



# **New Zealand Search and Rescue Council**

## **ZK-NCA SEARCH AND RESCUE CASE STUDY**

### **Background**

1. About 7.10pm on Friday the 6 June 2003, an Air Adventures Piper Chieftain light aircraft containing the pilot and nine passengers crashed en-route from Palmerston North to Christchurch while making a final approach to Christchurch Airport. Eight occupants died at the crash scene. Two passengers survived the impact.

2. A substantial rescue operation involving a number of emergency services and related agencies commenced on notification of the probable crash of the Air Adventures flight. The first alarm of a missing aircraft was raised by air traffic controllers from Airways Corporation. NZ Police controlled the subsequent search operation as 'lead agency' but a number of emergency services were involved in the Search and Rescue (SAR) phase of the operation.

3. A review of the response by emergency services concluded that those participating in the search and rescue operation to locate the occupants of the Air Adventures flight were involved in a highly stressful, often frustrating and technically difficult search and rescue activity. With the exception of the mistakes made in recording and processing particular coordinates provided to Police, the decisions and actions of the various emergency services, organisations and agencies involved in this operation were otherwise reasonable, timely and professional in execution.

4. This case study is intended to inform airport authorities throughout New Zealand of how this incident was responded to by emergency services. The lessons learnt in this incident may well be appropriate for other airport authorities or serve as the basis for future planning or exercises.

5. The case study will examine the sequence of events and the response by the various agencies in detail and then explore the relevant lessons that arise from the response to this incident. An accompanying PowerPoint presentation describes the timeline and locations.

### **Initial Crash Notification and Activation of the Emergency Response**

6. At 7.07pm Airways Corporation air traffic controllers in the Christchurch Airport control tower noted the Air Adventures flight had disappeared from radar while on final approach. Attempts to communicate with the aircraft's pilot, and locate the aircraft by enquiry with the Airways Corporation radar

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centre situated in Sir William Pickering Drive were unsuccessful. At 7.10pm the Tower contacted Airport Fire Service by direct line using the Emergency Plan crash message format to advise the aircraft was missing on its final approach. Air Traffic Control estimated the probable location of the aircraft at about one nautical mile (nm) [1.8km] from the end of runway 20.

7. Airways Corporation is required to follow notification procedures set out in the Christchurch Airport Emergency Plan in relation to (on-field) incidents within a 1,000 metre radius of the runway thresholds. In respect to Christchurch Airport that first point of contact is the Airport Fire Service which is manned 24 hours daily.

8. Incidents such as missing or crashed aircraft occurring further than two kilometres from the airport (off-field) require Airways Corporation to notify the National Rescue Coordination Centre (NRCC) (now RCCNZ) situated in Wellington. The NRCC then assumes responsibility for controlling and coordinating search operations.

9. In the case of the Air Adventures flight, it was assumed the aircraft was on-field within the two kilometre range and therefore the responsibility of local emergency services coordinated under the Christchurch Airport Emergency Plan. Under the Christchurch Airport plan, Police assume the overall command and control responsibility in managing the incident response.

10. **Emergency Plan.** The local emergency plan requires the Airport Fire Service to activate the response of emergency services by way of a 111 conference call to specified services including; Fire Service, St John Ambulance, Christchurch Airport Police and Christchurch Airport Company (CIAL). The NZ Police communications centre at Christchurch is not a direct recipient of the networked emergency activation system as they are co-located with the NZ Fire Service communications centre and advised internally of any alert.

11. An air traffic control supervisor from the Airways Christchurch radar centre situated in Sir William Pickering Drive also contacted Police and NZ Fire Service separately by 111 call at 7.18 pm to advise details of the missing presumed crashed aircraft.

12. At the time of the initial notification the only information able to be passed to emergency responders was the aircraft was a Piper Chieftain operated by Air Adventures that was missing on radar while approaching runway 20 at a distance of approximately one nautical mile. No details of the number of persons on board were available.

13. **Emergency Services Response.** The response of emergency services was immediate. Airport Fire Service and Aviation Security Service deployed resources to search both the internal perimeter of the airport boundaries, with AFS despatching two rescue tenders to the vicinity of Greywacke Road to begin a search of the general area identified by the air traffic control tower ie. one nautical mile from the runway threshold.

14. The Christchurch Airport Emergency Plan requires the dedicated Emergency Operations Centre (EOC) situated in the international terminal be opened following activation of emergency services for 'standby', 'full emergency' and 'crash' incidents. Airport Police officers and Airport Company officials opened the EOC at 7.20pm to coordinate the response of the various agencies and services. The EOC remained operational until officially stood down at 2355hrs.

15. **Lead Agency.** Christchurch Police assumed initial control of the incident. Command of a multi agency incident is determined according to the Coordinated Incident Management System (CIMS) model. For those incidents where Police are the 'lead agency' procedures require the senior officer in the Southern Communications Centre to take command of not only the response of police units, but also overall control and coordination of all emergency services and agencies involved. The initial command role remained with the shift team leader and then officer in charge of the communications center until the arrival of the Canterbury District on-call commissioned officer, at 8.07pm.

16. Police units and a Senior Field Supervisor were dispatched to the area of the Airport within a minute of the initial call, as well as to the Dickeys Road / Coutts Island area and also the northern bank of the Waimakariri River. Between 7.14pm – 7.50pm, 13 police units were deployed to the incident location. Between 7.50pm – 9.24pm (when the aircraft was located), an additional 19 police units had been deployed, comprising approximately 45 police staff.

17. **NZ Fire Service.** NZ Fire Service units also immediately responded. The initial responding unit was supported by a further four appliances, a command unit and water tanker; a total of 26 staff. Initial deployments were to the northern end of the runway on McLeans Island Road, with one appliance being dispatched to the vicinity of Dickeys Road Coutts Island.

18. NZ Fire Service operate a decentralised system of command and control of incidents, which differs to that operated by Police. The NZ Fire Service established a command headquarters position in respect of Fire Service units and was joined subsequently by the Police scene controller.

19. Overall command and control of the operation remained with Police throughout however, and was exercised centrally from the Christchurch police station via the Southern Communications Centre.

20. **Christchurch Airport Company.** Christchurch Airport Company (CIAL) officials played a significant role in staffing the Airport Emergency Operations Centre (EOC) through the night, and in coordinating the flow of information and communication between various agencies.

21. **St John Ambulance Service.** St John Ambulance Service responded within five minutes of the initial 7.13pm notification. Six emergency

ambulances were dispatched to the Airport and a senior officer attended at the Airport EOC.

22. St John coordinates deployments of the Westpac Rescue helicopter service situated adjacent to Christchurch airport. The rescue helicopter was placed on standby and crew activated, however due to dense fog at the airport the helicopter could not be deployed in a search role, even though ready to fly.

23. St John alerted Christchurch Hospital Emergency Department at 7.31pm. An early lack of information on the number of persons on board the Air Adventures flight resulted in Christchurch Hospital activating a full response of trauma specialists and support staff, and those staff remained on duty throughout the incident.

24. **Other agencies.** Other support agencies activated in the early stages of the operation included Salvation Army and Victim Support whose role is to assist with families and friends of those involved, and Opus for management of traffic on state highways.

25. Police notified the National Rescue Coordination Centre (NRCC) of the missing aircraft at 7.25pm. Overall responsibility for management of the incident was not assumed by the NRCC, so remained with Police. Note that the NRCC has now been replaced by the Rescue Coordination Centre.

### **Search Phase**

26. Emergency services were activated by 7.18 pm and responded immediately. This initial immediate response was supplemented with other units being deployed to the area as they became available.

- ◆ Airport Fire Service and Christchurch Airport Company (CIAL) personnel were the first to deploy as they are based at Christchurch Airport.
- ◆ Between 7.14pm – 7.50pm, 13 Police units were deployed to the general area. Between 7.50pm – 9.24pm (when the aircraft was located), an additional 19 police units had been deployed, comprising approximately 45 police staff. A reserve section of staff were assembled at the Airport Fire Service, to be deployed when the missing aircraft was located.
- ◆ NZ Fire Service units deployed comprised two senior officers, four appliances and crews, a command unit and water tanker; a total of 26 staff. Police and Fire staff formed the major portion of those involved in the search phase of the operation.
- ◆ St John Ambulance Service deployed six Ambulances, two senior officers and a communications officer; a total of 14 staff.
- ◆ Local landowners and residents who were contacted via media broadcast, telephone or personally by searchers also responded to participate in the search operation.

27. The two major problems confronting the Police Incident Controller, senior Fire Service officers and searchers from the outset were ;

- a. 'where to begin looking' for the aircraft, and
- b. the physical environment in which the search operation was conducted ie. weather and ground conditions at the time.

28. The main 'area of probability' for locating the missing aircraft and occupants became a rectangular area based on an extension of the centerline of runway 20 running from Christchurch Airport in a northeast direction through largely rural and uninhabited farmland. Natural boundaries existed to some degree, formed by the Waimakariri River, Hall Road / McLeans Island Road (defined by a lengthy flood stop bank) in the west, Christchurch Airport to the south and an eastern boundary comprising industrial premises and the Clearwater Resort (refer Appendix B – Air Adventures crash plan).

29. The distance between Christchurch Airport and the Waimakariri River is approximately six kilometres, and approximately two kilometres between western and eastern boundaries; a total area of 12 square kilometres.

30. Although sealed or gravel roads existing on three of the four boundaries (the exception being to the east) and the privately owned / restricted use Greywacke Road ran through it, vehicle access to remaining areas was largely limited to farm tracks and was unsuitable for some heavy rescue vehicles. Airport Fire Service vehicles are required to have off-airport rough terrain capability.

31. **Search assistance.** In reducing an area of 'where to look' for a missing aircraft, searchers are usually assisted by one or more of the following ;

- a. Coordinates for a last radar position, provided by Airways Corporation Air Traffic Control
- b. Eye witness reports confirming the location of the aircraft or crash site
- c. An emergency locator beacon signal detected by satellite or aircraft in the vicinity
- d. A visible source of fire from a crash site
- e. Aerial reconnaissance by fixed wing aircraft or helicopter
- f. Ground level reconnaissance utilising vehicles or fast moving search teams on foot.

On this occasion, as is discussed further in the report, the Police incident controller was effectively limited to radar coordinates and ground search options.

32. **Search Strategy.** The initial strategy of the senior Police and Fire Service officers tasked with locating the aircraft, later adopted by the Police Incident Controller, emphasised searchers in vehicles rapidly covering as much ground

as possible, anticipating as they did so that if the searchers did not locate the crash site in their initial deployment a more accurate location would quickly be identified as a result of further information from one or more of the 'other' usual sources.

33. Airways Corporation played a significant role in defining the early search area. The first notification from air traffic controllers indicated the approximate position of the aircraft as one nautical mile (1.8km) from the end of runway 20.

34. Immediately following the loss of the aircraft from radar, controllers at the Airways Corporation air traffic control radar centre in Sir William Pickering Drive began evaluating computer records to produce a more precise location for the last known position. This is a time consuming and technical process that can take up to 40 minutes, and was also influenced by the fact that air traffic controllers still had to maintain a 'business as usual' response for other aircraft, including those landing or leaving Christchurch Airport which remained open throughout this emergency.

35. **Search Position.** At 7.46pm Airways Corporation Air Traffic Control centre advised emergency services of a possible location for the aircraft as five to six nautical miles ( 9 to 10.8km ) from the runway (Ref 2 Appendix B). This extended the 'area of probability' from the Airport to well north of the Waimakariri River.

36. At 7.51pm emergency services were informed that the possible location was approximately one nautical mile (1.8 km) south of the Waimakariri River and one nautical mile (1.8km) west of the extended centerline of runway 20 (Ref 3 Appendix B). This would have placed the aircraft within what is known as Templars Island, an area situated between the Isaac salmon farm on McLeans Island Road and the river.

37. The 'possible' position was updated by Airways Corporation at 7.52pm and restated in the form of a latitude / longitude reference of 43 degrees 25' 30" south and 172 degrees 33' 55" east.

38. This set of coordinates incorrectly positioned the aircraft in the vicinity of Harpers Road near South Eyre Road Eyreton; also on the north side of the Waimakariri River and approximately six kilometres north of the Airport. Air traffic control staff at the Airways Corporation radar centre identified this possible position when attempting to interpret technical data including compass bearings and distance.

39. As each of the 'possible' positions were received by emergency services the focus of searchers changed. It is clear that conflicting information created some confusion about the possible location of the aircraft. Those searching south of the Waimakariri River concentrated on an area approximately 1.5 to 2 kilometres west of the actual location of the actual crash site. Searchers were simultaneously responding to possible locations north of the River.

40. This confusion was evident at 8.07pm when search supervisors queried the various reported possible locations between two and seven nautical miles ( 3.6 to 12.6 km ) from the airport. Airport Fire Service reconfirmed to searchers information from air traffic controllers that the approximate distance from the runway to the aircraft as 6.1 nautical miles (Ref 5, Appendix B). This was also on the north of the Waimakariri River near Kaiapoi.

41. **Search Coordination.** Search activity was coordinated from the operations headquarters at the Christchurch police station. A forward headquarters had been established at an early stage to direct searchers 'on the ground' in the main area of probability between the Airport and Waimakariri River. A feature of efforts in the search phase was the interaction of personnel from each of the services and organisations taking part in the operation in this area. Search teams in vehicles and on foot were frequently an amalgam of staff from different agencies, sharing equipment and radios and being tasked by the co-located Police and Fire Service controllers situated at the forward headquarters near McLeans Island Road. As each possible location was notified, emergency services staff concentrated on the frustrating task of searching that in thick fog and minimal visibility.

42. Physical searching of this area began between 7.20-7.30pm and continued throughout the period until the wreckage was located at 9.24pm near Greywacke Road.

43. A simultaneous mobile search, primarily by Police units was also conducted in areas north of the Waimakariri River during the same period. This was in response to various reports, including 'witness accounts' and coordinates indicating the aircraft had possibly crashed further from the Airport than first believed.

44. **Other Information.** Information from members of the public who witness incidents is often a valuable means of focusing resources on a more defined area. In the course of this search a number of reports were received that were considered valid and consistent with other information being received, albeit none were in fact connected with the Air Adventures crash. Each however resulted in Police and/or Fire Service units being deployed to investigate.

45. The significant 'witness' accounts included ;

- a. A resident from Depot Road Oxford reporting a 'flash in the sky' in that area at about 7.30pm
- b. A resident from Ohoka reporting a flash or explosion on the north bank of the Waimakariri River between the river and her property, shortly after 8pm and occurring immediately after an aircraft passed over her home
- c. A report from a Kaiapoi resident of an 'explosion' over her home at about 8.20pm
- d. A resident in North Eyre Road reporting hearing a 'bang' at about 8.25pm

- e. A report from a media source of wreckage being found in Dickeys Road at 8.45pm

None of these reports were in fact connected with the search operation but each required immediate attention and follow-up.

46. Following the information at 7.52pm from Airways Corporation which focused searchers north of the Waimakariri River near South Eyre Road, and the reference to a possible position 6.1 nautical miles away at 8.07pm, the next event of significance occurred between 8.09pm and 8.23pm and related to revised latitude / longitude coordinates passed by Airways Corporation to Police.

47. **Recording Coordinates.** At 8.09pm the Police officer in charge of the Airport Emergency Operations Centre (EOC) was in discussion with the supervising air traffic controller in the Airport control tower and was informed of the aircraft's possible location being at a coordinate position of 43 degrees 27' 32.33" south and 172 degrees 33' 55.71" east. The approximate 'on the ground' position of this reference is near the aircraft's point of initial impact.

48. The latitude / longitude reference was mistakenly recorded by Police as being ; 43 degrees 26' 32.33" south and 172 degrees 33' 55.71" east. As one degree is equivalent to one nautical mile (1.8km), the effect of recording 26' instead of the correct 27' was to position the location of this reference approximately 2 kilometres further north east, near the intersection of Coutts Island Road and Greywacke Road.

49. A second mistake in respect of the same coordinates was made shortly after when the already incorrect latitude / longitude coordinates reference was communicated to a supervisor in the Police Communications Centre at the Christchurch central police station. The reference was wrongly entered into the police computer and pinpointed a location near the end of Two Chain Road and the north bank of the Waimakariri River. This was a position approximately 10 kilometres west of the crash site.

50. Airways air traffic control had passed the same coordinates to Airport Fire Service staff by phone at 8.14 pm. These coordinates were subsequently verbally passed to a police officer at the airport fire station building and via that officer back to the Airport Emergency Operations Centre (EOC) and Operation HQ. The earlier errors made by Police in recording and then processing the latitude / longitude coordinates were not identified.

51. Police officers who had been held in reserve at the Airport Fire Service station were sent to the north bank of the Waimakariri River about 8.25 pm for the purpose of carrying out a search in the area of the coordinates position. A fire appliance was also dispatched to this area. These reserves had not been deployed at an earlier stage due to the widely varying reports of possible positions and the likelihood of the National Rescue Coordination Centre (NRCC) providing an accurate position for the aircraft from its emergency locator beacon following a satellite crossing due to occur at 8.37pm.

52. By 8.25-8.30pm Police and Fire Service resources had started arriving north of the Waimakariri River. Searching continued however on the south bank and events leading to the ultimate finding of the crash site overtook searchers before an intensive ground search commenced in the wrong area. It is apparent that air traffic controllers were aware the last radar contact for the missing aircraft was south of the Waimakariri River, but were unaware emergency services were being sent north of the river to search. Similarly Police were unaware the coordinates had been incorrectly recorded. Officers believed they were responding to the latest, accurate possible position of the aircraft and were also unaware this should have been midway between the airport and the Waimakariri.

53. In a further discussion between Air Traffic Control and Airport Fire Service at about 8.45pm, the last position of the aircraft was again confirmed as being 1.5 nautical miles (2.7 km) from the runway and approximately 0.1 nautical miles (200 metres) west of the extended centre line of the runway (Ref 9 Appendix B).

54. About 8.50pm a staff member of the Air Traffic Control radar centre also informed searchers in the McLeans Island area of similar coordinates to those given to Police at 8.09 pm. The coordinates passed by the air traffic controller were 43 degrees 27' 25.09" south and 172 degrees 33' 57.91" east. This location was also the general vicinity of the actual crash site. Officers at the forward headquarters Fire Service command vehicle possessed the technical means of converting a latitude / longitude reference to a location on a map and immediately dispatched a four person team comprising fire officers and police to investigate that position.

55. The dense fog, limited visibility and terrain resulted in the rescue team still taking 35-40 minutes to reach the location; however shortly after arriving in the general area they were able to confirm that location as the crash site at 9.24pm.

### **Other Information Sources to Aid the Search**

56. In the course of this operation, emergency services were only able to locate the Air Adventures aircraft and occupants by information and coordinates sourced from radar data provided by Airways Corporation air traffic control staff. None of the other usual sources for fixing a missing aircraft's position had been of assistance.

57. **Fire.** Fire at a crash site occurs only in 10% of light aircraft crashes but when it does exist is an indicator of the location of wreckage. In this case there was apparently no ignition of the fuel or other material connected with the aircraft, and therefore no visible fire to guide rescuers. Due to the thick fog, it is doubtful that even if there had been fire at the scene that emergency services personnel would have been able to detect it.

58. **Distress Beacon.** Reference has been made (paragraph 69) to rescuers anticipating information being provided of the location of the aircraft as a result of signals from an emergency locator transmitter being detected. Their reliance was on information being provided by the National Rescue Coordination Centre (NRCC) following the next scheduled sweep of a satellite over New Zealand at 8.37pm. No emergency signal was detected by the satellite in that pass-over. An emergency beacon signal can also be detected on a more localised level by passing aircraft and other receivers if a device has activated. Again in this case no signals were detected by those having the technical capability to do so which indicated the emergency device had not operated.

59. **Air Search.** An effective means of reducing the time involved in looking for a missing or crashed aircraft is the use of fixed wing aircraft or helicopters to carry out an aerial search of an area of probability. Despite staff and machines of both the Garden City Westpac Rescue helicopter service and Christchurch Helicopters Ltd being on site and ready to fly the dense fog that prevailed over the search area made it unsafe for an observation capability to be deployed in the air. These adverse weather conditions continued throughout the period leading up to the ground party locating the wreck site.

60. As a consequence of the absence of other information emergency services were restricted to searching at ground level for the wreckage; a response that was always going to be a difficult and time-consuming exercise in the weather and ground conditions that existed.

### **Conduct of the Ground Search**

61. **Ground Search Strategy.** The ground search strategy decided upon to achieve the objective of finding the occupants of the Air Adventures flight was to cover as much of the ground involved as possible using mobile patrols in order to find some early indication of the crash site. Reserve personnel were then to be deployed within any smaller area identified to conduct a more intensive search. In addition, reports indicating other 'areas of probability' were also to be evaluated and investigated.

62. The reasons for not immediately deploying a large number of searchers on foot in the area between Christchurch Airport and the Waimakariri River included the number of different locations being reported and responded to, the lack of certainty in the mind of search controllers and supervisors of the probable crash site and the practical difficulties searching the terrain involved

63. The area to be searched appears at first impression to be relatively open in nature. Searchers in this area however reported that visibility was limited by dense fog to about 10 metres, and sometimes less. The terrain included deep water courses, open creeks and streams, areas of thick sometimes impenetrable gorse or bush and electrified fencing.

64. Deploying a large number of inadequately equipped general duties Police or Fire Service staff into such an area, in the fog and night time conditions

would have inevitably resulted in significant risk and safety hazards for the staff involved.

65. Those who are trained and equipped to carry out such a role are the members of the Police Search and Rescue Squad, and civilian volunteers trained in SAR operations. The Police Incident Controller and Police O/C SAR Squad considered there was a high likelihood of squad members having to deploy in their Disaster Victim Identification (DVI) role when the crash site was located. Police SAR Squad officers were activated however not deployed in a searching role

66. **Reconstruction.** On the 1 July 2003 a reconstruction exercise was conducted by the Police SAR supervisors to determine how many personnel, and how long it would have taken to locate the crash site had a ground search been initiated based on the assumption the Air Adventures aircraft was close to the extended centerline of runway 20, somewhere between Christchurch Airport and the Waimakariri River.

67. Assuming visibility was restricted to 10 metres and a 500 metre area either side of the runway centerline was to be searched (ie. a one kilometre 'front'), approximately 100 searchers would need to have been deployed to confidently cover the search zone. The search technique used by SAR squad members in the circumstances that existed is termed 'purposeful wandering'. This involves slow controlled movement by an extended line of searchers under the direction of supervisors behind the line. Periodically searchers would be stopped and first make noise and then listen for any responses before repeating the movement. When encountering an obstacle such as a water course or thick bush, searchers would cross or go around the obstacle, clearing it as best they could before reforming on the other side and recommencing the search.

68. The reconstruction indicated that searchers commencing at McLeans Island and moving northeast would have taken between 2.5 to 3 hours once assembled and briefed to cover the 1.5 kilometres before reaching the crash site. Even in that time three areas of swamp, gorse and water courses, sufficiently large enough to contain the aircraft wreckage physically could not be searched from the ground and would have had to be left for a subsequent aerial examination.

69. In the event a ground search commenced at the Waimakariri River and moved along the flight path in the opposite south-westerly direction towards the Airport applying the 'purposeful wandering technique, the search party once assembled would have taken about 3.5 hours to come across the crash site.

### **Recovery Phase**

70. The site of the wreckage was located by a joint Fire Service / Police four person team at 9.24pm. The crash scene was about 300-400 metres

southwest from the latitude / longitude coordinates supplied by Airways Corporation.

71. Minutes later the search team was able to confirm the presence of two survivors, but could account for only seven others. Having located the crash site, the next problem encountered by supervisors was coordinating the arrival of other emergency services, particularly St John Ambulance to the same location.

72. The distance via unsealed road and farm track from the intersection of Greywacke Road / Johns Road (SHW1) to the crash site was approximately 3 kilometres and involved units having to drive through the sprawling and confusing Ashby's gravel complex. Subsequently a secondary access route was established using internal farm tracks through Shipley's Island Farm on McLeans Island Road. This also involved a distance of approximately 2.5 kilometres.

73. St John had previously established a reserve area for its resources in the near vicinity of Johns Road. The first of two ambulances arrived at the crash site at 9.46pm after being guided into the exact location by a local resident farmer. The number of emergency services personnel at the location continued to increase with the subsequent arrival of Fire Service and Police units.

74. Following initial treatment at the scene, the survivors were transported by ambulance to Christchurch Hospital. The bodies of the eight deceased on board were removed the following day following a scene examination by Police and Transport Accident Investigation Commission (TAIC) investigators.

75. Prior to and following the finding of the aircraft, Police, Salvation Army and Victim Support volunteers dealt with relatives and family of those who had been on board. A meeting and support area was established at Christchurch Airport. Subsequently Police assigned a family liaison officer to each of the 10 families of those aboard the flight and have maintained an appropriate level of contact and communication with each, dependent on the needs of the individual families.

### **Communication and Technology Issues**

76. Deficiencies in the linkages and communication between Airways Corporation air traffic controllers, Airport Fire Service, NZ Fire Service and Police were identified.

77. The Emergency Operations Centre (EOC) at Christchurch Airport carries out a critical command and control role during on-field incidents, and a more supportive coordination function in off-field emergencies close to the Airport. Not all 'key players' however were represented at the centre. In addition to recommending that each service or organisation deploy a liaison officer to the EOC for both on-airport and off-airport incidents it is particularly recommended that improved linkages exist between the EOC and Airways

Corporation air traffic control during the course of the response to an emergency incident involving a crashed or missing aircraft.

78. Secondly, Air Traffic Control staff were unaware both Police and NZ Fire Service Communications Centres have the technical capability to process latitude / longitude (or map grid) coordinates to identify relevant positions on maps available to frontline staff. Generally, frontline police officers do not possess maps marked with latitude and longitude references (eg. NZ 260 series 1:50,000 scale topographical maps) but do carry basic street map books extending into some rural areas. They depend on communications centre personnel to effectively direct them to locations of interest, such as latitude / longitude references provided by agencies such as Airways Corporation.

79. Airways Corporation is required to notify the National Rescue Coordination Centre (NRCC) of missing off-field aircraft, or in the case of on-field events notify the first point of contact specified in that airport's emergency response plan; in the case of Christchurch the Airport Fire Service (AFS). In the present case air traffic controllers satisfied themselves that AFS did not have the technical means (ie. computerised or hand-held GPS devices) to process latitude / longitude coordinates and attempted to re-define their technical data to a format they believed would be meaningful to searchers. Mistakes were made in doing so which resulted in a range of different positions being provided prior to an 'accurate' location being available at 8.09pm.

**80. Improvements Made.** As a result of this incident, the following improvements have been made at Christchurch International Airport:

- a. Airways Corporation has been made aware of the capability of Police and Fire Service Communications Centres to process latitude / longitude or map grid reference coordinates and is communicating this to staff
- b. Christchurch Airport Company (CIAL) is examining possible modifications to the Christchurch Airport Emergency Plan to improve interaction between services, and functioning of the Emergency Operating Centre (EOC)
- c. CIAL has examined new technology systems to enhance the current Emergency Activation System (EAS) in operation at Christchurch Airport to create greater efficiency and accuracy in the passing of information electronically (including coordinate positions) between parties, and minimize or eliminate the potential for error that accompanies manual recording and transmission of information
- d. CIAL has completed a comprehensive survey of the wider airport environment to facilitate the rapid deployment of emergency services to a particular location in situations where weather conditions or terrain might otherwise slow the arrival of emergency services. Christchurch Airport Company is also considering acquiring technical equipment (such as

vehicle mounted or hand-held GPS devices) to assist the movement of responders on the ground.

### **Other Issues**

81. The Christchurch Airport Emergency Plan guides the response of emergency services to on-field incidents and emergencies, including an air crash. This contingency plan is updated on a regular basis, at least annually. Suggested improvements or modifications to aspects of the plan are outlined in this report and all parties have expressed the willingness to review those recommendations with a view to further updating the response plan.

82. Particular components of the emergency plan are exercised annually. An exercise focusing on an off-field aircraft crash was last completed in 1997 and no particular deficiencies were noted in the relevant provisions of the plan, nor application by the various emergency services.

### **Summary**

83. Weather conditions, particularly the thick fog, delayed the arrival of immediate back-up from other emergency services to those who had located the crash site. Airport Fire Service (AFS) arrived at the scene within approximately five minutes, providing basic medical equipment and a supply of blankets. It took approximately 15-20 minutes for other support staff, including ambulances to reach the scene despite being relatively close to the entry point at Greywacke Road and SHW1 / Johns Road.

84. The difficult conditions in terms of terrain and disorientating effect of the foggy conditions that impacted on the rescue operation is difficult to fully appreciate in hindsight. Conditions were such that even local farmers who possessed an intimate knowledge of their own properties were disorientated once local reference points were no longer visible.

85. Given these limitations, the locating of occupants and recovery of survivors was accomplished in a prompt and professional manner.

86. A minor issue in terms of improving the management of a scene as difficult as that encountered is identifying and marking access / egress routes from an assembly point into a scene. This could be in the form of human resources, and visible or physical markers.

### **Lessons**

87. As a result of this incident, a number of measures were recommended to improve communication and inter-agency effectiveness. It is believed that these lessons would be of value to airport authorities throughout New Zealand and the emergency services which support them.

- a. Senior staff from the relevant organisations should complete a Coordinated Incident Management Systems (CIMS) training programme
- b. The Airport Emergency Operations Centre (EOC) should establish the capability for mapping latitude / longitude coordinates or grid references by the acquisition of computer mapping software (eg. TopoMap NZ) or relevant NZ260 series topographical maps
- c. Selected emergency response personnel from the various agencies need to receive training to a basic standard of proficiency in map reading and have access to relevant maps. This provides a secondary means of mapping coordinate data in the absence of electronic means as well as providing a secondary check relating to accuracy
- d. Supervisors in the Police Communications Centre who are likely to be the officers electronically processing latitude / longitude coordinates or map grid references require ongoing training in the use of relevant mapping software applications to ensure they maintain the confidence and competence to speedily process such information in emergency situations where response time may be critical. These supervisors should also be training in manually mapping coordinate and map reference data
- e. Airport Police should acquire one or more handheld GPS devices to be retained with other emergency response equipment, and staff receive relevant training in their use.
- f. The transmission and recording of 'critical' information such as map references and coordinate positions be double-checked to ensure accuracy. Messages should be read back to the originator immediately after they have been written down, to ensure the accuracy of the recorded material
- g. All key agencies should assign a liaison officer to an incident headquarters when activated, whether that is the Emergency Operating Centre (EOC) in the case of airport related emergencies, or elsewhere in respect to aviation incidents clearly off-field.
- h. As soon as the EOC is activated the initial linkage between Airways Corporation air traffic control and Airport Fire Service that is required to initiate the emergency activation system (EAS) be replaced by one between the EOC and Air Traffic Control. Where practicable an Airways Corporation liaison officer should be present at the EOC along with other emergency services representatives, however if this is not possible due to the 'business as usual' requirements of air traffic control staff then the linkage should be via telephone . The same recommendation would apply to more remote off-field aviation accidents which although managed by the Rescue Coordination Centre (RCCNZ) in Wellington are controlled at local level by District Police. Liaison officers need to be present at the site of the operation headquarters.