEN capabilities, for detecting and tracking vehicles moving under the cover of foliage. By combining FOPEN radar imagery with Infra Red and Conventional radar information, greater information can be provided of previously hidden ground activities. It should be noted that resolution limits on the radar result in reasonably large objects being identifiable, but not smaller objects that are indistinguishable from the background clutter.*
4. How the system works: *The FOPEN radar functions almost exactly as any conventional radar system, except that this radar operates in the VHF / UHF radio frequency range rather than the microwave frequency range. Where microwave radiation is unable to penetrate solid objects, the lower frequency FOPEN radar is capable of looking through comparatively dense objects (just as normal radio transmissions of the same frequency penetrate buildings and vehicles). The lower frequency is also less harmful to “biologics”, allowing a much higher powered and concentrated beam to be used near personnel. The initial trials were conducted using a radar with 1m resolution, however a radar of 0.6m resolution was projected before the system was to be introduced to service.*
5. Size: *The electronics associated with the FOPEN radar is of a comparative size to most conventional radar systems. As the frequency is relatively high, the size of the antenna remains small,*

allowing its installation into smaller aircraft. The current configuration of the US Unmanned Aerial Vehicle (UAV) Global Hawk is capable of collecting and down-linking FOPEN SAR imagery to battle planning cells and airborne AWACs platforms.

6. *Based on the references reviewed, we were unable to ascertain if the system is available to other nations. Most open-source information on this radar system becomes scarce after 2000, and the most recent developments of the radar are likely to possess technology and processing algorithms that would be closely protected. Based on my knowledge of the US approach to releasing information on other radars developed in the US by DARPA and other Department of Defense agencies (let alone releasing the radars themselves), I can say that it is extremely unlikely that this radar would be released for civilian usage, and having it released for military usage would likely be a very long process with little surety of a successful outcome.*

Appendix 8

ELT Test Report

EMC Technologies (NZ) Ltd
Test Report No 60111.1
Report date: 2 February 2006

TEST REPORT

**Kannad 406 AF-H Emergency Locator Transmitter
(ZK-HTF)**

for

Civil Aviation Authority of New Zealand

This Test Report is issued with the authority of:

Andrew Cutler - General Manager

EMC Technologies (NZ) Ltd

STREET ADDRESS - 47 MacKerron Street, Grey Lynn, Auckland, New Zealand
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EMC Technologies (NZ) Ltd

Test Report No 60111.1
Report date: 2 February 2006

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EMC Technologies (NZ) Ltd

Test Report No 60111.1

Report date: 2 February 2006

1. INTRODUCTION

In late 2005 helicopter ZK-HTF crashed.

On board was a Kannad 406 AF-H Emergency Locator Transmitter which was not detected by searching aircraft.

The antenna for this beacon was snapped off at the base when the helicopter crashed.

EMC Technologies NZ Ltd have been asked by the Safety Investigation Unit of the Civil Aviation Authority carryout radiated emission tests on this beacon.

These emissions levels are then to be compared to the levels observed when a standard whip antenna is then connected.

Measurements are to be carried out where ever possible in accordance with C/S T.007 – Issue 4, November 2005.

The ELT operates on 121.5 MHz and 406 MHz.

Testing was carried out on these frequencies.

Emissions were observed on 121.5 MHz continuously with a break of approximately 5 seconds every 45 – 50 seconds when the 406 MHz transmitter was observed to operate.

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EMC Technologies (NZ) Ltd

Test Report No 60111.1

Report date: 2 February 2006

2. CLIENT INFORMATION

Company Name Safety Investigation Unit
Civil Aviation Authority of New Zealand

Address PO Box 31-441

City Lower Hutt

Country New Zealand

Contact Mr Joseph Collier

3. DESCRIPTION OF TEST SAMPLE

Brand Name Kannad

Model Number 406 AF-H

Product Emergency Locator Transmitter

Manufacturer Kannad

Country of Origin Not known

Serial Number L0505-0013

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EMC Technologies (NZ) Ltd

Test Report No 60111.1

Report date: 2 February 2006

4. MEASUREMENT SETUPS ETC

Radiated emissions testing was carried out on 121.5 MHz and 406 MHz.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand (Note: Site conforms to the requirements of CISPR 16, Part 1, Clause 16, and ANSI C63.4 - 2003).

Before testing was carried out, a receiver Self Test, Long, and Short calibration was undertaken.

Additionally, a check of all connecting cables and programmed antenna factors was carried out.

The device was placed on the test tabletop, which was a total of 0.8 m above the test site ground plane.

On top of the test table was a metallic ground plane as required by C/S T.007 with the beacon and the antenna being placed on top.

Measurements of the radiated field were made with the antenna located at a 3 m horizontal distance from the centre of the test table.

Testing was carried out in both vertical and horizontal antenna polarisations.

The maximum level was found by rotating the automated turntable, and by varying the antenna height with an automated antenna tower.

A Quasi Peak detector was used with a bandwidth of 120 kHz.

The emission level is determined in field strength by taking the following into consideration:

$$\text{Level (dB}\mu\text{V/m)} = \text{Receiver Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB)} + \text{Coax Loss (dB)}$$

Measurement uncertainty with a confidence interval of 95% is:

$$\text{- Free radiation tests (30 - 1000 MHz)} \pm 4.1 \text{ dB}$$

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Test Report No 60111.1

Report date: 2 February 2006

5. RESULTS

Frequency MHz	FS Level dBuV/m	EIRP Power watts	EIRP Power dBm	Polarisation
Damaged antenna				
121.500	24.5	8.46E-11	-70.7	Vertical
	22.7	5.59E-11	-72.5	Horizontal
Sample whip antenna				
121.500	111.4	4.14E-02	16.2	Vertical
	92.3	5.09E-04	-2.9	Horizontal
Damaged antenna				
406.020	82.5	5.33E-05	-12.7	Vertical
	72.6	5.46E-06	-22.6	Horizontal
Sample whip antenna				
406.020	131.7	4.4	36.5	Vertical
	105.1	9.71E-03	9.9	Horizontal

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6. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref
Aerial Controller	EMCO	1090	9112-1062	RFS 3710
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612
Log Periodic Antenna	Schwarzbeck	VUSLP 9111	9111-228	3785
Measurement Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595
Tuntable	EMCO	1080-1-2.1	9109-1578	RFS 3709
VHF Balun Antenna	Schwarzbeck	VHA 9103	-	RFS 3603

7. ACCREDITATIONS

The tests were carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ISO 17025.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ISO 17025.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

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8. PHOTOGRAPHS



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Appendix 9 Suspension of Search Criteria.

Extract from RCCNZ Standard Operating Procedures

8. Incident Termination or Suspension

8.1 SAR Action Not Successfully Concluded

8.1.1 Consultation

8.1.1.1 A SAR search should continue until the possibility of success is no longer reasonable and all hope of rescuing survivors is past. If, after consultation with the OSC and/or others involved it has been determined that a further search would be to no avail, the SMC must consult the RCCNZ Duty Manager before commencing procedures to terminate or suspend a search.

8.1.2 Search Termination Considerations

8.1.2.1 As the search progresses it may be necessary to re-evaluate scenarios and redefine the search area. Plots of search sub-areas covered should be maintained so that a progressive record of the search is built up. Before terminating or suspending search activities the SMC should review the following factors in consultation with RCCNZ Duty Manager:

- (a) There is no longer any probability that survivors might still be alive, given temperature, probable employment of life saving appliances, wind and sea conditions prevailing since the distress incident;
- (b) The cumulative Probability of Success;
- (c) The probability that survivors were in the search area and that the area has been exhaustively searched, or that it is no longer possible to continue;
- (d) That all probable locations have been investigated and enquiries as to the whereabouts of the vessel or craft have been exhausted; and
- (e) The availability of search facilities to continue the search.

8.1.3 Search Termination

8.1.3.1 When the efforts to locate the distressed aircraft or vessel and their occupants have been successful and the survivors, if any, have been rescued, the SMC shall terminate the search. This action will be followed by notifying all participating organisations, persons and rescue units/elements that the search activities are terminated and confirming that all rescue or survival equipment has been recovered or removed from the scene when possible. Appropriate documentation shall be completed.

8.1.4 The Decision to Suspend the Search

8.1.4.1 The difficult decision to suspend active search operations pending the receipt of additional information must be taken at some stage. Prior to suspending such search operations a thorough case review should be made. The SMC must decide that additional search effort will not result in success. In making this decision each SAR incident must be considered on its own merits and care should be taken not to end the search prematurely.

8.1.5 SAR Case Review

8.1.5.1 The decision to suspend a search involves humanitarian considerations, but there is a limit to the time and effort that can be devoted to each SAR case. The reasons for suspending a search should be clearly recorded. A case review of the incident leading to the decision should examine:

- (a) Search decisions for proper assumptions and reasonable planning scenarios;
- (b) Certainty of initial position and any drift factors or anomalies used in determining the search area;
- (c) Significant clues and leads re-evaluated;
- (d) Data computations;
- (e) The search plan to ensure that:
 - i. All assigned areas were searched;
 - ii. The Probability of Detection is as high as realistically achievable; and
 - iii. Compensation was made for search degradation caused by weather, navigational, mechanical or other difficulties;

- (f) The determination about the survivability of survivors, considering:
 - i. Time elapsed since the incident;
 - ii. Environmental conditions; and
 - iii. Age, experience, physical condition of potential survivors, the likely will to survive;
 - iv. Survival equipment available; and
 - v. Studies or information relating to survival in similar situations.

8.1.6 Search Suspension

8.1.6.1 When the efforts to locate the distressed aircraft or vessel and their occupants have been unsuccessful and the RCCNZ team is unanimous that further search, without fresh evidence, will be to no avail, the SMC shall initiate search suspension procedures. This shall include a comprehensive review of the operation, using the Mission Suspension Class III SAR Mission Checklist at **Annex P01-8A** to cover:

- (a) Search decisions to ensure appropriate assumptions were made and that planning scenarios were reasonable;
- (b) Certainty of initial position and drift factors used in determining the search area should be re-examined and significant clues and leads should be re-evaluated;
- (c) Datum computations;
- (d) The search plan should be reviewed to ensure that:
 - i. all assigned areas were searched;
 - ii. the probability that the search effort would have located the survivors; and
 - iii. compensation was made for search degradation caused by weather, navigational or other difficulties.
- (e) A determination of the survivability of potential casualties should be made, considering:
 - i. time elapsed since the distress;
 - ii. environmental conditions;
 - iii. age, experience, clothing and physical condition of occupants;
 - iv. survival equipment available;

- v. immersion tables and other studies or information relating to survival in similar situations; and
- vi. the reasons for suspension shall be clearly recorded and signed off by the SMC and the Suspending Authority.

8.1.6.2 Following this review procedure the SMC shall advise the RCCNZ Duty Manager of the decision to recommend search suspension and request approval from the appropriate Suspending Authority. The completed Mission Suspension Checklist Form (**Annex P01-8A**) should be printed and either emailed or faxed to the Suspending Authority together with copies of relevant Media releases if practicable. The SMC shall also provide a comprehensive verbal briefing of the reasons for seeking approval to suspend operations and answer any questions that may be raised. Upon receipt of the faxed, or emailed confirmation of approval from the Suspending Authority, all participating organisations, persons, and SRUs shall be notified and the Media staff should issue a final media release. Note a verbal approval is not an acceptable authority to proceed unless this whole process has been recorded on the RCCNZ Operations Room voice recording system. Written confirmation is to follow at the first opportunity.

8.1.6.3 During the period of search suspension the RCCNZ Duty Manager shall evaluate any additional pertinent information in consultation with the SMC. Should a continuation of the search be contemplated, the Suspending Authority shall be fully briefed by the RCCNZ Duty Manager on the circumstances, reasons for resumption and the extent of the renewed operations proposed. Upon agreement by the Suspending Authority, the SMC shall reactivate the search.

8.1.7 Reopening A Suspended Incident

8.1.7.1 If significant new information or “clues” are developed, reopening a suspended incident should be considered. Reopening without good reason may lead to unwarranted use of resources, risk of injury to searchers, possible inability to attend to other emergencies, and false hopes among relatives.

8.1.8 Suspending Authorities

8.1.8.1 Suspending authorities for Class III SAR operations are:

- Missing civil aircraft Director or Deputy Director of Civil Aviation
- Missing military aircraft and missing naval vessels or personnel Chief of Defence Force who may delegate authority to the ACAS (Ops) or CNS (Chief, Naval Operations Requirements and Plans), as

appropriate

- Missing marine vessels Director of Maritime New Zealand or Acting Director of Maritime New Zealand.

8.1.9 Ministerial Advice

8.1.9.1 The Suspending Authority (Director of Civil Aviation, Director Maritime New Zealand) may, at his or her discretion, refer the matter, to the Minister of Transport for final decision.

8.1.10 Next of Kin

8.1.10.1 Before a Class III SAR operation is suspended, the SMC, through the Police Liaison Officer, shall consult the next of kin when possible and brief them on the search effort, conditions in the search area and the reasons for proposing suspension.

8.1.11 Notification of the Decision to Suspend a Search

8.1.11.1 In a protracted incident, notification of the decision should normally be made **one day prior** to the suspension of operations, allowing relatives at least one more day of hope, while giving them time to accept that the search cannot continue indefinitely.

8.1.12.2 Clearly, this amount of notice will not always be appropriate, but the significance of providing relatives with some notice of the intention to suspend the search should be taken into account.

8.2 Dealing With Relatives

8.2.1 Briefing Relatives During a Search

8.2.1.1 The SMC/PLO should advise the relatives and/or Next of Kin (NoK) of missing persons that the search has been suspended. Relatives and NoK are normally more willing to accept the decision to suspend operations if they have been allowed to follow the progress of the search. The SMC should maintain contact with relatives during the search to provide information and outline RCCNZ's plans.

8.2.2 Providing Access to Coordination Centres

8.2.2.1 Providing access to the coordination centre during a search is discouraged. When terminating or suspending a search it may be appropriate to enable relatives and/or NoK to see the RCCNZ Operations Room and be shown the Search Plans. These steps may assist relatives and NoK in accepting the SMC's decision to

conclude search operations in the event that missing persons are not located.

Extracts from the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual

(As supplied by RCCNZ)

IAMSAR Vol II, Chapter 1, SAR Mission Coordinator, Para 1.2.3a: “The SMC is in charge of a SAR operation until a rescue has been effected or until it has become apparent that further efforts would be of no avail, or until responsibility is accepted by another RCC....”

IAMSAR Vol II, Chapter 1, Conclusion Stage, Para 1.6.12: SAR operations enter the conclusion stage when: “...during the distress phase, the SMC determines that further search would be to no avail because the area has been adequately searched and all probability areas have been investigated or because there is no longer any reasonable probability of survival of the persons on board.”

These paragraphs, in essence are contained in Para 8.1.1.1 of RCCNZ SOPs, P01-8

Copy of the Suspension Checklist for ZK-HTF

Suspension of Class III Search: Mission Checklist

1. Mission Designation EUROCOPTER EC 120 B ZK-HTF

		(<input checked="" type="checkbox"/> Tick Boxes)	Checked	Satisfactory
2.	Re-Evaluation	- Distress Position	√	√
		- Drift Factors	N/A	N/A
		- Intelligence	√	√
		- Search Decisions	√	√
		- Assumptions	√	√
		- Scenarios	√	√
3.	Review	- Search Areas/Plans	√	√
		- Assigned Areas Searched	√	√
				Insert Values
		- Coverage Factor: Variable depending on search conditions (terrain, vegetation, weather) and the capability of SRUs assigned.		0.4
		- Probability of Detection: Also variable as above.		10 – 40%
		- Total Search Time (Aircraft)		Approx 400 hrs
		(Vessel/s)		N/A
		(Ground Teams)		TBA
4.	Survivability Assessment	- Elapsed Time of Incident		148 hours
		- Environmental Conditions (Temps/Chill Factors)		Moderate temps/ drizzle/ strong winds
		- Physical Condition (Potential Survivors)		Unknown
		- Survival Times Ex Graphs: (Specialist advice is that uninjured persons in good physical condition could survive. Any injury coupled with lack of adequate clothing and/or shelter, together with the stress of surviving a crash, markedly reduces the potential for survival.)		N/A

5. Recommendation for Suspension (*State Reasons*)

A Eurocopter EC120B helicopter, registration ZK-HTF with two people on board was declared missing at 040541UTC Nov 05 after failing to arrive in Queenstown on a flight from Ardmore. An extensive communications search was immediately commenced and is ongoing. It was considered that the aircraft was missing somewhere between Ardmore and its first planned refuelling point at Wanganui.

An aerial search, later supported by ground teams, was commenced on Saturday 05 November 2005, the initial focus being on Mount Karioi near Raglan which was the helicopters last known position. More search areas were developed and covered as hearing and sighting reports that may have been relevant were received. By 100400UTC Nov 05 nearly 400 hours have been flown to search the coastal area from Limestone Downs to Raglan and much of the area bounded generally by lines joining Raglan, Raetihi, Wanganui, Patea, Stratford, Urenui and back to Raglan. The total area covered was in the order of 16,000 sq km.

Following two reviews of the actions to date and in the absence of further information and given the time that has elapsed since the start of this incident, it is considered that further air search efforts in the RCCNZ determined areas of interest are unlikely to find survivors.

It is therefore recommended that the air search effort be suspended but the incident remains open pending receipt of further credible information that may lead to the location of the missing aircraft and its crew. Further, it is recommended that RCCNZ provide guidance and advice to the organisers of the ongoing private search where that is practicable.

Signature _____ (*Name Removed*) Date _____ Time _____
(SMC)

Signature _____ (*Name Removed*) Date _____ Time _____
(RCCNZ Duty Manager)

6. Suspending Authority Approved Not Approved

Appendix 10

As supplied by RCCNZ

Developments in the New Zealand Search and Rescue System

Since early 2001 a number of reviews have been conducted aimed at, inter alia, improving SAR in New Zealand. These include the Maritime Patrol Review (2001), The Maritime SAR Review (2001), the Bowdler Report (2003), the Class III SAR Risk Assessment (2003) and the Cost-Benefit analysis for Maritime New Zealand's Coordination of Marine SAR (2005). This demonstrates a sustained body of work aimed at improving the New Zealand SAR system both strategically and operationally.

On 28 January 2003, the New Zealand Government determined the need for stronger strategic co-ordination and governance of all SAR modes in New Zealand and agreed to a change in the SAR governance structure. This change resulted in the establishment of the SAR Council (comprising Ministry of Transport as Chair, Maritime New Zealand, Civil Aviation Authority, New Zealand Police and New Zealand Defence Force). To support the SAR Council and provide technical expertise a SAR Consultative Committee was formed from key SAR stakeholders (e.g. Aviation Industry Association, NZ Coastguard Federation, LandSAR). A SAR Secretariat Manager was also appointed to coordinate activities to meet the SAR Council's responsibilities and to facilitate developments within the SAR sector. During its period of tenure the SAR Council has had oversight of SAR within New Zealand and has developed a SAR vision, mission and goals and a strategic plan.

In May 2005 the SAR Council commissioned the most recent work to address three outstanding recommendations from the Maritime Patrol Review relating to SAR and to address the ongoing uncertainty, associated with the Co-ordination of SAR, at the interface between Class II and Class III SAR. The work was also to address the current shortcomings associated with SAR response assets, both surface vessels and aircraft; relied upon to respond in a timely and professional manner as and when tasked.

After nearly 12 months of work by Maritime New Zealand and members of the SAR Consultative Committee, a draft proposal was submitted to and approved by the SAR Council at its meeting in December 2005. It was recommended for submission to the government Officials' Domestic and External Safety Committee (ODESC) for consideration. The paper was approved by ODESC in February 2006 and is currently undergoing final amendment prior to submission to Cabinet shortly.

The Cabinet paper presents the strategic and operational risks associate with the current New Zealand SAR system and seeks to provide Cabinet members with options to significantly address the current risks in the SAR sector.

Following the location of the missing helicopter ZK-HTF on 19 November 2005, the SAR Council proactively commissioned an independent review in the interest of continuing developments within the New Zealand SAR system. This decision was

welcomed by all of the key SAR stakeholders and mission participants as an opportunity to reaffirm the many identified and known risks in the strategic and operational components of the SAR system. Further, all stakeholders are supportive of constructive recommendations, as an outcome of the independent review, that will lead to improvements in the SAR system. Such an outcome is viewed as providing substantial benefits to the New Zealand public and other users of New Zealand's SAR system.

Appendix 11

Erceg Family Views

SAR Independent Review

Search and rescue is, and will continue to be, a task that remains challenging. The Independent review that has been carried out by Mr. Paul Fitzharris, is an excellent document which goes a long way in identifying many of the issues that currently exist, and which with time must be corrected. It is acknowledged that each search is unique, but the weaponry that must be utilized, should be available to meet the needs of the search coordinators.

The Independent review identifies much of the weaponry. It acknowledges that no single item will provide the final solution, but a combination of weaponry that is managed in an intelligent manner will yield a successful conclusion. A successful search and rescue organization must have access to all available weaponry. It must be at the cutting edge, and its culture must be capable of lateral thinking.

Within any search and rescue organization, the organization must be well established, and must have a seamless flow from air, sea to civil activities.

The personnel that are required within the three categories must understand the needs of their associates, and must enjoy the highest form of cooperation from equipment coordination through to information sharing. The planning capability of each entity must be capable of linkage with each entity of a search, and must ultimately form a single plan that is continually updated and which remains live. Within the plan, procedures should be in place to enable analytical review to occur and this information should be provided to all entities.

Each search has one ingredient that can never be replaced, and which can never be procured in sufficient quantity. This ingredient is time itself. There will never be enough time to do things out of sequence, or several times over. Lives of those who are in need of being found do not have time on their side.

The search for ZK-HTF suffered from three issues. They are identified as:

1. Time delay.
2. Co-ordination.
3. Data analysis.

All three issues are critical for a successful search outcome. The failure of the official search for ZK-HTF should not be a finger pointing exercise, but one which leads NZ towards a successful search and rescue organization. With every mistake made, the knowledge gained, provides the correct solutions for the future. It is the future that we must protect, and that can only occur if the lessons from the past are not lost.

To understand what may have occurred during the search for ZK-HTF, the three critical issues as outlined, are recognized within the Independent review, and can be identified in summary as follows:

Time delay

- Why did it take until the Saturday for the radar information to come through?
- Why does RCCNZ not get everything relevant from Airways automatically once SARTIME is reached?
- Why did it take until Sunday 6 November to put order to the aerial search?

Time has been lost. The outcome is unknown. This lesson should not be lost. The Independent review identifies the need for improved data sharing and availability. It recognizes that time is the most precious commodity.

Co-ordination

When time is of the essence, logistics and analytical coordination of the search are of paramount importance. Therefore, why was Mr. Funnell made an OSC when he had no idea what was in the procedures manual.

Clearly insufficient resources to:

- manage the volume of information coming in
- Co-ordinate the search
- Analyse data in a timely fashion

No co-ordination or cooperation between land and air resources.

Failure to use NZ Police Air Support Unit, (CAA), Land SARS,

Ability to handle a major search of this nature.

Improved coordination, cooperation, equipment and resources are vital for New Zealand's search and rescue operations. The Independent review shows the path that we must travel. The future can only be secure for all New Zealanders if we learn from the past and ensure that the future does not suffer from the mistakes of the past.

Data Analysis

Early access to and assessment of the radar plot was the key to locating the aircraft. This evidence was available for analysis from day one. Yet it was not analysed until day 11 (15 November) and not properly understood or acted upon until day 15 (19 November).

FLIR and the dying foliage were the final aids in location but the main tool was (or should have been) proper analysis of the radar plot. The essential data was available on 5 November:

- Error in the radar plot could have been determined and acted upon at or about that time.
- The track of the flight path of the aircraft would have disclosed to the assessor that there was an issue and focused the search (to an even greater extent) in that area.

Co-ordination between land and air would have assisted at that time as would a better canvassing of the immediate community.

The failure of the official search for ZK-HTF has much of its failure located in the three identified issues. The search for ZK-HTF would have been completed within the first three days had the data been correctly analyzed, and had the land search been coordinated with the air searches. Air searches have an efficiency of no more than ten percent, and remain reliant on accurate data from all available weaponry.

Although the outcome of the search for ZKHTF is now known, the knowledge gained must be analyzed correctly and used in future searches. The well being of all New Zealanders is of utmost importance. They have a right to expect and receive search support in a professional and timely manner. Our lives may be at risk for every minute longer a search may take. The private search for ZK-HTF should never have been necessary, but we are thankful for its existence as the knowledge gained through the Independent review will assist in ensuring our future searches benefit from the lessons learnt.

On behalf of my family and friends, I would like to thank Paul Fitzharris and members of the Search and Rescue Council for giving us the opportunity to express our understandings.

Ivan Erceg