CHIEF OF THE DEFENCE FORCE

BLACK HAWK 221
BOARD OF INQUIRY
2007-2008

REPORT OF THE BOARD OF INQUIRY INTO THE DEATHS OF CAPTAIN MARK BINGLEY AND TROOPER JOSHUA PORTER FOLLOWING THE LOSS OF ARMY BLACK HAWK 221 ON 29 NOVEMBER 2006 WHILST DEPLOYED IN HMAS KANIMBLA FOR OPERATION QUICKSTEP
PREFACE

The President of the Black Hawk 221 Board of Inquiry, The Honourable D.D. Levine RFD, QC, forwarded the Board’s report to the Appointing Authority, Air Chief Marshall A.G. Houston, AC, AFC, on 25 January 2008. The version here includes a number of additions, corrections and deletions. Changes are listed in the Table of Amendments. Changes fall into the following areas.

Typographical, formatting and clerical errors and corrections

In preparing the report for release minor corrections have been included where they do not make substantive change to the report.

Material not published

As identified in the Table of Amendments there are sections of the report which have not been published. Some material has not been published because publication would be an unreasonable disclosure of sensitive personal information or because of operational security. These parts are not material to the findings or recommendations in the report.

Table of Amendments

| Paragraph | vi, 11th line | Correction of ‘(aviation’ which should read ‘(Aviation). |
| Annex list | xviii, I | Inclusion of the word ‘List’ before ‘of’. |
| Paragraph | xxi, 3,1 | Correction of ‘Honing’ which should read ‘Homing’. |
| Paragraph | 3, 1.11 | Not published for reasons of operational security. |
| Paragraph | 4, 1.12 | Not published for reasons of operational security. |
| Paragraph | 4, 1.13 | Correction of ‘Enoggerah’ which should read ‘Enoggera’. |
| Paragraph | 63-64, 4.24 | Elements not published for reasons of operational security. |
| Footnote | 63, 42 | Not published for reasons of operational security. |
| Footnote | 64, 44, 45 | Not published for reasons of operational security. |
| Paragraph | 66, 4.33 | Elements not published for reasons of operational security. |
| Paragraph | 75, 4.62 | Elements not published for reasons of operational security. |
| Paragraph | 76-77, 4.65 | Elements not published for reasons of operational security. |
| Paragraph | 77, 4.68 | Elements not published for reasons of operational security. |
| Paragraph | 77-78, 4.69 | Elements not published for reasons of operational security. |
| Paragraph | 78, 4.70 | Elements not published for reasons of operational security. |
| Paragraph | 78, 4.71 | Elements not published for reasons of operational security. |
| Paragraph | 78, 4.74 | Elements not published for reasons of operational security. |
| Paragraph | 114, 7.31-7.33 | Elements not published for reasons of operational security. |
| Paragraph | 114-115, 7.34 | Elements not published for reasons of operational security. |
| Paragraph | 115, 7.35-7.36 | Elements not published for reasons of operational security. |
| Footnote | 116, 67 | Not published for reasons of operational security. |
| Paragraph | 117, 7.41 | Elements not published for reasons of operational security. |
| Paragraph | 159, 9.31 | Elements not published for reasons of operational security. |
| Paragraph | 171, 9.71 | Not published for reasons of operational security. |
| Paragraph | 183, 9.101 | Elements not published for reasons of operational security. |
| Paragraph | 213, 12.2 | Elements not published for reasons of operational security. |
| Paragraph | 214, 12.6a | Elements not published for reasons of operational security. |
| Paragraph | 215, 12.6c | Elements not published for reasons of operational security. |
| Paragraph | 233, 14.10 | Correction of 'adapting' which should read 'adopting'. |
| Paragraph | 247, 14.56 | Inclusion of the word 'King' after '5'. |
| Paragraph | 251, 14.68 | Correction of 'DCOMDT' which should read 'DCOMD'. |
| Paragraph | 266, 15.52 | Elements not published for reasons of operational security. |
| Paragraph | 267, 15.54 | Elements not published for reasons of operational security. |
| Footnote  | 268, Footnote 17 | Correction of '15' which should read '16'. |
| Paragraph | 267-268, 15.56 | Elements not published for reasons of operational security. |
| Paragraph | 279, 16.3 a. | Surname not published for reasons of operational security. |
| Paragraph | 279, 16.3 b. | Surname not published for reasons of operational security. |
| Paragraph | 284, 17.4 | Inclusion of the word 'of' after 'absence'. |
| Annex     | H         | Not published for reasons of operational security and unnecessary disclosure of sensitive personal information. |
| Annex     | I         | Not published for reasons of operational security. |
| Annex     | J         | Not published for reasons of unnecessary disclosure of sensitive personal information. |
IN MEMORIAM

8223861 Captain Mark Anthony Bingley
29 January 1971 – 29 November 2006

8240331 Trooper Joshua Nathan Noel Porter
29 December 1977 – 29 November 2006
PREFACE

At approximately 1610 hours on Wednesday 29 November 2006 Australian Army Black Hawk helicopter A25-221 crashed into the aft deck of HMAS KANIMBLA and thereafter into the sea. At the time of the accident Black Hawk 221 was conducting a training flight as part of Operation QUICKSTEP in the southern Pacific Ocean. Captain Mark Bingley, the pilot, died and Trooper Joshua Porter, a passenger, was missing presumed dead. His remains were recovered on 5 March 2007.

By Instrument dated 18 January Air Chief Marshal A.G. Houston AO AFC, Chief of the Defence Force, appointed a Board of Inquiry into the accident. On 6 March 2007 Terms of Reference were issued by CDF.

The Board sat in open session on the following days:


Oral testimony from 65 witnesses was received. 296 Exhibits were tendered.

The Board was constituted by:

The Hon. D.D. Levine RFD QC, President

Group Captain S.J. Fielder AM, Member

Commander A.J. Rourke RAN, Member

Board Secretary: Lieutenant Commander J.M. Probert ADC RANR

Assistant Secretary: Mr W.B. Davis

The Counsel Assisting the Board were:

Commander J.T. Rush RFD QC, RANR

Colonel G.B. Hevey RFD

Lieutenant P.C. Neal RAN
Counsel Representing Mrs. Melissa Bingley

Major D.J. Campbell SC

Major M. Johnston

Counsel Representing Mrs. Carinna Porter

Lieutenant R.J. Nash RANR

Counsel Representing Major 3

Major N.J. Gabbedy

Appearances:

Mr Daoud Sibtain, Barrister at Law, for Channel 7, Channel 9, John Fairfax Publications and Nationwide News, instructed by Mallesons, on 18 June 2007

Captain David Knaap for 16 Brigade (Aviation) and 171 Aviation Squadron, on 18 June; 28 and 29 July 2007

Mr Kevin Lynch, Solicitor, Johnson Winter & Slattery for Sky News, on 20 July 2007

Note on the Structure of this Report

The Board has chosen a chronological and narrative method in presenting the evidence, analyses, reasons and findings. Necessarily however there will be some repetition and reference back to material and other references to material or subjects to be dealt with later in the Report. Sections 14-20 deal with discrete topics, appropriate to be placed after the chronological narrative.

The Board’s Findings

It is to be taken that a finding by the Board has been made to reflect its satisfaction on the balance of probabilities.
AUTHORISATION

The President and Members of the Board of Inquiry into the loss of Army Black Hawk 221 on 29 November 2006 confirm that we unanimously support the findings, conclusions and recommendations presented in this report.


The Hon D.D. Levine, RFD QC


Group Captain S.J. Fielder, AM


Commander A.J. Rourke, RAN


Date 25 January 2008
INTRODUCTION

1. Pursuant to the Instrument of Appointment of 18 January 2007, this Board of Inquiry is appointed to inquire into the circumstances of the crash of Australian Army Black Hawk helicopter A25-221 ("the aircraft") in international waters on 29 November 2006 ("the incident") during Operation QUICKSTEP, including the death of 8223861 Captain (CAPT) Mark Bingley and the presumed death of 8240331 Trooper (TPR) Joshua Porter.

BACKGROUND

2. I am advised that on 29 November 2006 the aircraft crashed whilst operating with HMAS Kanimbla. Following the incident, nine members were recovered from the sea. One of those nine members, CAPT Bingley, died. The tenth member, TPR Porter, was not recovered from the sea and is missing presumed dead. CAPT Bingley and TPR Porter were both members of the Australian Regular Army and it appears that they both died in service. I have decided to appoint a Board of Inquiry pursuant to Part III, the Defence (Inquiry) Regulations 1985.

OBJECTIVES OF INQUIRY

3. The Board of Inquiry is to obtain evidence and to provide me with a report detailing:

   a. the circumstances surrounding the incident resulting in the death of CAPT Bingley and the presumed death of TPR Porter;

   b. the medical cause or causes of death or likely cause or causes of death of CAPT Bingley and TPR Porter;

   c. the findings of the Board as to the cause or causes of, and factors which contributed materially to, the incident and the reasons for such findings;

   d. the findings of the Board in relation to the sufficiency of Defence actions and decisions relating to the incident prior to the incident and the reasons for such findings;

   e. the findings of the Board in relation to the sufficiency of Defence actions taken and decisions made in the aftermath of the incident and the reasons for such findings;
f. subject to the recovery of the aircraft or parts of the aircraft, analysis of any recording material recovered there from, any other information concerning airworthiness or adequacy of equipment supplied to Defence personnel; and

g. the findings of the Board in respect of any weaknesses or deficiencies (isolated or systemic) in Defence policies, equipment, practices, procedures and training.

4. The findings and recommendations of the Board may be used by me:

   a. as the basis for appropriate remedial action in respect of any weaknesses or deficiencies (isolated or systemic) in Defence policies, practices, equipment, procedures and training as may be identified in the Board’s report; and

   b. to inform, subject to Regulation 63, CAPT Bingley’s and TPR Porter’s next-of-kin and other family about the circumstances surrounding their deaths.

Recommendations

5. Without limiting the scope provided for by Regulation 25, I request that the Board make recommendations regarding actions that the Board believes should be taken to rectify any inadequacies, problems, weaknesses or deficiencies (isolated or systemic) in Defence systems, practices, policies, procedures, equipment and training identified by the Board consequent upon its inquiry.

Documentation

6. In addition to the requirements of Regulation 36(4), the following are to accompany the Board’s report:

   a. references to all relevant orders or publications referred to by the Board in the course of making findings and recommendations;

   b. images of articles (other than documents) tendered as exhibits before the Board and the location of those articles;

   c. notices sent to, and any responses from, individuals against whom it is contemplated adverse findings may be made (unless the Board believe that doing so would be unfairly prejudicial to the interests of a person sent such a notice);

   d. any external legal advice obtained by the Board (with appropriate markings of any legal privilege);

   e. these Terms of Reference;

   f. the Instrument of Appointment;

   g. any written communications between the Board and the Appointing Authority;
h. a succinct executive summary of the report; and

i. insofar as is practicable, lists of persons who were:
   
   A. Ship’s Company of, and members embarked in HMAS KANIMBLA;
   
   B. Occupants of the aircraft at the time of the incident; and
   
   C. ADF members and Defence employees directly involved in post-incident procedures.

**Reports and monitoring**

7. **Inquiry Plan.** Following completion of Inquiry Planning (and further to CDF Directive 12/2006), the Board is to provide me with an Inquiry Plan. The Inquiry Plan should build upon the initial Scoping Plan and is intended to provide me with indications of the likely complexity and duration of the Inquiry, as well as resource implications, for which I retain ultimate responsibility. The Inquiry Plan should address the matters listed in paragraph 7.14 of ADFP 06.1.4—*Administrative Inquiries Manual*.

8. **Monthly Progress reports.** During the course of the Inquiry, the President is to provide me with a written update on the last working day of each month informing me of progress made against the Inquiry Plan, these Terms of Reference, and other matters of significance to the President.

9. **Other reports.** The President is to provide me with reports on matters he believes require my urgent attention or action. Such issues might include significant matters affecting the conduct of the Board’s inquiries, Defence safety, security, operational effectiveness or the welfare and wellbeing of ADF members, Defence employees, or persons otherwise potentially affected by the Board of Inquiry.

10. **Final report.** You are to submit your final report to me by 31 January 2008. If completion is delayed, you are to submit to me a report seven days before that date and justify any request for an extension of time.

[Signature]

A.G. HOUSTON, AO, AFC
Air Chief Marshal
Chief of the Defence Force

Appointing Authority

6 March 2007

Object ID: R1604472
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BLACK HAWK 221 BOARD OF INQUIRY 2007-2008
EXECUTIVE SUMMARY

At approximately 1610 hours on Wednesday 29 November 2006 Australian Army Black Hawk helicopter A25-221 crashed into the aft deck of HMAS KANIMBLA and thereafter into the sea. At the time of the accident Black Hawk 221 was conducting a training flight as part of Operation QUICKSTEP in the southern Pacific Ocean. Captain Mark Bingley, the pilot, died and Trooper Joshua Porter, a passenger, was missing presumed dead. His remains were recovered on 5 March 2007.

By Instrument dated 18 January Air Chief Marshal A.G. Houston AO AFC, Chief of the Defence Force, appointed a Board of Inquiry into the accident. On 6 March 2007 Terms of Reference were issued by CDF.

The Board sat in open session on the following days:


Oral testimony from 65 witnesses was received. 296 Exhibits were tendered.

The Board was constituted by The Hon. D.D. Levine RFD QC, President, Group Captain S.J. Fielder AM, and Commander A.J. Rourke RAN.

Board Secretary was Lieutenant Commander J.M. Probert ADC RANR. Assistant Secretary was Mr W.B. Davis.

The Counsel Assisting the Board were Commander J.T. Rush RFD QC, RANR, Colonel G.B. Hevey RFD and Lieutenant P.C. Neal RAN.

The principal and overarching finding of the Board of Inquiry is that the cause of the crash of Black Hawk 221 was pilot error by the aircraft captain. This finding however cannot be viewed in isolation nor be taken as the attribution of specific and discrete blame against one serving officer of considerable experience and unquestioned reputation.

The Board stresses that the context in which the principal finding must be viewed is particularly revealed in the following Sections of the Report: Section 2 – History of the Flight; Section 4 - Helicopter Dynamics and the Special Operations Approach; Section 5 - The Special Operations Course of Instruction; Section 6 - Aviation Risk Management; Section 7 - Normalisation of Deviance; Section 9 - Human Factors,
During the course of his evidence GPCAPT Lee said:

"In my view, the most apposite explanation is that CAPT Bingley, and his crew, simply did not fully understand, appreciate, or perceive the extremely high level of risk involved in flying the mission in the way that he did under the particular circumstances and environmental conditions pertaining at the time. If he had been aware of the potential outcome it is most unlikely that he would have operated in the manner that he chose to do."

Shortly stated, the Board has found conformably with the opinions of GPCAPT Lee that Black Hawk 221's accident was inevitable due to systemic failures within Army Aviation. GPCAPT Lee explained the system's approach to aviation as follows:

"The systemic approach to air safety investigation, which has driven the adoption of safety management systems in aviation, has shown that the same underlying organisational factors, such as inadequate training, equipment deficiencies, ineffective risk management policies and procedures, absence of effective integrated safety management systems, and so on, can all combine with a set of specific circumstances and events on the day, to contribute to a multiplicity of possible accident scenarios. Each of these scenarios might appear to be quite different on the surface, but all emanate from the same underlying contributory systemic factors. In the present accident, a number of systemic deficiencies in the Army Aviation System have been identified, and the tragic accident to Black Hawk 221 was but one of many potential accident scenarios which could have resulted from the same underlying systemic factors."

The Board has noted, particularly in the context of normalised deviance, the Squadron's blasé approach to wind and especially whilst conducting a Special Operations Assault Approach. Furthermore, it was a combination of factors; height, speed, lateral distance from the ship and tail wind that contributed to the crash of Black Hawk 221. Moreover, the energy that the aircraft carried into the approach could not be successfully dissipated in the available space while keeping the aircraft within the Flight Manual engine management and performance limitations. The resultant flare terminated in an extreme attitude and in the presence of a tail wind. Under these circumstances, the engines were unable to respond to the power demands in a timely fashion and the Black Hawk responded as should have been expected.

That so experienced a pilot such as CAPT Bingley flew in such a manner led the Board to critically review training methods, safety systems and their application, effectiveness of supervision and leadership, and the balance between operational
outcome and safety. Throughout, systemic failures through the erosion of standards (normalised deviance) were found to exist.

Thus the tragic events of 29 November 2006 can be viewed and are viewed by this Board as the culmination of an uncontrolled, inadequately supervised and indeed unnoticed evolution of normalised deviance coupled with an unchecked level of complacency. This observation is not to be taken as being critical of officers and serving men and women of 171 Avn Sqn as a whole but of the regrettable erosion of standards that, alas, can occur in highly trained, highly disciplined, highly focussed and highly motivated bodies of personnel in the absence of effective leadership and direction.

FORMAL FINDINGS AND RECOMMENDATIONS

By reference to Sections of the Report

Section 1 – Introduction

Finding:

1.1 The cause of the crash of Black Hawk 221 was pilot error by the aircraft captain.

Section 2 - History of the Flight

Finding:

2.1 The weather was suitable for flying operations.

3 - Events Immediately After Impact

Findings:

3.1 During the course of his egress from the aircraft, CAPT Bingley’s helmet came into contact with the VHF/FM Hearing Antenna thereby being dislodged to his physical prejudice resulting amongst other things in damage to his larynx and thus internal haemorrhaging and aspiration of blood.

3.2 At some point either during the snagging with the antenna or otherwise the HABD mouthpiece became separated from the second stage regulator and thus provided a mechanism for the aspiration of water rather than air and thus the finding on autopsy of drowning by the aspiration of water and blood.

3.3 The recovery of CAPT Bingley and the assistance provided to him by all personnel could not have been handled in a more efficient or timely fashion.
3.4 CAPT Bingley’s remains were treated with due dignity and respect.

3.5 As to the survivors, overall the circumstances of their repatriation were adequate.

3.6 The search effort for TPR Porter by ADF assets was thorough and professionally conducted with a tremendous effort expended by many.

3.7 TPR Porter’s injuries are likely to have hindered him in his efforts to escape the sinking aircraft.

3.8 TPR Porter’s cause of death was drowning.

3.9 TPR Porter’s remains were treated with due dignity and respect.

Recommendations:

3(a) If an aviation medical specialist is available within a force, he/she should be situated where the majority of aviation assets are situated to best utilise those specialist skills.

3(b) The Board recommends that should personnel require AME, that the evacuation processes continue until the evacuees reach their final destination to ensure appropriate care and comfort is provided.

3(c) As far as is practicable, ADF should ensure the privacy and identity of personnel in the position of this accidents’ survivors be protected and preserved in foreign jurisdictions.

Section 4 - Helicopter Dynamics and the Special Operations Approach

Findings:

4.1 The S-70A-9 Black Hawk helicopter, fitted with T700-GE-701A-1 engines, is susceptible to significant main rotor droop if mishandled by the pilot. Whilst an unsatisfactory characteristic, main rotor droop can be avoided if Flight Manual limitations and recommendations are adhered to.

4.2 The general attitude of 171 Avn Sqn aircrew toward main rotor droop was that of an acceptance of it solely as a characteristic of the Black Hawk rather than a result of poor airmanship or of mishandling the aircraft.

4.3 The descent was effectively near vertical in relation to the air mass in which
Black Hawk 221 was operating, taking into account the apparent forward motion in relation to the ship as recorded by KANIMBLA's aft deck camera.

4.4 It is likely that at some point early in the descent possibly as early as the flare termination point, Black Hawk 221 entered a Vortex Ring state, thereby ending any chance of recovery.

4.5 The SO air assault has been allowed to develop with a number of significant differences from the standard quickstop and these disparities have, over time, become accepted as normal. The SO assault approach had become inadequately defined and had not been validated. Safety margins to allow for safe and repeatable terminations had not been developed and tested, nor were go-around criteria specified. The SO assault approach techniques carried out by 171 Avn Sqn at the time of the accident regularly placed the aircraft in a flight regime where main rotor droop may occur.

4.6 The concept of the "comfort zone" is too subjective and provides little guidance for the safe execution of the SO assault manoeuvre. When conducting the SO assault approach the high pilot workload, coupled with exclusive reliance on the judgement of the flying pilot throughout the comfort zone and the lack of defined performance parameters give rise to an unacceptable level of risk. Under these circumstances, performance monitoring by the other aircrew is extremely difficult, if not impossible, becoming an ineffective risk mitigating mechanism.

4.7 The application of the flare point formula, such as under the circumstances of Black Hawk 221's final approach, ignores the effect that a tailwind may have on energy management during termination. As the flare point formula is applied using only the wind component in the direction of the run in, the application of the flare point formula during the conduct of an approach that involves changes in direction such as turns and slides is not valid.

4.8 There remains an uncertainty amongst aircrew at 171 Avn Sqn as to the primacy of stability over speed with respect to aircraft safety. In the absence of such clarity, there was evidence of the prevailing pressure to achieve the mission as quickly as possible. A few extra seconds taken in flying a slightly more conservative approach would make a significant improvement in the safety margins for the approach when compared with the anticipated minimal increased risk of exposure to enemy action.

4.9 Conducting turns during an SO assault approach, whilst allowed for by the Standardisation Manual, is contrary to the tactics and doctrine as described in both Standard Operating Procedures and the SO Training Briefing Notes.

4.10 In order to comply with intent of the Standardisation Manual, the quickstop must be conducted such that the helicopter completes the flaring manoeuvre before losing effective translational lift.
4.11 Basic airmanship considerations specified in the Black Hawk Standardisation Manual have not been fully applied when developing tactics and techniques for the SF role even though the applicability should have been obvious.

4.12 Rotating about the tail wheel directly into the hover at the end of a quickstop manoeuvre may further increase the risk of exposure to main rotor droop and possibly vortex ring due to the increased up flow through the main rotor system, particularly if executed rapidly.

**Recommendations:**

4(a) The SO assault approach should be re-developed to incorporate the basic airmanship considerations considered essential by the authors of the Standardisation Manual and the tactics brought into line with the “Air Mobile Support to Special Operations Forces” SOPs (400 Series).

4(b) The SO assault approach should be subjected to regular external validation.

4(c) The extensive use of exceptions to the embedded requirements of the Black Hawk Standardisation Manual must be eliminated. Other than under extraordinary circumstances, the embedded requirements must be applied.

4(d) The Standardisation Manual should be amended to emphasise the need to complete the quickstop flare prior to the loss of translational lift and subsequent transition into the hover. Interpreting this requirement for SO approaches, the flare may be terminated directly into the hover only if the head wind component maintains the helicopter in effective translational lift. In all cases, including terminations downwind, the flaring manoeuvre should be completed before effective translational lift is lost.

4(e) The Black Hawk Standardisation Manual should be amended to include a section dedicated to the conduct of flying operations in support of SF. Care must be taken to ensure that this section does not merely reflect unsafe practices which have evolved.

Section 5 - The Special Operations Course of Instruction

**Findings:**

5.1 The Special Operations course of instruction, while meeting the original intent as described in SOPs, falls short with respect to the specialist SO flying techniques as they have evolved.

5.2 The Special Operations course of instruction has not been formalised despite...
being in place for more than a decade.

**Recommendation:**

5(a) The course of instruction should be formalised as soon as possible to ensure proper design, resourcing and validation.

**Section 6 - Aviation Risk Management**

**Findings:**

6.1 The tactical application of AVRM was not adequately processed and thus failed to identify and address numerous hazards which cumulatively had a direct causal effect on the loss of Black Hawk 221.

6.2 Acceptance of HIGH risk in regards to safety is intolerable for training activities unless in extraordinary circumstances. Then, the benefits in accepting that risk must be clearly understood and justified in a detailed risk analysis.

**Recommendations:**

6(a) The continued education and emphasis of AVRM at all levels should be a high priority.

6(b) Leadership must actively discourage the application of AVRM from becoming an administrative ‘box ticking’ exercise.

6(c) ADF should not accept HIGH risk (regarding safety of personnel) for any training activity. Any exception must be justified through the detailed risk analysis and approval considered at a high level.

**Section 7 - Normalisation of Deviance**

**Findings:**

7.1 171 Avn Sqn has experienced normalised deviance with respect to conducting assaults, hovering, and terminating with varying amounts of tail wind. Over time the special consideration normally afforded to the effect of a tail wind in the final phases of an approach has been replaced with trust in pilot ability and an overconfidence in the Black Hawk’s performance under such circumstances.

7.2 The Fire Support Slide Approach, when used in the context of an SO assault, is not a legitimate application of the procedure.
7.3 The current use of the “Slide Approach” in the context of an SO assault, more likely than not, has come about as a “normalised deviance” of the standard Fire Support Slide Approach.

7.4 Due to the adverse effects of control cross-coupling, and the associated increase in pilot workload, the use of the sliding turn as a decelerative technique in the Black Hawk can be hazardous; particularly when applied to a dynamic manoeuvre such as the quickstop and the derivative SO Assault Approach.

7.5 OCL was within current guidelines for use in Blackhawk 221 on 29 November 2006.

7.6 The use of OCL for 171 Avn Sqn activities when working with Special Forces has become the ‘norm’ and there is little ‘contingency’ about it. The operating culture of SASR and 171 Avn Sqn has shifted to normalise the use of OCL as a common activity. As highlighted in the more general discussion of normalised deviance generally above, when this occurs, the ability of the participants to identify and mitigate risks is compromised. Normalised deviance in respect of OCL is highlighted by the evidence before the Board.

7.7 In all likelihood the injuries to the passengers of Black Hawk 221 on 29 November 2006 would have been significantly less if they had been appropriately seated and harnessed rather than attached via a helicopter restraint strop.

7.8 It can be reasonably assumed that had TPR Porter been seated and harnessed the injuries he sustained would have likely to have been less severe and as such his chances of escaping the sinking aircraft would have been significantly improved.

7.9 If AVRM had been properly applied so that the risk could be reduced to as low as reasonably practicable, approval for OCL would not have been given. However, given that the more appropriate seats were not available, the option to apply AVRM fully was taken away.

7.10 The risk to TPR E could have been reduced given that he was seated and could easily have been harnessed.

7.11 That current seating arrangements in the Black Hawk helicopter when in OCL do not provide adequate safety for its passengers and are not fit for purpose for some of the roles that the passengers are required to perform.

7.12 On 29 November 2006 the SHOLS were not referred to.
Recommendations:

7(a) The Standards Manual policies and procedures must be adhered to. Any departure from those procedures must be fully validated and documented prior to operational use.

7(b) The slide slipping or sliding manoeuvre should not be used in the context of a quickstop, and in particular the Special Operation Assault Approach unless there is formal flight test validation.

7(c) That a design review be conducted to determine whether seats can be developed that will enable at least some of the roles that currently see Black Hawk passengers in OCL mode, be conducted in a seated, harnessed and safer posture.

7(d) Spare seating should be taken on deployments to allow the Commander of the Aviation Forces the maximum amount of flexibility in aircraft use whether it be for operations or continuation training.

7(e) A review of OCL requirements for Black Hawk operations be conducted to ensure that safety of passengers is not being unnecessarily compromised or sacrificed in trying to gain operational capability. The need is to provide safe operating systems and that any contingent loading should only be considered in operational extremis. The review should ensure that ADF complies as best it can and certainly within the spirit and intent of current OH&S requirements.

7(f) For training evolutions with RAN Ships the SO Assault should utilise the Utility Evolution SHOL for that particular class of ship in accordance with ABR 5419.

7(g) A generic SHOL should be developed for use when deploying SF to non naval vessels.

Section 8 - Briefings on 29 November 2006

Findings:

8.1 The Board accepts that Orders were completed in a timely fashion.

8.2 Seating arrangements were unlikely to have been discussed at Orders. There was thus an inconsistency between aircrews at the subsequent Crew briefs.

8.3 The briefing of the flying serial should have encompassed discussion on lateral distance from the ship. In light of the lack of currency for such serials, that distance should have been of a conservative nature.

8.4 It is likely that the two factors, first that the ship would not be making way and secondly the purpose of the training was to approach a static target, were not
emphasised at Orders. However, CAPT Bingley, who was involved in planning the mission, would have been well aware that the ship would not be making way and that the purpose of the sortie was to practise against a static target.

8.5 When a ship is used as a "static" target, it is in reality not static. It remains susceptible to the forces of wind and current.

8.6 It does not appear to have been appreciated by 171 Avn Sqn how KANIMBLA would lie in the water relative to the wind while drifting. Not knowing this, compromised 171 Avn Sqn’s ability to best brief how the wind on 29 November 2006 would most likely be coming around the ship as the target.

8.7 There was evidenced an unacceptable level of complacency with regard to the importance of briefing wind. (NB. This is understandably so given the complacency 171 Avn Sqn personnel have displayed to flying with tail winds.)

8.8 Orders for Black Hawk sortie 29 November 2006 were inadequate to best prepare the aircrew for their mission. The numerous omissions from the Orders Group referred to in this Section which reflect an unhealthy level of complacency. Severally these omissions may not seem important but collectively they had an effect on the manner in which Black Hawk 221 was flown on the day.

8.9 There was no evidence as to whether 171 Avn Sqn personnel briefed KANIMBLA's Commanding Officer on the calculated risk for their flights. There is no formal requirement to do so.

8.10 There was the opportunity to do so at the ship’s Flying Brief although in the case of embarked Army helicopters, the Ship’s Commanding Officer is not vested with the authority and responsibility for approving such flights. It is therefore unlikely that CMDR Bannister was aware that the Black Hawk sortie flown on the 29 November 2006 was deemed to be HIGH risk.

Recommendations:

8(a) If seating arrangements may impact on the conduct of a serial, this information will assist in the ‘mental model’ and therefore should be briefed at Aviation Orders as required by 5 Avn Regt SOP 407.

8(b) When ships are used to simulate static targets the ramifications of it should be emphasised to the aircrew at Aviation Orders. This would include information such as how the ship will likely lie in the prevailing conditions and noting that a GPS point (to mark the position of the ship) will become less accurate with time and the primary method of distance calculation should be based on visual cues.
8(c) If the prevailing wind at the target is known, it should be briefed so that better planning and preparation can occur. If the wind is not known, a worst case scenario should always be briefed and planned for.

8(d) That the process and procedure for Aviation Orders be comprehensively reviewed and appropriately overhauled to place a greater emphasis on safety and AVRM.

8(e) That the calculated risk for a flight be briefed at the Ship’s Flying Brief to raise the awareness of any risks that are being taken for any particular flight.

Section 9 - Human Factors, Culture and Safety Issues

Findings:

9.1 Inside the cockpit of BLACK 1, the normally available checks and balances at the tactical level were eroded by a lack of definition and clarity in the standards associated with SO flying techniques and approach parameters. This situation was further exacerbated by the absence of formal CRM training on behalf of the co-pilot, an adverse cockpit gradient and a high unit and personal workload.

9.2 171 Avn Sqn personnel honestly believe that they have a healthy safety culture.

9.3 A more incremental approach to training should have occurred once a training deficiency had been identified. This would include the decision to carry passengers.

9.4 Conditions onboard KANIMBLA were cramped and a significant Command challenge was to keep 600 disparate personnel, motivated, fit, rested, entertained and fed. This required significant compromise and flexibility from all personnel. In the circumstances, the Board is satisfied that this was successful.

9.5 Fatigue, to the limited extent that it may have existed, was not a factor in the circumstances of the accident.

9.6 In the Board’s candid view, the array of evidence points to an unacceptable state of uncertainty vis a vis passengers.

9.7 The presence or absence of particular passengers appears not to have been planned, but rather fortuitous.

9.8 That no clear evidence could be given as to whether or not the carriage of passengers was briefed at any point, reflects an unsatisfactory state of affairs.
Recommendations:

9(a) The carriage of passengers must be the subject of a timely and firm decision, thorough planning, clear orders and necessary approvals.

9(b) The Board repeats its observations in paragraphs 8.66-8.70 of Section 8.

Section 10- Incident Management and Reporting within 171 Aviation Squadron

Findings:

10.1 The incident reporting and management system at 171 Avn Sqn failed to detect the normalisation of deviance with respect to the Squadron’s flying techniques. The informal debriefing process acted as a filter that prevented oversight of flying standards by the chain of command.

10.2 The SAFETYMAN guidelines were not followed with respect to the reporting of main rotor droop at 171 Avn Sqn. Had the guidelines been appropriately applied, many instances of main rotor droop would have been reported which in turn may have allowed the external audit system to identify trends and react accordingly.

10.3 The external auditing process by 16 Avn Bde, being limited to a documentation audit and in the absence of a fully documented reporting regime, failed to identify any major issues at 171 Avn Sqn.

10.4 The CONFIR system has been an ineffective tool at 171 Avn Sqn.

Recommendations:

10(a) The SAFETYMAN requirements for incident reporting must be consistently, uniformly and rigorously observed by 171 Avn Sqn.

10(b) For a Squadron with a unique role, the audit of 171 Avn Sqn should include a regular validation of the associated flying tactics, techniques and procedures against authorised doctrine and accepted and approved flying standards by suitably qualified individual who is external to the Unit.

10(c) A review be conducted to improve the effectiveness of the CONFIR system greatly and to include a ‘trip wire’ so that unusual reporting patterns are exposed and investigated.
Section 11 Analysis of the Final Approach of Black Hawk 221

Findings:

11.1 The energy that Black Hawk 221 carried into the approach could not be successfully dissipated in the available space while keeping the aircraft within the Flight Manual engine management and performance limitations. It was a combination of factors; height, speed, lateral distance from the ship that resulted in a flare that terminated in an extreme attitude and in the presence of a tail wind. Under these circumstances, the engines were unable to respond to the power demands in a timely fashion and Black Hawk 221 responded as should have been expected. Consequently the aircraft entered irrecoverable main rotor droop and likely entered into a vortex ring state.

11.2 CAPT Bingley flew Black Hawk 221 in a very aggressive manner. In addition to a harsh flare, he used the non standard technique of sideslapping or sliding to aid in energy management. He also used a turning approach contrary to SO doctrine and accepted a downwind termination contrary to the embedded requirements of the Black Hawk Standardisation Manual.

11.3 In relation to 171 Avn Sqn, in the light of the number of areas flawed by normalised deviance, the Board holds the problem to be systemic to that Squadron.

Section 12 - Post Accident Changes to the Special Operations Assault

Findings:

12.1 The actions by CO 171 Avn Sqn and COMD 16 Bde (Avn) after the accident were reasonable and consistent with the level of knowledge at the time. The decision to get the “science” is endorsed.

12.2 The current SFI still falls short of the Board’s expectations in that it fails to define adequately a repeatable and safe SO assault approach technique cognizant of safety margins and consistent with sound airmanship considerations.

Recommendation:

12(a) The SO assault approach must be redesigned to ensure adequate safety margins and sound airmanship considerations.

Section 13 - Ship Matters

Findings:

13.1 On the 29 November 2006, KANIMBLA being relaxed at flying stations had no xxxi
impact or effect on the crash or the recovery operation of the Black Hawk 221 survivors.

13.2 For Special Operations approaches that terminate over the ship, regardless of whether ropes, rappelling gear or the like are deployed, ships should be fully closed up at flying stations at a minimum for the periods that the aircraft are manoeuvring close to or over the ship.

13.3 There was no compliance with ABR 5419 Vol 1 Ch 5 Table 5.1 in relation to ABATA Healey and ABBM Chun.

13.4 Bridge records, particularly the Rough Weather Log and Officer of the Watch Notebook were inadequately maintained and contained too many inaccurate entries.

13.5 The Stokes litter was not in a serviceable state on 29 November 2007. The maintenance procedures had not been followed in accordance with current regulations (ABR 1977). Neither factor contributed, however, to the death of CAPT Bingley.

13.6 The collection and preservation of evidence was completed expeditiously and efficiently.

13.7 The preparation of the KANIMBLA flight deck to enable helicopter operations to resume was well executed.

Recommendations:

13(a) ABR 5419 be amended to reflect the above and that any ambiguity as to when and when it is not appropriate to ‘relax at flying stations’ should be eliminated.

13(b) Even when ‘relaxed at flying stations’ upper deck restrictions must be positively controlled by the Officer of the Watch. Control of the flight deck, in turn is delegated to the HCO.

13(c) No administrative or disciplinary action however is warranted against any officer.

13(d) Greater care, accuracy, attention to detail and supervision needs to be applied to record keeping. The importance of good record keeping is to be emphasised during appropriate training.

13(e) No administrative or disciplinary action however is warranted against any officer.

13(f) Review current mechanisms that should ensure that correct Safety Equipment maintenance procedures are carried out.
13(g) A review of the adequacy of the Stokes Litter shipboard allowance should be conducted.

13(h) No administrative or disciplinary action however is warranted against any person.

13(i) To improve situational awareness of emergency crews closed up in the hanger, a CCTV feed to the hanger should be provided.

Section 14 - Survival Training And Equipment

Findings:

14.1 HUET is relevant and a necessary risk mitigator for ADF helicopter flights over water.

14.2 HUET does not adequately prepare trainees for the scenario of escaping from a rapidly sinking helicopter.

14.3 Army training requirements are inconsistent with respect to the use of emergency underwater breathing apparatus. Both air crew and SO personnel who frequently fly over water and are provided with a HABD / EBA, have different training requirements. Air crew receive practical instruction on the equipment in an underwater training environment, whereas the SO personnel do not.

14.4 The maintenance, record keeping and configuration control of LSE by both 171 Avn Sqn Detachment and SASR (embarked) was not conducted in accordance within current guidelines.

14.5 AESSO-ALSE report “Investigation into Recovered Aircrew and SASR Life Support Equipment Black Hawk (A25-221) Accident – 29 November 2006” is accepted by the Board.

14.6 There is an identified need for a helmet with a communication system to allow the Sniper Safety Supervisor to have two way communications with the air crew whilst maintaining appropriate and approved cranial protection.

14.7 The quick release clip on the HRS used on 29 November 2006 enabled the survivors to rapidly release and egress the sinking aircraft. Conversely, had the aircraft been carrying members of 4 RAR using the other type of strop (without a quick release mechanism), it is likely that they would have struggled to release their strops under load and they may well have been trapped inside the aircraft as it sank.

14.8 That the approval process, or lack thereof, of the HRS into ADF inventory when
there is a valid case for its need has been slow and cumbersome without result.

**Recommendations:**

14(a) HUET should be reviewed to include the scenario of a rapidly sinking helicopter.

14(b) All personnel equipped with emergency underwater breathing apparatus (HABD / EBA) be trained in its use including practising using the equipment in an underwater training environment.

14(c) Under current policy, for personnel to train on the HABD/EBA in an underwater training environment, a full dive medical is required. It is recommended that this ruling be reviewed with the possibility that given the shallow water such training is undertaken, a full dive medical may not be necessary.

14(d) For rapid acquisition of aviation equipment where a continued need is identified a mechanism should be in place to ensure that equipment undergo the full process of being accepted into service expeditiously.

14(e) The strict adherence to current guidelines be followed and that mechanisms be put into place to ensure standards do not drop when deployed away from a unit's home base.

14(f) All recommendations within AESSO-ALSE report “Investigation into Recovered Aircrrew and SASR Life Support Equipment Black Hawk (A25-221) Accident – 29 November 2006” be acted upon.

14(g) That a review considered for the introduction of a quick release body armour system for combatants use in helicopters when they fly over water. This review should not be done in isolation of other LSE reviews.

14(h) A ‘fit for purpose’ communications capable helmet should be acquired given the identified operational need.

14(i) That any HRS without a quick release mechanism that can be released under load not be given approval for use.

14(j) That the approval process for a restraining system for use in legitimate Operational Contingent Circumstances be expedited and given a high priority.
Section 15 - Other Black Hawk Matters

Findings:

15.1 The Board finds that there is insufficient evidence rationally to conclude that the fitting of flotation devices to Black Hawk 221 would have improved its survivability in the circumstances of the events of the 29 November 2006.

15.2 The conduct of Defence in general and Army Aviation in particular cannot be impugned or criticised in relation to the consideration of flotation devices and the reasonable and appropriate decision to employ risk management principles in their stead.

15.3 The remaining life of Black Hawk in ADF is of such duration as to warrant the revisiting of the consideration of the installation of flotation devices and cognate issues.

15.4 There have been reasonable grounds for considering as impracticable to fit the Black Hawk with a DECU given the present time frame for the phasing out of the aircraft and the cost of the refurbishment.

15.5 There is an anomaly in the Black Hawk Flight Manual between the diagrammatic depiction of rotor RPM limits and those limits described in the text.

Recommendations

15(a) A detailed and comprehensive review be conducted into the fitting of the current fleet of Army Black Hawk helicopters flotation devices and cognate issues.

15(b) Defence considers the priority allocation to 171 Avn Sqn of MRH 90 aircraft upon their acquisition by reason of the operations known to be performed by 171 Avn Sqn over water.

15(c) As part of the review of Black Hawk generally in relation to flotation devices and cognate matters, the issue as to whether or not the Australian fleet of Black Hawk reasonably should be modified to accommodate a DECU compatible engine should be considered.

15(d) The anomaly referred to in Finding 15.5 be eliminated.

15(e) An analysis should be performed to establish the correct RPMR limits for the Black Hawk and the Flight Manual amended accordingly. In the meantime the Board recommends that the most conservative limits be applied. That is the continuous RPMR operating range of 96% to 101% as indicated on the cockpit gauge should be...
applied.

Section 16 - Major 3

Finding:

16.1 MAJ 3’s action in relation to CAPT 7 on 30 November 2006 was unauthorized in the strictest technical sense but beneficial in terms of morale and operational capacity.

Recommendations:

16(a) No administrative or disciplinary action be taken.

16(b) No disciplinary or administrative action be taken in relation to MAJ 3 as Detachment Commander of 171 Avn Sqn for Operation QUICKSTEP.

Section 17 - Flying Simulations And DSTO Support

Observations only.

Section 18 - Investigations of Survivors

Findings:

18.1 The investigation conducted by the AAIT insofar as it was constituted by interviews with the survivors was carried out with professionalism and effectiveness which contributed to the value of Exhibits 5 and 6 to the conduct of the hearing and the deliberation of the Board.

18.2 On the limited material available, the Board finds that there appears to have been no good reason for the presence of the military police/provost marshal during and after the AAIT investigation.

18.3 The Board also finds that the presence of the military police/provost marshal constituted at least a confusing intrusion as far as the survivors were concerned.

Recommendation:

18(a) That consideration be given to the promulgation of a protocol to the effect that when the AAIT is engaged. The necessity to have involved at the same time elements of the military police/provost marshal be the subject of separate convening authority.
Section 19 - Support To Families

Finding:

19.1 The Board is satisfied that the families of CAPT Bingley and TPR Porter were well served by the resources of DCO.

Section 20 - Release of AAIT Report to the “Bingley Family” and to “Aviation Commanders”

President’s Findings:

20.1 That it is not necessary in the interests of the Defence of the Commonwealth that aviation command elements or any other personnel, now have access to the AAIT Report to inform them as to any “immediate” action, or otherwise, required to prevent a recurrence of the accident.

20.2 That it is not necessary in fairness to Mrs Bingley or extended next of kin, in order that they have an understanding of the AAIT Report’s findings and recommendations as to the death of CAPT Bingley or otherwise, that Exhibit 6 be now provided to Mrs Bingley or the extended next of kin.

Section 21 - Official Recognition of Individual Actions

Finding:

Observations only
SECTI0N 1

INTRODUCTION

1.1. Australian Defence Force (ADF) elements were deployed to an area in the vicinity of Fiji as part of Operation QUICKSTEP in late 2006. Four Black Hawk helicopters flew to HMAS KANIMBLA from Townsville on 3 November 2006. Later the same day KANIMBLA departed Townsville with detachments of 171 Aviation Squadron (171 Avn Sqn), Special Air Services Regiment (SASR) and 4 Royal Australian Regiment Commandos (4 RAR (Cdos)) embarked. The Maritime Task Group comprised HMA Ships KANIMBLA, NEWCASTLE and SUCCESS. In addition to the four Black Hawk helicopters one RAN Sea King Helicopter was embarked.

1.2. Planning was carried out while sailing to the area of operations. Over the period prior to the accident flying training was conducted to maintain currency in various anticipated roles. The training involved day and night flying to the aft deck of KANIMBLA. All of the training up to 29 November 2006 had been to the ship whilst making way. Initially the flying training involved practice in deck landing, including practice for maintainers and ship’s crew in launching four helicopters to minimise the time involved.

1.3. At approximately 1611 hours on 29 November 2006, Australian Army Black Hawk helicopter, A25-221 (Black Hawk 221), crashed onto the aft deck of KANIMBLA and thereafter flew into the sea whilst conducting a training exercise. Two pilots, two loadmasters and six passengers from SASR were in the aircraft. The crash resulted in the deaths of the aircraft captain, Captain Mark Bingley and a passenger, Trooper Joshua Porter.

1.4. The Board, having considered what happened in the accident and why it happened has come to the conclusion for the reasons set out generally hereafter, that the cause of the accident was pilot error and finds accordingly.

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1 Exhibit 74, Statement of CMDR Bannister RAN, paragraph 2
2 LCDR Glynn T392.46
3 Throughout this Report the word “accident” is used in the sense defined in Exhibit 159, Safetyman, vol. 3 part 1 chapter 9 paragraph 9.10; see also Exhibit 278, Convention on Civil Aviation, Annex 13 Aircraft Accident and Incident Investigation, chapter 1, International Standards and Recommended Priorities: definitions
4 Exhibit 109, Statement of WO2 12, paragraph 9; Exhibit 98, Statement of CAPT 7, paragraph 7; Exhibit 92, Statement of CAPT 8, paragraph 6
5 MAJ 3 T2071.34; Exhibit 123, Statement of CAPT 11, paragraph 4; Exhibit 184, Statement of MAJ 3, paragraphs 13-14; Exhibit 92, Statement of CAPT 8, paragraph 15
6 Exhibit 92, Statement of CAPT 8, paragraph 6
7 President T5.46-6.3
Finding:

1.1 The cause of the crash of Black Hawk 221 was pilot error by the aircraft captain.

HMAS KANIMBLA

Figure 1.1 - HMAS KANIMBLA

1.5 KANIMBLA, built for the United States Navy as USS SAGINAW, was commissioned into the Royal Australian Navy on 29 August 1994. The ship underwent extensive modifications for the new role as a helicopter-capable amphibious transport ship (LPA). KANIMBLA's primary role is to transport, land and support a force of up to 450 personnel, their vehicles and equipment. Army landing craft (LCM8s) can also be carried on the forward flight deck to provide ship-to-shore transport. Accessed through a stern door, storage space is available on the tank deck for Army vehicles and other large items of equipment. The ship has operations and planning rooms and a comprehensive array of communications equipment to support joint operations.
1.6. KANIMBLA is fitted with a large and comprehensive medical facility, with a 40-bed hospital incorporating full surgical and recovery facilities. This is known as the Primary Casualty Reception Facility (PCRF).\(^8\)

1.7. KANIMBLA’s hangar is capable of accommodating and supporting four Army Black Hawk or three Sea King helicopters. Two helicopters can operate simultaneously from the aft flight deck, while a third helicopter can operate from the forward flight deck. Two LCM8s can be carried on the forward flight deck although this capability is at the expense of forward flight deck operations.

1.8. Dimensions of KANIMBLA are:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
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<tbody>
<tr>
<td>Length</td>
<td>159.2 m</td>
</tr>
<tr>
<td>Beam</td>
<td>21.2 m</td>
</tr>
<tr>
<td>Deck height</td>
<td>6.7 m</td>
</tr>
<tr>
<td>Masthead height</td>
<td>36 m</td>
</tr>
</tbody>
</table>

1.9. The ADF has deployed KANIMBLA and its sister ship HMAS MANOORA extensively in operations finding their versatility and capability very useful. The LPA’s have served in operations in the Middle East, East Timor, the Solomon Islands and supported Operation SUMATRA ASSIST following the 2004 Boxing Day Tsunami.\(^9\)

**171 AVIATION SQUADRON AND 16 BRIGADE (AVIATION)**

1.10. A Squadron 5 Aviation Regiment became an independent unit on 28 November 2004 and retitled 171 Avn Sqn. The reorganisation was to create a unit dedicated to Special Operations (SO). A unit Commanding Officer at the rank of Lieutenant Colonel was established in addition to the conventional squadron commander (Major level).\(^10\)

1.11.


\(^9\) Further historical matters and possible developments are dealt with in Section 15 below in relation to flotation devices.

\(^10\) Exhibit 2, Statement of MAJGEN Fraser, paragraph 8,

\(^{11}\) LTCOL 1 T1429.9 - 47
1.13. 171 Avn Sqn falls under the direct command of Commander 16 Brigade (Aviation) (16 Bde (Avn)). 16 Bde (Avn) was formed in April 2002. It was created by combining Headquarters Divisional Aviation (Operational Command) and Headquarters Aviation Support Group (Technical Command). The first Commander 16 Bde (Avn) after the reorganisation, MAJGEN Fraser, stated his opinion that this restructure and increased commitment of staff to the Brigade Headquarters "...enhance the continuity of command".13 16 Bde (Avn) is located at Enoggera Barracks in suburban Brisbane while 171 Avn Sqn has recently moved to Holsworthy Barracks in Sydney.

1.14. The Board is satisfied that the geographical separation, as far as communication is concerned, does not appear to be a barrier to the exercise of command.

1.15. 16 Bde (Avn) is the immediate superior headquarters to which 171 Avn Sqn belongs. Overarching control is held by Land Command14. Headquarters 16 Bde (Avn) has a number of branches including operations, logistics, information systems, aviation capability, standards and airworthiness. The present Brigade Commander is BRIG N.S. Bartels. The Brigade Commander is operational airworthiness authority (OAA) for Army and he is answerable to the Chief of Air Force in that capacity.15

1.16. As COMD 16 Bde (Avn) BRIG Bartels has widespread responsibilities. He has command over the headquarters of the Brigade, 1 Avn Regt and 5 Avn Regt, 171 and 173 Avn Sqns with technical control over Army Aviation Training Centre (AAvTC).16 MAJGEN Fraser stated that 16 Bde (Avn) carries out a high workload and exercises a large number of functions. "The establishment of it I think was under resourced to start with...[it's at a sustainable level, just."17 When asked about his span of control and workload and whether he has the resources to achieve the assigned tasks, BRIG Bartels said: "Right now we're managing. but I have been afforded the opportunity by my higher headquarters to look at that, for which I'm very grateful".18

1.17. DCOMD 16 Bde (Avn) has daily contact with 171 Avn Sqn (and all other units under command of 16 Bde (Avn)) and reports directly to the COMD on any matters he deems

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12 LTCOL 1 T1438.1 -27
13 Exhibit 2, Statement of MAJGEN Fraser, paragraph 38(6)
14 Exhibit 165, Statement of BRIG Bartels, paragraph 2
15 Exhibit 165, Statement of BRIG Bartels, paragraph 2
16 Exhibit 165, Statement of BRIG Bartels, paragraph 3
17 MAJGEN Fraser T1982.35
18 BRIG Bartels T1826.7
appropriate\textsuperscript{19}. The COMD speaks to each of his Commanding Officers (COs) as required but "at least weekly"\textsuperscript{20}. In addition there are weekly video conferences between the COMD and all his COs including the Commandant (COMDT) AAvnTC\textsuperscript{21}. There are one or two conferences per annum between senior Brigade staff and all COs and Regimental Sergeant Majors of the commanded units. The COMD and DCOMD make regular visits to each of the Units under command.

Findings:

1.2 In relation to command matters, proper and adequate lines of communication exist to disseminate and receive information, orders, directives and briefs. The efficacy, however, of the practices described depends upon the actions and workload of the individuals involved.

1.3 The Brigade Commander's workload (including the recent relocation) and span of control may have as at 29 November 2006 prevented adequate supervision of 171 Avn Sqn's activities and performance.

Recommendation:

1(a) The proposal to raise an intermediate Regimental Headquarters is supported.

\textsuperscript{19} Exhibit 165, Statement of BRIG Bartels, paragraph 4
\textsuperscript{20} BRIG Bartels T1788.40
\textsuperscript{21} BRIG Bartels T1789.2
BLACK HAWK HELICOPTER

1.18. The Black Hawk helicopter was developed by Sikorsky for the US Army in the 1970s. There are a number of different variants of the aircraft. In excess of 6.5 million hours have been flown on Black Hawk and Sea Hawk variants. It is in service in 27 different countries.\footnote{Exhibit 2, Statement of MAJGEN Fraser, paragraph 6(a)}

1.19. Thirty-nine S-70A-9 Black Hawk helicopters were purchased by the ADF and came into service between December 1987 and January 1991.\footnote{Ibid Annex C} The aircraft were initially operated by 9 Squadron RAAF. All Black Hawk aircraft, as a consequence of a 1986 decision of the Chiefs of Staff Committee, came under control of the Army in January 1989 and were operated by A and B Squadrons 5 Aviation Regiment.\footnote{Ibid paragraph 7}

1.20. The S-70A-9 Black Hawk helicopter is powered by two twin gas turbine engines. The Black Hawk is of conventional layout with a single main rotor and torque balancing tail rotor. The main rotor system has four blades made of titanium/fibreglass. The drive train consists of a main transmission, intermediate gear box and tail rotor gear box with interconnecting shafts. The engines are T700-GE-701A-1 engines operating in parallel. The maximum all up weight for the S-70A-9 Black Hawk is 22,000lb. In addition to its crew of 4 the aircraft can carry 10 combat equipped troops although 8 are normally carried so that packs can also be accommodated.\footnote{Ibid paragraph 12}

1.21. The Black Hawk is a robust aircraft. Its battlefield performance is well recognised.\footnote{Ibid paragraph 18} It is the most common troop carrying aircraft in use in the world. In Australia the Black Hawk fleet has accrued in excess of 118,500 flying hours.\footnote{Ibid paragraph 21} It has an excellent safety record both in Australia and overseas.\footnote{COL Crocombe T629.17}

1.22. The Black Hawk is "...a tremendously capable and at times forgiving aircraft". The aircraft "...has broad margins in many areas for engine flight profiles. It usually has quite significant power margins, so if you do find yourself in a situation where you need more power, that power is available for you to get yourself out of that situation".\footnote{SQNLDOR Morris T1887.31 -39}
Black Hawk A25-221 (Figure 1.2)

1.23. A25-221 came into service in the ADF on 19 October 1990. The aircraft had flown 3428.8 hours since acquisition. This was below the fleet average of 3600 hours. During Operation QUICKSTEP the aircraft flew 6.8 hours prior to the accident on 29 November 2006.

![Figure 1.2 - Black Hawk A25-221](image)

1.24. The maintenance records of Black Hawk 221 were quarantined immediately after the accident. These records were examined independently by WOFF R. Dyball who was part of the AAIT. His inspection of documents included the EE500 Maintenance Forms being the aircraft log book and the primary source documentation for maintenance of the aircraft. An S34 marinisation service had been carried out on 1 November 2006 and thereafter every 5 days as required. An S57 service was due on 29 November 2006; such a service involves main rotor hub and spindle and dragger beam inspection. This inspection was to be carried out after

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29 Exhibit 2, Statement of MAJGEN Fraser, Annex C
30 Exhibit 114, Statement of CAPT 14, paragraphs 11-12
31 Ibid paragraph 12
32 LCDR Glynn T395.7-.18
33 Exhibit 5, AAIT Report, paragraph 6
34 WOFF Dyball T222.4
35 WOFF Dyball T223.9-.20
36 WOFF Dyball T224.44

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completion of flying on that day.\textsuperscript{38} The statement of CAPT 14, the Technical Support Troop Commander of 171 Avn Sqn, sets out the detail of the servicing carried out on deployment.\textsuperscript{39}

1.25. The inspection by WOFF Dyball disclosed that all servicing and maintenance requirements of the aircraft had been complied with.\textsuperscript{40} WOFF Dyball concluded that no maintenance matter raised by his inspection of the documentation gave rise to any concern as to the flying performance of the aircraft.\textsuperscript{41} In reaching this conclusion WOFF Dyball had regard to Carried Forward Unserviceabilities (CFU). It is noted that a CFU is not permitted for a flight critical component.\textsuperscript{42} His evidence disclosed that the CFU entries in the documentation were appropriately recorded and followed up.\textsuperscript{43}

1.26. Servicing records for the aircraft indicate an R2 service was commenced on 2 August 2006 and completed on 8 September 2006.\textsuperscript{44} This is the deepest level maintenance carried out by 171 Avn Sqn.\textsuperscript{45} CAPT 14 in his statement referred to a conservative approach to aircraft safety in 171 Avn Sqn maintenance culture.\textsuperscript{46} A review of all matters relating to the maintenance of Black Hawk 221 including servicings, Special Technical Instructions, unscheduled and other maintenance carried out prior to 29 November 2006 and the use of the Army Aviation Systems Program office (AASPO) for advice and endorsement validate his opinion and statement that “\textit{I believe that all maintenance was conducted in accordance with technical airworthiness considerations}”.\textsuperscript{47}

1.27. Aviation fuel samples from the ship were tested and found to be clear.\textsuperscript{48}

1.28. The Defence Science and Technology Organisation (DSTO) concluded that the analysis of the recovered Black Hawk wreckage did not identify anything that may have contributed to the accident.\textsuperscript{49} Furthermore the review of the Flight Data Recorder (FDR) from Black Hawk 221 indicated that the aircraft was functioning normally up to the point of impact.\textsuperscript{50}

\textsuperscript{38} WOFF Dyball T224.7
\textsuperscript{39} Exhibit 114, Statement of CAPT 14, paragraph 26
\textsuperscript{40} WOFF Dyball T234.36.
\textsuperscript{41} WOFF Dyball T235.27 - .236.14
\textsuperscript{42} WOFF Dyball T225.35
\textsuperscript{43} WOFF Dyball T228.38; T229.44
\textsuperscript{44} Exhibit 114, Statement of CAPT 14, paragraph 15
\textsuperscript{45} Ibid paragraph 13(b)
\textsuperscript{46} Ibid paragraph 17
\textsuperscript{47} Ibid paragraph 17-29
\textsuperscript{48} Exhibit 219, Statement of ABMT M Farina; Exhibit 192, DMO Minute
\textsuperscript{49} Exhibit 151, “DSTO Wreckage Assessment and Flight Data Recorder Analysis Black Hawk A25-221 Accident Investigation”, Paragraph 2.3
\textsuperscript{50} Exhibit 151, “DSTO Wreckage Assessment and Flight Data Recorder Analysis Black Hawk A25-221 Accident Investigation”, Paragraph 3.2
Findings:

1.4  Black Hawk 221 was properly serviced and maintained in accordance with ADF technical airworthiness requirements.

1.5  Black Hawk 221 remained serviceable and was performing as expected throughout its final sortie prior to impact with the deck of HMAS KANIMBLA.

THE ACCIDENT AIRCREW

CAPT Bingley (Aircraft Captain)

1.29.  CAPT Bingley was one of the most experienced and respected Black Hawk pilots. He enlisted in the Army in March 1990. Initially he was allocated to infantry serving primarily in 1 RAR until he was commissioned and transferred to Aviation in September 1997. CAPT Bingley completed his rotary wing pilots course in December 1998 and received his initial categorisation as a D Category Black Hawk pilot in June 1998. He undertook instructor training with the US Army in 2002. He obtained Category C Black Hawk instructor rating in June 2004. He then qualified as a Category B Qualified Flying Instructor (QFI), SO Squadron Flight Lead. He was posted to 171 Avn Sqn in January 2005. As at 29 November 2006 CAPT Bingley had accumulated 2518 flying hours.

1.30.  A review of the flight authorisation sheets indicates that between deployment on 3 November 2006 and 29 November 2006 CAPT Bingley flew a total of 28 serials. During this period he flew 27.8 hours as aircraft captain for deck landing practice, ship underway recovery assaults, airborne support by fire practices and formation rejoin practices.

51 Exhibit 204, Aircrew Assessment Report Categorisation and Mission Qualification of December 2004
52 Exhibit 204, Aircrew Assessment Report Categorisation and Mission Qualification of 8-9 December 2005
53 Exhibit 114, Flight authorisation sheets
54 Exhibit 5, AAT report, paragraph 46,
1.31. In the 7 days prior to the accident CAPT Bingley undertook 5.8 hours of flying. He conducted approaches and assaults to the ship whilst underway. During Operation QUICKSTEP, CAPT Bingley was intimately involved with the planning of training and frequently liaised with other embarked Force Elements for training purposes. At the time of the accident on 29 November 2006 CAPT Bingley was within allowable aircrew flight time limits.

**CAPT 7 (Co-pilot)**

1.32. CAPT 7 joined the Australian Army in July 2001 and commenced military flying training in August 2003. He was awarded Category C on the Black Hawk in March 2006. At the time of the accident he had accumulated a total of 626.9 hours on all aircraft types, with 32.8 as pilot-in-command. He had flown a total of 353.7 hours on the Black Hawk of which 9.5 hours was as pilot-in-command. In the seven days prior to the event CAPT 7 had conducted 3.9 hours flying, all by day. All flights involved SO techniques to a ship underway. Most likely he had conducted 1-2 assaults to a ship underway as the flying pilot and acted as a co-pilot for the remainder.

1.33. CAPT 7 was within allowable aircrew flight time limits at the time of the accident. The amount of flying that he had undertaken is consistent with that required to maintain his proficiency as a co-pilot in conducting SO profiles to a ship underway.

**WO2 12 (Right Hand Loadmaster)**

1.34. WO2 12 joined the Australian Army in July 1986 and after initial recruit training was allocated to AAAvn Corps. He spent four years as a ground crewman before completing loadmaster training in June 1991. He was then posted to 5 Avn Regt as a Category D loadmaster...

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55 Ibid paragraph 48
56 SQNLDR Pascoe T414.41-415.44; Exhibit 6, AAIT report, paragraph 49,
57 Exhibit 5, paragraph 50, 51 AAIT Report
58 SQNLDR Pascoe T414-415, Exhibit 40, Medical Report SQNLDR Pascoe 7 June 2007 together with cover letter, p15
59 SQNLDR Pascoe T414-415, Exhibit 40, Medical Report SQNLDR Pascoe 7 June 2007 together with cover letter, p15; Exhibit 5, AAIT Report, paragraph 54
on Black Hawk and was upgraded to Category C loadmaster in November 1993. WO2 12 qualified as a Category C Black Hawk loadmaster instructor in August 1996. He was posted to 171 Avn Sqn in January 2005. At the time of the accident he had accumulated a total of 3785.1 hours on all aircraft types, of which 3713.1 hours had been on Black Hawk. Also at the time of the accident WO2 12 had 1020.0 instructor hours on Black Hawk. In the seven days prior to the accident WO2 12 had conducted 3.3 hours flying (1.5 day and 1.8 night). WO2 12 was within allowable aircrew flight time limits.  

CPL 13 (Left Hand Loadmaster)

1.35. CPL 13 joined the Australian Army in January 1992 and after initial recruit training was allocated to the Royal Australian Artillery Corps. Upon completion of loadmaster training in March 2004, CPL 12 transferred to AAAvn and was posted to 5 Avn Regt as a Category D loadmaster on Black Hawk. He was posted to 171 Avn Sqn in January 2005 and upgraded to Category C loadmaster in December 2005. At the time of the accident he had accumulated a total of 694.2 hours on all aircraft types, of which 636.1 hours are on the Black Hawk. In the seven days prior to the accident CPL 13 had conducted 3.3 hrs flying (1.5 day and 1.8 night). CPL 13 was within allowable aircrew flight time limits.

Findings:

1.6 All Black Hawk 221 crew were within allowable aircrew flight time limits at the time of the accident.

1.7 All Black Hawk 221 aircrew were appropriately qualified and current for the tasks expected of them on the 29 November 2006.

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60 Exhibit 5, AAIT Report, paragraphs 55 to 59
61 Exhibit 5, AAIT Report, paragraph 60 to 64
62 See Section 9 paragraph 4 concerning CAPT 7's incomplete CRM training
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SECTION 2

HISTORY OF THE FLIGHT

2.1 The flying training conducted on 29 November 2006 involved the four Black Hawk helicopters embarked in KANIMBLA. The reason for the training was a lack of aircrew currency in assaults on static targets. It was therefore arranged that the ship would not be making way at the time of training. The planned formation involved two elements of two aircraft each with allocated call signs of BLACK and GOLD. The assaults were planned to terminate in an out of ground effect (OGE) hover over the aft deck of KANIMBLA.

2.2 CAPT Bingley planned and subsequently briefed the sorties on the afternoon of the accident. The sorties were authorised by MAJ 3 who attended the orders and signed the Authorisation Sheets (Form OA82).

WEATHER AND ENVIRONMENTAL CONDITIONS

2.3 On 29 November 2006, KANIMBLA was operating in the vicinity of 18 45 S, 177 00 E a position approximately 45 nm to the south west of the Fijian main island of Vitu Levu in International Waters. The predominant weather flow for this tropical area in November is the South Easterly trade winds. The weather on the day of the accident was typical of those trade winds with a moderate south easterly wind being observed and recorded throughout the day.

2.4 On HMA Ships, it is common practice to record basic weather observations hourly. These are most often taken by a junior member of the bridge staff under the ultimate supervision

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1 Exhibit 26, Statement of LCDR Stringer, paragraph 11; LCDR Stringer T340.7; MAJ 5 T1009.24; Exhibit 125, SITREP 28 November 2006 signed by MAJ 4, paragraph 12; MAJ 4 T1261.22; CAPT 7 T907.1; Exhibit 184, Statement of MAJ 12, paragraph 9
2 MAJ 3 T2072.32; LCDR Stringer T340.11
3 Exhibit 94, Restricted Bow Assault Mission Package
4 MAJ 4 T1265.38
5 Exhibit 129, OA82 Flight Authorisation serials 87-90
6 Exhibit 61, Screen Capture of Navy Display System - computer
7 Exhibit 59, Routing Chart- South Pacific
8 LCDR Stringer T319.1-9

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of the Officer of the Watch (OOW). The data is recorded in the ‘Rough Weather Log’. To
measure wind, the ship is fitted with two anemometers mounted on the ships main mast, one to
port and the other to starboard. The windward anemometer should be used and the relative wind
speed and direction will be indicated. The observer will then use a plastic ‘wind widger’ to
determine the true wind speed and direction which takes into account the movement of the ship.
The true wind speed and direction is then recorded.\(^9\)

2.5 The weather data is then transferred to the Ship’s Log in which weather observations
must be recorded every four hours.\(^11\) In ships such as KANIMBLA that operate helicopters, it is
common that the Procedural Air Controller (PAC) will also use this data from the rough log when
preparing the weather segment of the flying brief. This was the case in KANIMBLA on 29
November 2006.\(^12\)

2.6 The ‘Rough Weather Log’ for 29 November 2006 shows a steady trend with a consistent
wind of approximately 12 kts from the East South East being observed during the 16 hours prior
to the accident.\(^13\) The then Fleet Navigating Officer, LCDR Collins, reviewed the rough log and
verified this. There were some anomalies to the trend and he explained that they were likely to
be caused by operator error.\(^14\)

2.7 From the Rough Weather Log and supported by witness evidence\(^15\), it can be concluded
that the approximate weather conditions at the time of the accident were as follows:

True Wind Speed - 10-15 kts
True Wind Direction – ESE
Sea State – 2
Swell - SE
Air Temp – 28C
Humidity – 77%
Cloud – Partly cloudy (4/8 Octas)
Visibility – Excellent

Finding:

2.1 The weather was suitable for flying operations.

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\(^9\) Exhibit 279, HMAS KANIMBLA Rough Weather Log for 29 November 2006. The Rough Weather Log has been
admitted by the Board as Exhibit 279.
\(^10\) LCDR Collins T621-622, LEUT Houlihan T807
\(^11\) Exhibit 205, D(N) ADMIN 30-15, Instructions to the Officer of the Watch at Sea
\(^12\) Exhibit 131, Statement of LS Kuen
\(^13\) Exhibit 279, Rough Weather Log
\(^14\) LCDR Collins T610.31 – 611.12
\(^15\) Exhibit 90 Statement LEUT Houlihan
Ships Drift

2.8 At 1400 29 November 2006, to satisfy the sortie requirements of flying to a ‘static target’, KANIMBLA stopped in the water and shut down all main propulsion engines. This posture is known as being ‘underway but not making way’. Once settled, the ship’s movement is determined by the prevailing current (set) and the effect of the wind (drift).

2.9 LCDR Collins stated in his oral evidence that typically, most ships including the LPA, will lie on or near to beam on to the wind. That is, the ship will lie perpendicular to the direction of the prevailing wind. He also confirmed through plotting the GPS positions recorded in the Officer of the Watch (OOW) notebook, that the combined set and drift was approximately 280 at 0.9 kts for the period that the ship was stopped dead in the water. Similarly, the screen capture of the navigation display system, which KANIMBLA’s Navigator, LEUT Houlihan, sensibly printed within seconds after the incident, indicates at that very moment a combined set and drift of 306.9 at 1.2 kts was being experienced.

2.10 LCDR Collins also calculated the set and rate of the ship prior to shutting down the main propulsion engines and drifting. He determined that to be approximately 246 at 0.6 kts. This figure will indicate largely the effect of the current as ships make significantly less leeway (caused by the wind) when making way. This figure is supported by the November Routeing Chart that displays historic oceanographic data for the area indicating that a westerly current of 0.5 kts is likely to be present.

2.11 Ships will typically drift at approximately 1-1.5 kts for each 20 kts of wind and the LPA in particular has a high drift rate due to the large sail area and shallow draft. Given the 10-15 kts of ESE wind being experienced, it can be approximated that in all likelihood the drift rate was approximately 0.5 – 1.0 kt, that is the rate at which the ship will move bodily through the water column, in a west north west direction. Similarly, the current being experienced at the time of the accident was westerly at approximately 0.5 kts. The total combined rate of set and drift is WNW at approximately 1-1.5 kts.

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16 Exhibit 82, OOW Notebook
17 LCDR Collins T614.19
18 LCDR Collins T617.19-25
19 Exhibit 61
20 LCDR Collins T616.30
21 Exhibit 59, November Routeing Chart
22 LCDR Collins T614.19
THE FLIGHT

2.12 The first element of GOLD 1 and 2 departed KANIMBLA at 1502 and 1525 hours respectively, followed by BLACK 1 and 2 at 1556 and 1601 hours respectively. The time interval and sequence were required to provide a clear flight deck for the movement of BLACK 1 and 2 from the ship's hangar (the aft flight deck of KANIMBLA is only capable of handling two aircraft at a time). GOLD 1 and 2 loitered in the vicinity of KANIMBLA whilst awaiting the departure of BLACK 1 and 2.

2.13 Once BLACK 1 and 2 had departed, GOLD 1 and 2 commenced their run-in from the IP which was located 10 km off the bow of the ship, in a stream formation. In this first approach, the Flight Lead of the GOLD element elected to use the starboard side of the ship as the active side. This meant an approach from the ship's bow followed by a right turn in order to approach the aft flight deck in a hover in preparation for the assault. Once GOLD 1 and 2 had completed their approaches and simulated assault, BLACK 1 and 2 commenced their run-ins, similarly in a stream formation. On this occasion the captain of BLACK 1, CAPT Bingley, elected to use the port side of the ship as the active side, as he was seated on this side and wished to conduct the first practice. This was a similar approach to that of GOLD 1 and 2, except that the formation would instead pass along the port side of the ship followed by a left turn through 90° into the assault position.

2.14 BLACK 1 commenced its run-in from the IP and then passed along the port side at 1610 hours. The aircraft was observed by eye witnesses to approach the ship from ahead, commence a decelerative flare, pass down the port side of the ship, and turn left toward the flight aft deck. At the completion of the left turn, and as recorded by the ship's aft looking camera, the aircraft proceeded to descend toward the aft flight deck, impacting the deck midway between number two and three landing spots. When the fuselage impacted the flight deck, the tail boom and rotor separated from the aircraft after colliding with the edge of the flight deck and fell over the port side of the ship. The remaining fuselage section became airborne, rotated and transitioned.

23 Exhibit 31, Flying Evolutions Record Sheet
24 Exhibit 132, Statement of CAPT 6, paragraph 17; CAPT 6 T1359.2-26; Exhibit 134, Statement of CAPT 10, paragraph 9; CAPT 10 T1389.6
25 CAPT 7 T909.41; CAPT 10 T1390.32
26 Exhibit 124, Statement of MAJ 4, paragraph 25
27 Exhibit 123, Statement of CAPT 11, paragraph 10
28 Exhibit 125, SITREP 28 November 2006 signed by MAJ 4; Exhibit 124, Statement of MAJ 4, paragraph 26;
29 Exhibit 5, AAIT Report, paragraph 15
30 Exhibit 1, Video of Incident. Note time is represented in GMT and approx 12 minutes ahead of the correct time.
32 Exhibit 1, Video of Incident
laterally across the flight deck to starboard. It crashed into the ocean on the starboard side of the ship.\textsuperscript{33}

2.15 An accurate electronic recording of the location date and time was captured by the ship’s Electronic Chart Display Information System (ECDIS). The ECDIS was activated by the navigator of KANIMBLA within one minute of the crash.\textsuperscript{34} The GPS recorded the ship’s position as 18° 44.922’S 176° 59.450’E. The date recorded is 29 November 2006 at 04.11.59 UTC.\textsuperscript{35}

**THE ACCIDENT SEQUENCE**

2.16 An analysis of the recovered FDR\textsuperscript{36} revealed the following sequence of events immediately preceding impact of Black 1 with KANIMBLA’s deck and the subsequent crash into the ocean:

### 30 Seconds before Deck Impact:

- **Airspeed:** 100 KIAS
- **RADALT:** 98 Ft
- **Pitch Attitude:** 2°ND
- **Roll Attitude:** Wings Level
- **RPMR:** 100%
- **Engine Torque:** 45% Matched

\textsuperscript{33} WO2 F T209.31; Exhibit 14, Statement of WO2 F, paragraph 7; AB Williams T359.20
\textsuperscript{34} Exhibit 90, Statement of LEUT Houlihan, paragraph 6
\textsuperscript{35} Exhibit 90, Statement of LEUT Houlihan, paragraph 14; Exhibit 61, Screen Capture of Navy Display System
\textsuperscript{36} Exhibit 8, Flight Data Recorder Comparative Analysis; Exhibit 152, DSTO Wreckage Assessment and Flight Data Recorder Analysis; Mr T Truong T1602.34-T1617.30
26 Seconds before Deck Impact:

Gradual descent initiated (at approximately 120 feet per minute (fpm) calculated from RADALT)

22 Seconds before Deck Impact:

Flare initiated

- Pitch attitude progressively increased to achieved 20° NU (at -7.5 seconds)
- Initial turn (right) away from ship at 12° AOB (approx 8° heading change)
- Collective is maintained at approx 20° displacement and slowly reduces to 16° @ -3 seconds

16 Seconds before Deck Impact:

Commenced rapid roll to left

- AOB peaks at 43° Left (@-2.2 Seconds)
- Left pedal progressively introduced peaking at 65% displacement (@ -5 seconds)
- Heading change of approx 100° left (@ up to 20° /Second)

10 Seconds before Deck Impact:

Gradual descent initiated at -26 seconds is arrested at 70 feet RADALT

5 Seconds before Deck Impact:

Right pedal is introduced

- Progressively and linearly introduced to peak at 47% at -1 Second (last data point)
- Helicopter continues to turn left with no detectable reduction in rate of heading change
3 Seconds before Deck Impact:

Flare termination point

- Right cyclic is rapidly applied (peaking at approx 90% deflection) before returning to approx 60% (@ -0.5 seconds) until impact
- Collective is rapidly raised from 10% to 100% in 2 seconds (where it stayed until impact)
- Both engines respond immediately but in a non-linear fashion as described by the following Torque observations:
  - 0% matched @ -3 Seconds
  - 12% matched @ -2 Seconds
  - 80% matched @ -1 Second
  - 120% matched @ impact

2.5 Seconds before Deck Impact:

Final descent point

- Rapid descent from approx 75 feet
- Rotor RPM rapidly decreases from 101% as derived from the data:
  - 101% RPMR @ -2.5 Seconds
  - 92% RPMR @ -1.5 Seconds
  - 75% RPMR @ -0.5 Second

Deck Impact

Impact angles relative to ship’s fore and aft axis\textsuperscript{37}.

\textsuperscript{37} Exhibit 152, DSTO Wreckage Assessment and Flight Data Recorder Analysis, paragraph 2.7
• Aircraft Heading: $38^\circ \pm 5^\circ$
• Aircraft pitch: $20^\circ \pm 3^\circ$ nose down
• Aircraft role angle: $12^\circ \pm 3^\circ$ left wing low

Other Parameters:
• Rate of descent: 1800 fpm

**Water Impact**

The aircraft impacted the water and sank on the starboard side of the ship. The Military Aeronautical Distress (MAD) alarm was heard momentarily in KANIMBLA's Operations Room.

2.17 Witnesses observed that Black Hawk 221's final approach was lower and closer to the ship than normal, faster than expected with the flare being initiated late and developed quickly. CAPT 8 stated in evidence "I think I recall saying that Binga was hot".

2.18 MAJ 4 in his original contemporaneous statement said that CAPT Bingley came in too fast, too close to the ship and too low. In oral evidence he changed his position to "slightly". This officer's oral evidence attracted little weight as far as the Board was concerned in the light of the incident involving himself as aircraft pilot on 23 June 2007.

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38 The cited heading of $56^\circ \pm 5^\circ$ was derived by averaging the results from DSTO's two Photogrammetry techniques, $(51^\circ \pm 3^\circ$ and $56^\circ \pm 4^\circ$) and that of $62^\circ \pm 2^\circ$ arrived from by the relationship of the ship's heading to the aircraft heading as recorded by the FDR. 39 Exhibit 147, DSTO PowerPoint Presentation re Photogrammetry, slide 8, as derived by Photogrammetry from KANIMBLA's all facing camera; Exhibit 151, DSTO Accident Investigation Report, paragraph 2.7; Exhibit 152, DSTO Wreckage Assessment and Flight Data Recorder Analysis, Appendix A paragraph A.6 40 Tu Truong T1613.43 “I calculated it, and I think that at impact it was 1800 feet per minute; that was the rate of descent.” As determined from Photogrammetry the rate of descent was calculated as approx 1300 fpm whereas the rate of descent as derived from the rate of change of the FDR radar altimeter height over the last three seconds was 1800 fpm. The latter method was considered as producing the more accurate result due to the errors associated with the quality of the “camera orientation model” Exhibit 151 paragraph 2.6, DSTO Accident Investigation Report. 41 Exhibit 26, Statement of LCDR Stringer, paragraph 26; Exhibit 131, Statement of LS Kuen, paragraph 20 42 Exhibit 79, Statement of LCDR Wong, paragraph 13; Exhibit 124, Statement of MAJ 4, paragraph 41; AB Williams T358.38. 43 Exhibit 92, Statement of CAPT 8, paragraph 19; CAPT 8 T832.3; CAPT 8 T854.10. 44 CAPT 8 T854.10 45 Exhibit 124 paragraph 41 46 T1315.7 - questions from the President 47 T1315.7 48 T 1306, T1329, Exhibit 112 ASOR
2.19 From the FDR, the collective was held at nominal 10\% deflection throughout the flare although engine torque fell to 0\% during the latter part of the flare. The pilot executed a turning flare (or a flaring turn); in essence, a skidding manoeuvre similar to a parallel turn when snow skiing. This manoeuvre was evidenced by a large left pedal input at the 5 second to deck impact point that was accompanied by a significant heading change without apparent lateral closure to the ship\(^49\). The flare was terminated with an attitude of 20\(^o\) nose up and a bank angle of 43\(^o\).

2.20 The Board finds that this effectively placed the helicopter into an out of ground effect hover, at an extreme attitude\(^50\) and with no power applied. At this point, the pilot, the Board infers, attempted simultaneously to roll wings level, adjust the pitch attitude to the horizon and introduce power by raising the collective. The aircraft responded to these control inputs by simultaneously:

- pitching through the horizon to achieve 16\(^o\) nose down at impact,
- rolling from 43\(^o\) left wing low to 10\(^o\) left wing low at impact, and
- commencing a descent from 70 ft that rapidly increased in rate\(^51\).

2.21 To further arrest the developing rate of descent, collective pitch was rapidly applied.\(^52\) The collective lever reached full upward travel 1 second before the helicopter impacted the deck. Despite an immediate response by both engines, as demanded by the pilot in raising the collective control, the rotor RPM further decayed and the helicopter continued its rapid descent.\(^53\)

2.22 Both engines were able to achieve and deliver 120\% Torque\(^54\), being the maximum available power, at impact\(^55\). The last recorded Rotor RPM is 75\% at 1 second prior to impact. Despite full engine power, the rotor RPM had continued to decay. This was due to the combination of high collective pitch and the resultant high angle of attack being experienced by the rotor blades giving rise to enormous aerodynamic drag forces.\(^56\) The FDR data show that significant main rotor droop was experienced during the final termination caused by a very rapid (20\% to 100\% in 2 seconds) collective lever application starting at T-3 secs. Both torques were zero at the start of the collective pull so both engines would have been scheduled back to flight idle. Although operating normally, the engines could not keep up with the drag increase on the rotor blades as the collective pitch was increased and the RPMR reduced linearly from 100\% at T-3 secs to about 75\% at impact.\(^57\)

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\(^{49}\) CAPT 8 T854.22 “He commenced a left pedal turn and it seemed that the momentum of the aircraft - the aircraft was sliding or slipping…”

\(^{50}\) CAPT 8 T854.28 “It had quite excessive left wing low.”

\(^{51}\) CAPT 8 T854.24 “… and had rate of descent that wasn’t arrested, wasn’t stopped.”

\(^{52}\) Exhibit 152, DSTO Wreckage Assessment and Flight Data Recorder Analysis, Appendix B

\(^{53}\) Exhibit 8, Flight Data Recorder Comparative Analysis; Exhibit 152, DSTO Wreckage Assessment and Flight Data Recorder Analysis; Mr T Truong T1602.34 to T1617.30

\(^{54}\) SQNLDR Morris T1921.14; Exhibit 152, DSTO Wreckage Assessment and Flight Data Recorder Analysis, Appendix A

\(^{55}\) Mr T Truong T1607.27

\(^{56}\) SQNLDR Morris T1915.22 and T1916.44

\(^{57}\) Exhibit 175, Statement of SQNLDR Morris, paragraph 32
2.23 Even at contingency power rating, the engines could not produce sufficient power to simultaneously overcome the drag to accelerate the rotor and produce sufficient lift to arrest the rate of descent.\(^{58}\)

2.24 After the flaring turn, Black Hawk 221’s final flight trajectory toward KANIMBLA’s deck was on a heading of approximately GREEN 056° (relative to the ship’s fore and aft axis) and at a speed relative to the ship of 14-20 knots.\(^{59}\) The wind relative to the ship at the time was most likely RED 120° at 10-15 knots.\(^{60}\) The wind relative to Black Hawk 221’s final flight path was therefore most likely within 10° of being a pure tail wind. While the FDR could not be used to provide a reliable source of airspeed for analysis,\(^{61}\) the effective airspeed under these circumstances is derived by subtracting the wind speed from the aircraft’s speed relative to the ship immediately prior to impact. Therefore Black Hawk 221’s airspeed on its final descent was determined to be approximately 5 knots.

2.25 Immediately prior to impact, the helicopter was descending at 1800 fpm, with an effective airspeed of less than 5 knots and with significant power applied. These conditions are within those described in the Flight Manual to be most favourable for developing Vortex Ring.\(^{62}\)

2.26 Upon hitting the deck, the aerodynamic load on the main rotor was immediately reduced. The engines then rapidly accelerated the main rotor to flying speed\(^{63}\) and the aircraft lifted off the deck. Minus the tail rotor, the aircraft rapidly rotated and described a spinning arc over the starboard side of KANIMBLA and into the water. The differing observations of witnesses as to the orientation of the aircraft as it entered the water are understandable given the confusion and disorientation resulting from the violent impact and post crash gyrations.\(^{64}\) The

\(^{58}\) Exhibit 175, Statement of SQNLDR Morris

\(^{59}\) Exhibit 147, DSTO PowerPoint Presentation re Photogrammetry, Slide 8, as derived by Photogrammetry from KANIMBLA’s ait facing camera and Exhibit 152 paragraph A.6 DSTO Wreckage Assessment and Flight Data Recorder Analysis paragraph A.6.

\(^{60}\) Exhibit 28, Flying Brief Proforma states the wind as 115° at 15 knots. The wind was “predominately trending the same, towards a wind direction 115 at about 12 knots” (LCDR Collins T610.31). With a ship’s head of 233°T (Exhibit 5: paragraph 77 AAIT Report), the wind relative to the ship is RED 118° at 15 knots. The wind was “RED 115° to 135° at 10 knots” (LEUT Jones, T300.43). The video of the post accident recovery clearly shows the wind as being from just aft of beam on the port side at 10-15 knots as evidenced by the smoke marker in the water (Exhibit 1 Video of incident and Exhibit 5 AAIT Report, Paragraph 69). From this evidence, the relative wind was most likely from RED 120° at 10-15 knots.

\(^{61}\) Mr T Truong T1605.5

\(^{62}\) Exhibit 101, Flight Manual Black Hawk (AAP 7210.015-1) Section 6 page 6-2. “Vortex ring state describes an aerodynamic condition where a helicopter may be in a vertical or near vertical descent with power applied and little or no cyclic authority. Vortex ring is possible at descent rates above 700 fpm and airspeed from 0 to 20KIAS and is likely at descent rates of about 1500 fpm and airspeed of 5 to 10 KIAS. Vortex ring may also be encountered during any dynamic manoeuvre which places the main rotor in a condition of high outflow and low longitudinal airspeed.”

\(^{63}\) Exhibit 220, Statement of ABATA Healey, paragraph 6 “I heard the aircraft engine to wind back up as if we were going to lift...” ABATA Healey referred to the engines spinning up at impact although according to the FDR they were already delivering full power. This is easily explained as being the noise of the main rotor spinning up in response to being unloaded.

\(^{64}\) Exhibit 9, Statement of TPR E, paragraph 7: “I think the aircraft hit the water as if it were coming in for a landing, with the floor downwards”. See also TPR E T143.7.
most clear and reliable recollections had the aircraft entering the water on its port side. At the time of entry into the water Black Hawk 221 had both main compartment doors open. The two loadmaster windows were open, the port side pilot’s door had opened as a result of impact with the ship and the tail boom had detached from the helicopter. Consequently there were no air pockets or other buoyancy components; the aircraft sank very quickly.

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CAPT 7 T947.16 “I can’t give you the direction of the aircraft, but it was approximately 60 degrees left wing low”. WO2 12 T1044.22 “We hit the water left side down, I think.”
Exhibit 79, Statement of LCDR Wong, paragraph 15: “The left side of the aircraft seemed to hit the water first.”
Exhibit 154, Statement of TPR B, paragraph 12: “It seemed like the right hand side of the aircraft went into the water first”. T1660.9 “…the right-hand side, I believe, hit the ocean first, as I saw the water come in the door”.
Exhibit 238, Statement of TPR D, paragraph 15: “…it was tilted slightly with the port side down when it entered the water.”

65 LCDR Wong T725.27 and WO2 12 T1044.22. This orientation is further supported when analysing the evidence associated with the underwater egress of survivors. In particular, TPR D’s escape path is corroborative of the aircraft having entered the water port side down and therefore provided an easier avenue of escape for those on the starboard side of the aircraft.

66 Exhibit 1

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SECTION 3
EVENTS IMMEDIATELY AFTER IMPACT
EGRESS OF OCCUPANTS - GENERAL

3.1 The crew and passenger positions in Black Hawk 221 at the time of the accident are shown in Figure 3.1.

![Diagram of crew and passenger positions]

Figure 3.1 - Crew and passenger positions at the time of the accident

3.2 After the aircraft impacted the water and sank on the starboard side of KANIMBLA, four personnel were observed to surface almost immediately on the starboard side.¹ A fifth person was observed by witnesses beneath the water's surface on ascent. Eventually a further three survivors surfaced on the starboard side of the ship towards the stern.² TPR E surfaced on the port side having come up under the ship's hull.³ Some 4-5 minutes later CAPT Bingley surfaced a considerable distance off the port side aft quarter of the ship⁴.

¹ Exhibit 222, Statement of AB Inwood, paragraph 4
² Exhibit 84, Statement of LS Hofman, paragraph 12
³ Exhibit 9, Statement of TPR E, paragraphs 13-14
⁴ LEUT Jones T292.11: About 10 metres off the port side adjacent the Flyco
3.3 At the time of the impact a Rigid Hull Inflatable Boat (RHIB) from the ship was just completing a diving serial with members of the SASR. The RHIB was tied alongside the port officer of the day station. Members of the dive team were climbing up the jumping ladder onto the ship. Some of the divers had already reached the deck of the ship, another was on the ladder and the rest were preparing to leave the RHIB. The RHIB’s crew consisted of a coxswain, LSBM Hofman, and a bowman, SMN Shirley. There had been 12 divers involved in the diving serial. There was a standby diver and a medic. The safety officer for the serial was WO2 F. A civilian female was also aboard the RHIB.

3.4 Immediately the impact occurred the safety of the person on the ladder was ensured and the RHIB then slipped from the ship and moved to the starboard stern quarter to check for survivors.

3.5 Five survivors surfaced on the starboard side of the ship near the sponson. CPL G, who was in the RHIB stated:

“When we got to the starboard side, there we already survivors on the surface with their life jackets inflated. The remaining divers in the RHIB “jumped into the water without their dive equipment to help. The standby diver onboard, CPL R, went into the water with his diving gear on to have a look at what he could see under the surface. WO2F gave CPL R directions as to how deep to go, where to dive and the maximum time under the surface.”

3.6 TPR R in fact descended to 30 metres and maintained station for ten minutes. The underwater visibility was very good, he could see approximately 50-100 metres in a fully dimensional environment but could see no personnel or the aircraft under the water.

3.7 During the recovery of the personnel KANIMBLA had launched its second RHIB K2 with LS Levi as its coxswain. The second RHIB was launched at 1614. The Coxswains of both RHIBs were able to communicate with each other and the ships bridge via VHF radio.

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5 Exhibit 14, Statement of WO2F
6 Exhibit 84, Statement of LSMB Hofman paragraph 7
7 Exhibit 247, Statement of SGT W, paragraph 7
8 Exhibit 249, Statement E Allsop
9 Exhibit 14, Statement of WO2F, paragraphs 3-4, Exhibit 84, Statement of LS Hofman, paragraph 11
10 Exhibit 10, Statement of TPR C, paragraph 22
12 Exhibit 244, Statement of TPR R, paragraph 3
13 ibid
14 CMDR Bannister T685.24-30, WO2F T210.38, Exhibit 84 Statement of LS Hofman
15 LEUT Clark T745.7

26
3.8 TPR C was one of the survivors who was recovered into the second RHIB. TPR C was suffering from spinal injuries and he remained in the water being supported by CPL H and LCPL N until he was placed in the RHIB.

3.9 TPR E had surfaced near the port sponson and was quickly seen by CPL Q who immediately jumped from the sponson to assist TPR E. CPL I, CPL J and later CPL L joined CPL Q in assisting TPR E. TPR E remained in the water with their assistance for a considerable period until he could be hoisted onto the ship. LCDR Oborn threw a life buoy which was placed under TPR E to assist in supporting his injured back.

Captain Bingley

3.10 CPL L stated that he was still in the water after assisting survivors on the starboard side when he observed someone surface on the port side of the ship. He headed for that person who was about 30 to 40 metres off the port side of the ship. On getting closer he observed that it was CAPT Bingley. He noted that CAPT Bingley was unconscious and carried out an initial assessment and first aid. He noted the presence of the mouthpiece still in CAPT Bingley’s mouth. CPL I arrived at the scene shortly after and together they tried to perform CPR until the RHIB arrived. LCPL M also swam to CAPT Bingley and assisted as best he could.

3.11 CPL G an SAS medic in RHIB K1 stated:

"The bowman and I grabbed CAPT Bingley from either side and pulled him up into the RHIB. We put his head towards the bow of the boat and I conducted an assessment. I knew he had been a fair while without oxygen because his face was cyanotic, ashen and pale, especially around the lips. His pupils were fixed and dilated. His chest appeared normal but his abdominal area was distended more than his normal pot belly. I also felt his hand and it was very cool. He was unresponsive to verbal or painful stimuli. I knew that the prognosis was not good."

3.12 CPL G, commenced immediate CPR with the assistance of TPR B and CPL 13. They continued with CPR for the eight minutes or so that CAPT Bingley was in the RHIB.

3.13 Upon the first RHIB’s return to the ship a Stokes Litter was “…delivered very rapidly” from the ship. When trying to load CAPT Bingley into the litter it was found that

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16 Exhibit 10, Statement of TPR C, paragraph 26
17 Exhibit 9, Statement of TPR E, paragraph 15
18 Exhibit 9, Statement TPR E, paragraph 18
19 CPL L T1650.25
20 Exhibit 12, Statement of LCPL M, paragraphs 7 and 8
21 Exhibit 13, Statement of CPL G, paragraphs 13-17
22 CPL G T204.4
some of the karabiners were salted over and could not be opened.\textsuperscript{23} This delayed the placing of CAPT Bingley into the litter before he could be raised onto the ship.\textsuperscript{24}

3.14 Once CAPT Bingley was repatriated to the ship, the remaining four survivors from K1 were transferred to K2 and taken back to the ship.\textsuperscript{25}

**Captain 7**

3.15 CAPT 7, the co-pilot of BLACK 1, began to use his HABD as he entered the water\textsuperscript{26}. He was able to release himself from his harness and exit the aircraft through his starboard door. He swam to the surface and activated his life vest. CAPT 7 estimates that he was at about four metres under the water before escaping the aircraft. His life saving equipment appears to have worked as expected.

3.16 CAPT 7 gave no oral evidence as to his injuries nor was there any reference to them in his statement Exhibit 98. It is apparent however that he sustained a bruise to the inside of his left elbow and to the upper arm and a tongue bite to the left side of his tongue.\textsuperscript{27}

**Warrant Officer Class 2 12**

3.17 WO2 12 was the right hand loadmaster. His evidence that he believed the aircraft entered the water "left side down"\textsuperscript{28}. He thought that it was safe to leave the aircraft believing that the rotor blades were probably no longer attached to the aircraft. He had his visor down and was unable to know which way was up. He found his seat belt and released it. As he tried to exit the aircraft he was blocked by his apparel and objects within the aircraft but was able to swim through his window and over the top of the gun attached to that window. WO2 12 was wearing issued leather gloves and had some difficulty in finding the toggle to inflate his RFD but he was able to do so and inflate the vest\textsuperscript{29}. Once activated the RFD worked as expected. WO2 12 was unable to find his mouthpiece for his Helicopter Aircrew Breathing Device (HABD) and was therefore unable to use it to assist him. He stated that once he had surfaced he observed CAPT 7 emerge about 15 metres forward of his position\textsuperscript{30}.

\textsuperscript{23} Exhibit 13, Statement of CPL G, paragraph 19
\textsuperscript{24} Exhibit 13, Statement of CPL G, paragraph 19
\textsuperscript{25} Exhibit 84, Statement of LS Hofman, paragraph 21
\textsuperscript{26} Exhibit 98, Statement of CAPT 7, paragraph 25
\textsuperscript{27} Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, p20
\textsuperscript{28} WO 12 T1044.22
\textsuperscript{29} Exhibit 106, Statement of WO 12, paragraph 36
\textsuperscript{30} Exhibit 106, Statement of WO2 12, paragraph 38

28
3.18 WO2 12 suffered multiple soft issue injuries to thoracolumbar spine, left scapula, left knee, left ankle and left hand. Also he suffered abrasions to his left anterior chest and left lower leg and also sustained bilateral otic trauma. WO2 12 gave the following oral evidence:

Q. You sustained back injury as a consequence of the incident?

A. Yes, sir.

Q. Are you able to say to the Board whether that was sustained at the time of initial impact or as a consequence of being thrown against the grenade bin?

A. Well, sir, the pain that I felt was on the initial impact. I didn't feel the other injuries as they happened. I'd dislocated ribs and stuff from hitting the grenade bin and had severe swelling afterwards. I also had a compartment injury to my lower left leg. I also had a cut on my face, apparently. I don't know how that happened, either. The only thing I felt was the pain in my back, and that's the pain that plays up every so often. 32

3.19 The Board is satisfied in the light of both the evidence in Exhibit 40 and the oral testimony that the left side injuries were caused by contact with the ammunition box and rear right-hand pilot seat, lower limb injuries were caused by contact with the aircraft frame facing the loadmaster seat and the thoracolumbar spine injuries were caused by the initial impact (downward) forces. 33

Corporal 13

3.20 CPL 13 was the left hand loadmaster. After impacting the ship he lost visual cues and felt like he was spinning around until he hit the water 34. At that stage he executed his HUET drills. He released himself by unhooking his restraint at his waist and then proceeded to move out the window. The positioning of his ABS blower at the front of his body armour caught on the gun positioned at his window and he needed to pull back into the aircraft to release that snag 35.

3.21 He used his HABD before exiting the aircraft and inflated his SO28 life-preserving vest after exiting the window 36. The vest fully inflated suggesting that he may have been relatively close to the surface at the time that he commenced his ascent. This is supported by

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31 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 38
32 WO2 12 T1047.4-18
33 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 44
34 CPL 13 T1102.22
35 CPL 13 T1103.12
36 CPL 13 T1103.31

29
the fact that despite having commenced to use his HABD very quickly CPL 13 estimated that he only used about one third of the contents of the bottle. On arrival at the surface CPL 13 saw WO2 12 and CAPT 7 as well as a couple of SASR soldiers. He suffered soft tissue injury to his right buttock, abrasions to the right side of his chest and right knee; bruising to the posterior left knee, left posterior neck and right posterior shoulder. He suffered bilateral otic trauma. The injury to the thigh and “some bruises” on the right side of his ribs was referred to by him in oral evidence.

Corporal A

3.22 CPL A was not called to give evidence at the Board of Inquiry by reason of being on overseas deployment. He was sitting in the centre of the rear of the helicopter. Upon impact he grabbed hold of his helicopter strop which was already stretched very tight because of centrifugal force. He believed that he must have lost consciousness because he “woke up underwater gasping for air”. He could not say how deep he was but believed that it was 15 to 20 metres because when he got out he could see the bottom of the ship and thought he must have been a long way down.

3.23 He released himself via the quick release mechanism near his belt. He was able to identify what he thought was a door and grabbed hold of the Fast Roping Rappelling Device (FRRD) near the left hand door and pulled himself out of the aircraft. CPL A had been trained in the use of the HEED but did not try to activate it or use it during his escape. He activated his RFD and stated “it felt and sounded like it took forever to inflate, but probably only took about five seconds to begin to inflate”. It was only during the last three to five metres that the vest expanded completely and helped him to the surface. CPL A thought that he was one of the last ones to surface. He sustained bruising and abrasions to his face, elbows, right knee and left ankle, a minor head wound, seawater aspiration.

3.24 In his statement CPL A said at paragraph 14:

“I heard a loud bang and felt the impact which was very hard. As I hit, I must of bashed my face, elbows and knees to the floor.”

3.25 He further said at paragraph 20:

37 CPL 13 T1104.2
38 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 30
39 CPL 13 T1104.27
40 Exhibit 237, Statement of CPL B, paragraph 8; Exhibit 1 Video of Incident
41 Exhibit 237, Statement of CPL A, paragraph 15
42 Exhibit 237, Statement of CPL A, paragraph 16
43 Exhibit 237, Statement of CPL A, paragraph 18
44 Exhibit 237, Statement of CPL A, paragraph 21
45 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 46
“When I got out of the helicopter I was moving and there was no way I was going to stop to do anything like turn my HEED on. I had more than a lungful of water and just wanted to get up as fast as possible.”

3.26 And at paragraph 22:

“Even when I got to the surface, I found it really hard to breathe. I was sucking in air but couldn’t get enough. I thought that I might have damaged my chest.”

3.27 His head and facial injuries were possibly secondary to his not wearing a helmet and head contact with the floor or other aircraft structure.

Trooper B

3.28 TPR B was seated next to and forward of TPR D in the starboard door. It is his belief that the aircraft entered the water starboard side down. His evidence is that he took a deep breath before entering the water and that he was holding onto his helicopter strop as a point of reference. He was able to unclip his strop but that something blocked his egress. He thinks it may have been a person but it could also have been the fast ropes attached to the floor. When his way was clear he hit his head on either the floor or the roof or the door; there was something solid in his way. He reached for his Emergency Breathing Apparatus (EBA) and was about to use this when his way became clear. He is unsure of how deep he was before freeing himself but once free he was able to swim to the surface where he activated his RFD, which worked properly.

3.29 He sustained soft tissue injury to his lumbar spine and buttocks. He gave the following oral evidence:

“Q. Did you yourself suffer injury as a consequence of the impact of the helicopter with the deck of the ship?

Yes.

Q. Can you tell the Board the nature of the injuries?

Fractured spine, coccyx and neck.

Q. Is it a whiplash injury to the neck?

46 Exhibit 237, Statement of CPL A
47 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 60
48 Exhibit 154, Statement of TPR B, paragraph 12; TPR B T1660.9
Q. In relation to your spinal injuries, has that concerned a disc bulging at a couple of levels?

Yes. 

3.30 The Board is satisfied that the injuries were due to impact forces whilst sitting on the floor.

Trooper C

3.31 TPR C was seated in the aft position in the port door. To his right was TPR Porter. To his left seated in the rear of the compartment was TPR E. Immediately on impact he noticed TPR Porter’s helmet move downward and out of his peripheral vision. TPR C remembers grabbing hold of his helicopter strop but thinks that he probably lost consciousness for a moment. On regaining consciousness TPR C was unable to find his helicopter strop but was able to do so after a short search. He believes that two people swam over the top of him. He released himself via the quick release mechanism at his belt and made towards a door of the helicopter. He describes the force as like “hanging out of a car doing 100km/hr”. He was unable to escape because of the rate of descent of the aircraft.

3.32 Upon finally escaping the aircraft TPR C was “reefed” upside down because he was still connected by his helmet and the communication jack to the aircraft. He was able to unclip his helmet and pull off the headset. Once free of the aircraft TPR C activated his RFD. It did not inflate as expected but this was more than likely due to the depth he was at by that stage. He had completed HEED training (on the side of the pool) but did not attempt to use that training because his main focus was simply to get to the surface. His HEED bottle was turned off. On the way up he thought that he could see another member about 10 to 15 metres above him. On arriving at the surface he could see CPL A, CPL 13, TPR D and TPR B.

3.33 TPR C suffered a T12 vertebral crush fracture, soft tissue injury to his left ankle and bilateral otic trauma.

3.34 He gave the following oral evidence:

49 TPR B T1663.31-43
50 Exhibit 40, Medical Report SQNLD R Pascoe together with letter 7 June 2007, page 60
51 Exhibit 10, Statement of TPR C, paragraph 13
52 Exhibit 10, Statement of TPR C, paragraph 17
53 Exhibit 40, Medical Report SQNLD R Pascoe together with letter 7 June 2007, page 46
"Q. You suffered two fractures of the thoracic vertebrae and also a fracture at L1 of the lumbar spine. Are you able to inform the Board when that injury was sustained, or those injuries were sustained, in relation to the impact?

A. It was sustained on impact."

... ... 

"Q. Do you have any idea of how deep you were at the time you went to the surface?

A. No, no, apart from - I mean, I did, along with others in the accident, sustain, I guess, depth injuries, just bleeding from the ears because of the depth.

Q. When you started to move upwards to the surface, were you able to use your legs?

A. No, I wasn't, but I didn't actually realise that at the time."

... ...

When we surfaced, we were probably 2 or 3 metres away from the hull, so very, very close, and by the time - you know, we were there for a couple of seconds, we were actually pushing on to the hull. So I guess from what people were screaming down to us from the ship, "Get away from the ship", it was only at that point, talking to guys left and right of me, that I said, "I can't use my legs. I think" - words to the effect of, "I think something's wrong."  

3.35 In his statement TPR C said:

"People on the deck were shouting at us to get away from the ship. At this point I worked out that something was wrong with me, my legs were not really working and I had acute pain in my back."  

3.36 At paragraph 38 he said:

"I was in hospital a couple of days waiting for surgery and was not allowed to walk. I have two compressed fractured vertebrae of T11 and 12 thoracic vertebrae in my back, and a fractured L1 lumbar vertebrae. I also had bruising, cuts, slight kidney damage, and trauma to the ears. During the surgery I had four screws and two rods inserted into my spine to fix the spine while the injury heals. I got fitted with a body brace, which I stopped wearing in late Feb."

54 TPR C T151.40-44; TPR C T155.32-41 and T156.29-37
55 Exhibit 10, Statement TPR C, paragraph 3
3.37 The T12 crush fracture was, on the probabilities, due to vertical impact forces and/or forces due to flailing on the HRS; the left ankle injury might have been due to his legs having been outside the aircraft in contact with the ship’s deck during the initial impact.  

Trooper D

3.38 TPR D was not called to give evidence at the Board of Inquiry due to operational commitments. He was seated on the floor of the aircraft at the aft area of the starboard door. On the basis that the aircraft entered the water port side down he was one of those with easiest egress. He along with TPR B seated next to him was closer to the surface than those on the port side of the aircraft. The door being open and barred only by a restraining strap across there would have been minimal obstruction to exit. He may have been assisted by water rushing through the cabin from below having the effect of helping him toward the surface.

3.39 TPR D had never completed Helicopter Underwater Escape Training (HUET). When TPR D realised that the aircraft was about to enter the water he took a deep breath. He was able to use the “quick release” mechanism on the helicopter strop and states that “it felt like it took a long time to release, but in reality it was probably a couple of seconds”. He estimates that because of the pressure he could feel on his ears and experiments he has tried since in an effort to replicate the feeling, he considers he was about five metres below the surface before he began to ascend. Once TPR D had released his strop he was able to swim straight out of the door he had been sitting in “without going through the body of the aircraft”. He states that:

“Nothing impeded me in getting to the top, and I saw nobody else as I was getting out of the aircraft”.

3.40 The Board considers it is likely that TPR D was the first to escape the aircraft and ascend to the surface. TPR D did not use his breathing device and did not activate his flotation device (RFD) until he reached the surface. Once activated his RFD functioned properly.

3.41 He suffered a sacrococcygeal injury with overlying bruises (in lay terms tail bone and surrounds). He also suffered a probable left rib fracture with left chest wall bruising and wound to the left upper thigh.

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56 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 60  
57 Exhibit 238, Statement of TPR D, paragraph 7  
58 Exhibit 238, Statement of TPR D, paragraph 17  
59 Exhibit 238, Statement of TPR D, paragraph 17  
60 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 46  
61 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 46
3.42 In his statement TPR D said in paragraph 13:

"On impact, I felt something jar in my back. I was able to hook one arm over the ratchet strap across the doorway and hang onto this, to prevent myself from sliding around inside the aircraft. In doing so, I sustained some kind of chest injury, probably broken cartilage. The doctors have since said the injury looks like that inflicted by a seat belt."

3.43 The sacrococcygeal injury and thigh wound were probably the result of impact forces while sitting on the floor. The left chest wall injury was probably due to impact with other passengers or the aircraft structures during sideways flail.

Trooper E

3.44 Prior to joining the SASR TPR E was a Clearance Diver with the RAN. TPR E had been seated at the left seat on the rear wall of the main compartment of the helicopter. At the time of impact with the ship TPR E grabbed the bar of the seat he was sitting on and braced. He thought that they were going to enter the water so he took a breath. He believed that the aircraft impacted the water as if it were coming in for a landing, with the floor downward. The cabin filled with water "instantaneously". TPR E describes the sensation as "dropping through the water like a rock". With the advantage of his diving experience TPR E cleared his ears "early, often and hard probably five times in five seconds". He felt someone kick him as he exited the aircraft and believes that this was probably CPL A. He grabbed his Emergency Breathing Apparatus, turned it on and used it. Having activated his breathing device TPR E went through the HUET drill of finding his strop and releasing himself from the helicopter. He estimates that at that time he was about 20 to 25 metres below the surface.

3.45 He grabbed for the stabiliser bar that ran across the port door and attempted to pull himself out of the aircraft. His foot had been caught under the collapsing seat and required an extra effort to free himself. He was then able to exit the aircraft and commence his ascent. TPR E believes that by the time he commenced his ascent he was about 30 metres below the surface. He soon exhausted his EBA and tried to activate his RFD. An initial mistake as to the right cord meant that he ripped the whistle from the equipment but he was later able to activate the correct cord although because of the depth he was at the device did not instantly inflate. As he got closer to the surface the RFD did inflate but this had the effect of pushing his helmet forward and obscuring his vision.

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62 Exhibit 238, Statement of TPR D
63 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 60
64 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 60
65 Exhibit 9, Statement of TPR E, paragraph 6
66 Exhibit 9, Statement of TPR E, paragraph 7
67 Exhibit 9, Statement of TPR E, paragraph 8
68 TPR E T132.21-36
"I had nearly run out of breath, when I hit my head on something. I thought it that I was still inside the Black Hawk and had gone nowhere! I felt that I had hit a big metal object. I crab crawled sideways until I suddenly heard noises, voices and the flight deck alarm, and I felt air on my face. I looked up and saw the best sight I have ever seen – a big grey warship!".59

3.46 His head had struck the bottom of KANIMBLA and he had to drag himself across the hull until he reached its side and then the surface. TPR E surfaced on the port side of the ship near the port sponson.

3.47 He sustained soft tissue back injury, bruising to his left buttock, a wound to his left posterior upper thigh, bilateral otic barotrauma.70

3.48 He gave the following oral evidence:

"Q. Once you had come up to the surface, did you feel anything in relation to whether your body had been injured during the ascent or the accident?

A. Yes.

Q. What had happened to you?

A. Lower back spinal compression."71

3.49 In his statement72 he said at paragraph 14:

"I had surfaced right near the ship at the port sponson. I kicked way from the ship, took my helmet off and had a moment to reflect. It felt like my back injuries had knocked the wind out of me, because I was short of breath. I had bumps and bruises on my legs."

3.50 The soft tissue injury to his back was more probably than not caused by vertical impact forces and/or forces due to flailing on the HRS.73 The bruising on the left buttock was probably caused by contact with the seat edge during impact.74

3.51 The bilateral otic barotrauma where diagnosed was caused by the survivor being unable to *valsalva* frequently enough to keep up with the rate of underwater descent, and resulting change in ambient pressure.75

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69 Exhibit 9 TPR E Statement paragraph 13
70 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 46
71 TPR E T133.15-21
72 Exhibit 9, Statement of TPR E
73 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 60
74 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 60
3.52 The *valsalva* manoeuvre is defined as forcible exhalation against occluded nostrils and closed mouth. This causes increased pressure in the Eustachian tube and middle ear, moving the eardrum outward, allowing it to equalize the pressure levels across the ear and thus avoiding painful pressure differences.\(^76\) Divers and pilots attempt to *valsalva* by swallowing or yawning, which have the same effect.

**CAPTAIN BINGLEY – RECOVERY, CAUSE OF DEATH AND REPATRIATION**

3.53 CAPT Bingley was seated in the left pilot's seat. The door to his left was closed during flight but is seen to fling open upon impact with the ship.\(^77\) CAPT Bingley appears to have released himself from his harness and place his HABD in his mouth. The sequence in which this occurred cannot be known. It also cannot be known whether he was able to obtain any air from his HABD as the bottle was never recovered. At the time CAPT Bingley surfaced and was reached by CPL I the mouthpiece was still in his mouth but not connected.\(^78\)

3.54 The Board must express its appreciation to counsel appearing for Mrs Bingley for the thoroughness of submissions on this topic. None of the matters relevant to the cause of CAPT Bingley's death was in dispute and the Board has in effect adopted as a whole the submissions in this regard.

3.55 The cause of CAPT Bingley's death, the Board is satisfied, was drowning and aspiration of blood, with a secondary incidental finding of coronary arteriosclerosis.\(^79\) CAPT Bingley drowned at some point between activating his life vest and surfacing; the probabilities are that he died before reaching the surface.\(^80\) That this is the most likely explanation arises from the length of time that elapsed before CAPT Bingley came to the surface. Most people cannot hold their breath underwater for more than one or two minutes.\(^81\) The evidence is that the time lapse between the impact of the helicopter and the surfacing of CAPT Bingley was in the vicinity of four to five minutes.\(^82\) Further, any requirement for physical exertion to effect escape and egress would have increased CAPT Bingley's requirement for oxygen and reduced time available to hold his breath.\(^83\) There were SAS divers who were on the scene fairly quickly after CAPT Bingley surfaced and who quickly ascertained that he had no pulse, was not breathing and otherwise showed no signs of life.

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\(^{75}\) Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 60


\(^{77}\) Exhibit 1, Video of Incident

\(^{78}\) Exhibit 11, Statement of TPR I, paragraph 7; Exhibit 12, Statement of LCPL M, paragraph 7

\(^{79}\) Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 13

\(^{80}\) SQNLDR Pascoe T431.15

\(^{81}\) SQNLDR Pascoe T435.43; LEUT Squires T2001.24

\(^{82}\) Exhibit 5, AAIT Report, paragraph 152; Exhibit 13, Statement of CPL G, paragraph 11; CPL G T181.31; Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 10; Exhibit 92, Statement of CAPT 8, paragraph 28; Exhibit 12, Statement of LCPL M; Exhibit 11, Statement of TPR 1; CPL L T1649.37-1651.36

\(^{83}\) SQNLDR Pascoe T435.12
3.56 The report of the autopsy carried out by Prof. Williams, part of Exhibit 40, lists as causes of death: (a) "disease or condition directly leading to death: drowning and aspiration of blood due to helicopter accident;" (b) "antecedent causes: helicopter accident in sea water; other significant conditions: coronary arteriosclerosis."

3.57 Coronary arteriosclerosis is essentially the narrowing of a coronary artery. The right coronary artery was 55% stenosed. Although this is a significant medical condition it was not related to the underlying cause of CAPT Bingley’s death on 29 November. It should be noted at this point that the major injuries found on autopsy are described as "drowning, bleeding into airways, internal haemorrhage around larynx, abrasions to lower limbs, abrasions to face". There was no evidence of barotrauma or the bends (which occurs when a person ascends too quickly from deeper water where the pressure is greater than that found on the surface). Toxicology samples were collected during the autopsy and no traces of alcohol or illicit drugs were detected.

3.58 What has been advanced as a theory as to what may have been CAPT Bingley’s undoing in his endeavours to reach the surface involves the hypothesis or explanation of the “snagged helmet”.

3.59 The evidence is clear that CAPT Bingley surfaced approximately four to five minutes after the accident and that he did so on the port side of the ship. He was not wearing his helmet and therefore his helmet had become separated at some point prior to his surfacing. The helmet was recovered floating nearby and upon inspection there was revealed scratching over the front visor, minor gouging in the nose piece of the visor, the removal of the night vision goggle power cord and dislodgement of the right hand side of the dark visor. There was compression of the internal liner of CAPT Bingley’s helmet to an extent which indicates, through DSTO testing, that the helmet was exposed to a water pressure of no more than 30 metres. A piece of foreign object was discovered embedded in the RVC and the helmet shell.

3.60 The HABD mouthpiece was in CAPT Bingley’s mouth on the surface, but the mouthpiece had separated from the second stage regulator of the HABD. This, it is submitted and the Board agrees, indicates that CAPT Bingley managed to insert the HABD mouthpiece into his mouth at sometime during his escape but that it later became separated from the second stage regulator. No part of the HABD was recovered. CAPT Bingley was able to go through the drills to get out of the aircraft so it would appear, which included releasing himself from the harness, inserting the HABD mouthpiece into his mouth, inflating both chambers of his life preserver and swimming for the surface.

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84 SQNLDR Pascoe T432.45
85 SQNLDR Pascoe T432.47
86 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 115
87 Exhibit 102, Statement of LEUT Squires, paragraph 4; LEUT Squires T19999.30
88 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 13
89 Exhibit 46, AESSO Report, page 53 finding 4.1.10.1
90 SQNLDR Pascoe T419.10

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3.61 The depth of the aircraft at the time of CAPT Bingley's egress can be assessed by the internal damage to his helmet. If CAPT Bingley left the aircraft at a depth of 20 metres or more, it would have been necessary for him to actively swim to the surface as, even with the benefit of his life vest, at that depth he would have been negatively buoyant.

3.62 As has been noted, CAPT Bingley suffered laryngeal haemorrhage. This injury was considered at autopsy. SQNLDR Pascoe states:

"Given that CAPT Bingley's helmet was not on his head at the surface, the condition of CAPT Bingley's helmet, and the information from the life support specialists at AESSO ALSE, it was surmised that CAPT Bingley's helmet was likely to have been forcefully removed, possibly with the chin strap in place which could have resulted in a force over the larynx. There are of course other possible causes for this laryngeal haemorrhage, however no evidence in the autopsy or otherwise has suggested a specific cause."  

3.63 Immediately upon his egress from the aircraft, CAPT Bingley's helmet became caught or snagged. This in turn delayed his escape and caused him to exert considerable physical effort which would have had a detrimental effect on his ability to conserve oxygen.

3.64 DSTO testing of the foreign object embedded in CAPT Bingley's helmet revealed that the material is more probably than not from the VHF/FM Honing Antenna. The antenna is located directly outside the cockpit door and is attached in a vertical manner. It is logical that during the egress from the aircraft CAPT Bingley's helmet came into contact with the VHF/FM Honing Antenna. Analysis of the footage taken during the attempted recovery of the aircraft reveals that the antenna was still in location but appears to have an indentation in the forward edge of the antenna about the same size and shape as the foreign object that was recovered from CAPT Bingley's helmet. The matching to the point of certainty of the indentation on the foreign object cannot be made or confirmed because that part of the aircraft was never recovered.

3.65 Any contact between CAPT Bingley's helmet and the antenna was likely to initiate a chain of events that led to the loss of his helmet and the separation of the mouthpiece from the second stage regulator of the HABD, in addition to delaying his emergency egress.

3.66 The sequence of events posited by counsel appearing for Mrs Bingley is accepted by the Board as more probably than not descriptive of what occurred.
(a) CAPT Bingley carried out his emergency egress drill including releasing himself from the seat harness, inserting the HABD mouthpiece into his mouth and exiting through the port side cockpit door.

(b) The aircraft was facing port-side down while sinking at a rapid rate. The port side doors were open which resulted in a tremendous amount of water rushing through the aircraft cabin. This may partially explain the unexpected rapid rate of descent of the aircraft. The strength of this flow of water made it difficult for CAPT Bingley to escape out the port side.

(c) The fact that the aircraft sank on its port side is also material to the ease of escaping the aircraft from that side. There was evidence that the pressure of water entering the aircraft, combined with the rapid rate of descent made exiting from the port side difficult. One SAS witness describes having to do a manoeuvre like a chin-up to get himself clear of the aircraft. These are the conditions CAPT Bingley faced when attempting to exit the aircraft from the port side.

(d) Being in the port side pilot seat, the logical point of exit for CAPT Bingley was the port side pilot door.

(e) Darkness and spatial disorientation complicated his efforts to effect egress from the aircraft.

(f) On exiting the cabin CAPT Bingley’s helmet made contact with the VHF/FM Honing Antenna and became snagged for an unknown period of time. The force of the contact or snagging was such that it resulted in a part of the Antenna breaking off and lodging in CAPT Bingley’s helmet.

(g) Concurrently, the depth under water (up to 30 metres) led to the compression of the inner polystyrene impact liner of the helmet affecting its shape and fit on CAPT Bingley’s head.

(h) The force of the contact or snagging between the helmet and the antenna, in combination with the force of the water flow in and around the aircraft, and the compressed nature of the inner liner of the helmet affecting the shape and fit of the helmet on CAPT Bingley’s head, caused the helmet to rotate forward and down.

(i) As the helmet rotated forward, the dark visor (which was in the lowered locked position) came into contact with the bridge of CAPT Bingley’s nose, causing a 10mm cut as identified by SQNLDR Pascoe.
(j) The dark visor of the helmet made contact with the second stage regulator of the HABD and mouthpiece, which then dislodged the right hand side of the dark visor.

(k) The contact with the metal hose fitting of the second stage regulator left impression marks in the lower nose bridge area of the dark visor.

(l) As the helmet rotated forward on CAPT Bingley's head, the chin strap assembly progressively tightened resulting in pressure to the larynx and causing the internal haemorrhaging around CAPT Bingley's larynx.

(m) The dark visor of the helmet continued to rotate forward and applied pressure on the second stage regulator causing it to separate the regulator from the mouthpiece which was found in CAPT Bingley's mouth.

(n) The mouth piece's separating from the regulator could have led to water being ingested.

(o) CAPT Bingley eventually freed himself of the snag and, due to negative buoyancy experienced at the depth of 20 to 30 metres, he started to physically swim for the surface.95

(p) The life vest was not effective on its own in getting CAPT Bingley to the surface from a depth of 20 to 30 metres, but as he swam, assistance from the life vest increased as he got closer to the surface;96 and

(q) The physical effort required to resist the force of the water and the snagging, in addition to the effort required to physically swim for the surface, further reduced the air available in CAPT Bingley's lungs and removed his chance of survival.97

3.67 Clearly the above sequence of events would have occurred very quickly. The sequence takes into account what are called the following "uncertainties": first it is difficult to determine whether CAPT Bingley activated his LPSV before, during or after release from the snag with the antenna. It is fairly clear on the evidence that he managed to activate both inflation chambers at some point. Secondly it is unclear whether CAPT Bingley manually released the helmet by undoing the chinstrap during the snag, whether the inflation of the LPSV initiated helmet separation or whether he removed it while surfacing. Thirdly it is unclear whether CAPT Bingley received the assistance of any air from the HABD prior to separation of the mouthpiece from the second stage regulator, but if he did, it would have

95 LEUT Squires T2000.19-25
96 LEUT Squires T2000.33
97 LEUT Squires T2000.43
been minimal. Fourthly, it is also possible that the raised state of the collective or some other snag, hazard or exit obstacle also delayed CAPT Bingley’s egress, although there is no direct evidence to support that proposition. In this context it is to be noted that CAPT Bingley’s pilot’s door was still attached to the fuselage of the aircraft. This is evident from footage in Exhibit 1.

3.68 The Board is satisfied as to the validity in all the circumstances of the snagged helmet theory. This is so notwithstanding that scientific investigation could not conclusively match the foreign object lodged in CAPT Bingley’s helmet as being from the VHF/FM Honing Antenna. From the footage in Exhibit 1 there does appear to be an indentation on the forward edge of the antenna of approximately the same size and shape as the foreign object lodged on CAPT Bingley’s helmet and the theory is consistent with injuries CAPT Bingley sustained, especially internal haemorrhaging around the larynx. The theory could also explain the length of time it took for CAPT Bingley to surface. The theory further is consistent with damage to the helmet in particular the dislodgement of the dark visor on the right hand side and the impression marks on the lower nose bridge area of the visor, which seemed to match damage which would be caused by the metal hose fitting of the second stage regulator.

3.69 The HABD mouthpiece separated from the second stage regulator and was found in CAPT Bingley’s mouth during his recovery.98 The mouthpiece was subsequently lost or discarded during the resuscitation procedures.

3.70 Whilst it is clear that CAPT Bingley managed to insert the mouthpiece in conducting his escape, it is less certain whether he was able to obtain the assistance of air from his HABD cylinder. What will never be known is whether the separation of the mouthpiece had materially affected the outcome of CAPT Bingley’s death, although the existence of the mouthpiece in an unconnected state would, one would think as a matter of common sense, support the ingestion of water. The mouthpiece is designed to hold the mouth open and secondly if a person is expecting to breath air in through the mouthpiece then any attempt to do so when the regulator had been disconnected could unexpectedly involve the ingestion of water.

3.71 Even if CAPT Bingley had used the HABD at depth there would have been at best, only several breaths applied and certainly insufficient air to permit him to stay submerged for four to five minutes.99 The capacity of the HABD depends on the user and the conditions, however the deeper the user is underwater the less effective is the HABD equipment.100 At a depth of 30 metres there would be approximately one quarter of the available air in a breathing device as then would be available on the surface.101

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98 See CPL 1 T174.20 and Exhibit 11, Statement of CPL 1, paragraph 7
99 LEUT Squires T2001.4
100 SQNLDR Pascoe T435.24
101 SQNLDR Pascoe T454.41
3.72 CAPT Bingley was the first person recovered onboard. LCDR Lassam recorded his arrival at the triage area at 1630. This was about 19 minutes after impact. The resuscitation team headed by CAPT Rathjen immediately commenced work to try and revive CAPT Bingley. CMDR Wilson, an anaesthetist, assisted with the intubation of CAPT Bingley. CAPT Rathjen and his team worked on CAPT Bingley until 1651 at which time he was pronounced dead as a consequence of drowning.

3.73 According to the evidence of LCDR Lassam other casualties were received in the following order 1638 TPR E; 1643 TPR D; 1645 CPL 13; 1646 TPR B; 1649 WO2 12, CAPT 7 and TPR C. All of the located personnel were receiving medical treatment aboard the ship within about 40 minutes of the impact.

3.74 KANIMBLA had a medical capacity with capability being at Level 3 plus. This meant that the ship had the personnel, expertise and equipment to perform major surgery onboard and have the capability to provide very good care to multiple casualties. Many of the medical personnel were reservists or contractors who were being rotated during the course of the operation. The recovery of CAPT Bingley and the resuscitation efforts provided to him, and the medical treatment to all survivors by KANIMBLA personnel could not have been handled in a more efficient or timely fashion.

3.75 Despite KANIMBLA having five helicopters aboard it lacked a qualified Aviation Medicine expert. A doctor with such qualifications was serving in NEWCASTLE. This specialist knowledge would have been better utilised in KANIMBLA from the outset where the majority of aviation assets were situated.

Repatriation – Captain Bingley

3.76 Late on the evening of 29 November 2006, CAPT Spedding spoke to COL McLachlan, Chief of Staff to the Commander Joint Task Force 636 regarding the repatriation of the survivors and of CAPT Bingley. It was decided that the best and fastest method of repatriation would be a transfer to NEWCASTLE for transit to Noumea. They would then return to Australia by RAAF aircraft.

3.77 At 2220M, CAPT Spedding communicated this plan to the Commanding Officer of NEWCASTLE, CAPT Johnston via Same Time Chat. Staff at Fleet Headquarters arranged diplomatic clearance for NEWCASTLE to visit Noumea on Friday 1 December 2006. Early on 30 November 2006, NEWCASTLE conducted a RAS (Replenishment At Sea) with SUCCESS to refuel for the transit to Noumea and back.

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102 Exhibit 21 paragraph 8
103 The complete medical treatment given is set out at T382 to T388
104 Exhibit 231, LCDR Manderson Statement
105 Exhibit 145, Statement of CAPT Spedding, paragraph 21
106 Exhibit 207, Same Time Chat transcript
107 Exhibit 229, Statement of CAPT David Johnston, paragraph 11
3.78 On the night of the accident, one of loadmasters from 171 Avn Sqn compiled the available photos of CAPT Bingley on Operation QUICKSTEP and previous deployments. Personnel from 171 Avn Sqn and SASR came together in an informal commemoration and played the photos as a slide show with music.\textsuperscript{108}

3.79 KANIMBLA’s Sea King was tasked to move CAPT Bingley from KANIMBLA to NEWCASTLE. At 0745M on 30 November 2006, CAPT Bingley’s body was moved from KANIMBLA’s Fridge Flat to the Sick Bay Flat. LCDR Lassam ensured that all the necessary documentation accompanied his body.\textsuperscript{109}

3.80 CAPT Bingley was encased in a body bag covered with an Australian National Flag and was secured to a stretcher. The Sea King pilot, LCDR Glynn, noted that the crew was conscious of the need to treat CAPT Bingley with proper dignity and the respect that he deserved.\textsuperscript{110} All personnel from the 171 Avn Sqn detachment and some SO personnel formed an honour guard between the hangar and the Sea King on the aft deck.\textsuperscript{111} CAPT Bingley was accompanied in the Sea King by two escorts.\textsuperscript{112}

3.81 In preparing for the Sea King’s arrival, NEWCASTLE cleared the main passageway of all members of the Ship’s Company. Again, the focus was on upholding the dignity of CAPT Bingley, as well as minimising the exposure of the Ship’s Company to a potentially distressing situation. Volunteers from the Chief Petty Officers’ Mess escorted his body from the Sea King on the aft flight deck to the ship’s refrigerators.\textsuperscript{113}

3.82 On arrival at Noumea at 1600 on 30 November 2006, NEWCASTLE berthed in a commercial dockyard. Again, the main passageway was cleared of all ship’s company personnel. As the gangway was too narrow to safely carry a coffin, CAPT Bingley was placed on a stretcher and covered with an Australian National Flag. His escorts and volunteers from the Chief Petty Officers’ Mess carried him off the ship. In full ceremonial uniform, the CO, CAPT Johnston, the XO, LCDR O’Grady and the Coxswain, CPO Leeming stood on the flight deck and piped him ashore.\textsuperscript{114}

3.83 CAPT Bingley was taken directly to a hearse and into a shipping container on the dock, where he was transferred into a waiting coffin.

3.84 The transcending principle governing the management and repatriation of deceased ADF personnel in Di(G) PERS 20-6, Deaths within and outside Australia of ADF personnel is that the deceased are to be treated with dignity and respect.\textsuperscript{115} The Board considers that

\textsuperscript{108} Exhibit 123, Statement of CAPT 11, paragraph 19; Evidence of MAJ 4, T1242.47-1243.5
\textsuperscript{109} Exhibit 21, Statement of LCDR Lassam, paragraphs 11 and 16; Exhibit 22, Notes of LCDR Lassam
\textsuperscript{110} Exhibit 35, Statement of LCDR Glynn, paragraph 20
\textsuperscript{111} Exhibit 35, Statement of LCDR Glynn, paragraph 20; Exhibit 134, Statement of CAPT 10, paragraph 18
\textsuperscript{112} Exhibit 35, Statement of LCDR Glynn, paragraph 20
\textsuperscript{113} Exhibit 229, Statement of CAPT Johnston, paragraph 12
\textsuperscript{114} Exhibit 229, Statement of CAPT Johnston, paragraph 14
\textsuperscript{115} Exhibit 205, Folder of Defence Documents, paragraph 6a
CAPT Bingley was treated with the greatest dignity and respect at all times befitting his achievements and service to the ADF.

Findings:

3.1 During the course of his egress from the aircraft, CAPT Bingley’s helmet came into contact with the VHF/FM Honing Antenna thereby being dislodged to his physical prejudice resulting amongst other things in damage to his larynx and thus internal haemorrhaging and aspiration of blood.

3.2 At some point either during the snagging with the antenna or otherwise the HABD mouthpiece became separated from the second stage regulator and thus provided a mechanism for the aspiration of water rather than air and thus the finding on autopsy of drowning by the aspiration of water and blood.

3.3 The recovery of CAPT Bingley and the assistance provided to him by all personnel could not have been handled in a more efficient or timely fashion.

3.4 CAPT Bingley’s remains were treated with due dignity and respect.

Recommendation:

3(a) If an aviation medical specialist is available within a force, he/she should be situated where the majority of aviation assets are situated to best utilise those specialist skills.

REPATRIATION OF SURVIVORS

3.85 The Sea King, after conveying CAPT Bingley’s body to NEWCASTLE, then returned to KANIMBLA to collect the survivors. Several of the SASR troopers noted their apprehension at being back in a helicopter again, with the additional concern of being strapped to a stretcher with no life support equipment.\footnote{Exhibit 10, Statement of TPR C, paragraph 30; Exhibit 238, Statement of TPR D, paragraph 27; Exhibit 9, Statement of TPR E, paragraph 23} ABMED Cherry accompanied them to NEWCASTLE and onward to Noumea\footnote{Exhibit 216, Statement of ABMED Cherry, paragraph 13. LCDR Glynn states that he picked up a “Nursing Officer”, Exhibit 35, Statement of LCDR Glynn, paragraph 21}. At 1200, NEWCASTLE detached from the task group and made best speed to Noumea.\footnote{Exhibit 145, Statement of CAPT Speeding, paragraph 23} The survivors spent one night onboard NEWCASTLE and were accommodated in the sick bay, in some Wardroom cabins and in stretchers in the hangar.\footnote{Exhibit 229, Statement of CAPT Johnston, paragraph 13} The treatment of the survivors in NEWCASTLE was warmly appreciated.\footnote{Exhibit 10, Statement of TPR C, paragraph 30; Exhibit 106, Statement of WO2 12, paragraph 49}
3.86 The survivors on stretchers were carried into waiting ambulances and those who could walk got into vehicles on the dock. CO NEWCASTLE met with the French military officials who had made the arrangements for the repatriation, and found them to have been “extremely supportive and discreet ... willing to do as much to help us as we were able to permit”. 121

3.87 From the dockyard, the transport drove to the airport to meet a RAAF C-130 Hercules medium transport aircraft.

3.88 TPR C noted a matter of concern to the Board with respect to media access to the survivors. He stated that as they were waiting to board the aircraft, they were in full view of around 50 media personnel. At one stage, the survivors were asked for their names, for what they believe to be for a passenger manifest. Upon questioning, it was discovered that the man asking for the names was one of the car drivers compiling a list for the media. TPR C also expressed concern that this footage was shown on Australian television in breach of ADF policy. 122

3.89 The Board recognises the limitations of what restrictions can be placed on media access in foreign jurisdictions. However, the Board is of the view that some arrangements should have been made to prevent effectively open access to the SASR personnel waiting to board the aircraft.

3.90 The C-130 arrived in Townsville at around 2300 on 30 November 2006. The survivors were then taken into an aircraft hangar where there was a welcoming party of “officers and other dignitaries” and “more Generals than to meet us than I have ever seen in my life”. 123 They were then transferred to hospital for the night. The second night, most of the SASR survivors were moved to a hotel, after which they were put in Economy class on a Virgin Blue Airways civilian commercial flight home to Perth via Brisbane. 124

3.91 There was general discontent expressed by the SASR about a particular aspects of the repatriation, namely why they were required to spend a few days in Townsville at all, when their families were all in Perth. 125 The Board acknowledges that WO2 12 and CPL 13 were domiciled in Townsville at that time, so it was appropriate to stop there. However, the Board questions whether the transport from Townsville to Perth was appropriate for the survivors, particularly TPR C with spinal injuries, and would recommend that repatriated persons be returned to their home unit location at the earliest possible time. WGCDR Down, the Deputy Director Aero Medical Evacuation (AME), at the Air Operations Centre has indicated that the repatriation of the survivors had only been arranged to Townsville as

121 Exhibit 229, Statement of CAPT Johnston, paragraph 15
122 Exhibit 10, Statement of TPR C, paragraphs 31 and 32. The ADF Policy is Chief of Army Directive 06/02, Public Release of Information Relating to Personnel Associated with Sensitive Capabilities
123 Exhibit 10, Statement of TPR C, paragraph 33; Exhibit 106, Statement of WO2 12, paragraph 49
124 Exhibit 237, Statement of CPL A, paragraph 31; Exhibit 154, Statement of TPR B, paragraph 26; Exhibit 9, Statement of TPR E, paragraph 24
125 Exhibit 154, Statement of TPR B, paragraph 26; Exhibit 10, Statement of TPR C, paragraph 36; Exhibit 9, Statement of TPR E, paragraph 24

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requested and that Army would make the necessary arrangements for the transfer of the Perth survivors. She indicated that had the AME been requested to Perth as had been offered, that more appropriate care would have been afforded to those suffering injury. 126

3.92 Furthermore WGCDR Down was critical of the lack of information that was available from the Task Group because they had strictly limited the communications between the ship and shore. She felt that this hindered preparations for the evacuation of the survivors. She states 127:

*The main concern was comms shutdown. This meant that best practice did not apply as I was not able to speak directly with the MO on HMAS NEWCASTLE to ask the pertinent questions prior to launching the mission. This process ensures that the AME team tasked with the mission can provide the best care because they:*

a. have the appropriate number of personnel plus the correct skill sets and,

b. have the appropriate amount and type of AME equipment.

There was confusion about the exact number of patients to be evacuated. The HQJOC J07 (GPCAPT Dines) said in her original telecon that she had been told 7 patients, so we started to pull together potential teams, including the provision of an enhanced AME team in the event intensive care was required. A subsequent call said it appeared that there may be only 2 patients. Information flow was slow and I had several phone conversations with the deployed J07 (LTCOL David Sweeney) who finally managed to get information from the ship about the patients. When we finally did get information, secondary e-mail came out which stated that only two of the patients were considered to be AME patients, when in fact all 7 of them were. To this day I am unsure who made this call and what expertise they had to make such a call. With conflicting evidence, we were highly suspicious that the integrity of the information was compromised. Hence we planned for worst case scenario. The MO of the AME team also was not able to make contact with the ship's MO before we launched the a/c and only, got a verbal hand-over via phone prior to loading patients on the a/c. The turn around time on the ground was only short due to crew duty restrictions plus patients arrived without med docs and when the AME MO tried to contact the ship's MO to ask where there were, she was unable to make contact. This meant that the AME team and DMF (Destination Medical Facility) (Lavarack Barracks Medical Centre) did not have access to additional clinical info that may have assisted in patient care.

126 Exhibit 296 Email WGCDR Down dated 21 Dec 2007
127 ibid
Findings

3.5 As to the survivors, overall the circumstances of their repatriation were adequate.

Recommendations

3(b) The Board recommends that should personnel require AME, that the evacuation processes continue until the evacuees reach their final destination to ensure appropriate care and comfort is provided.

3(c) As far as is practicable, ADF should ensure the privacy and identity of personnel in the position of this accidents' survivors be protected and preserved in foreign jurisdictions.

TROOPER PORTER – SEARCH AND RESCUE, RECOVERY, CAUSE OF DEATH, REPATRIATION

3.93 CAPT Spedding, DSC, OAM, RAN the commander of Task Group 636.1, comprising, HMA Ships KANIMBLA, NEWCASTLE and SUCCESS, had the responsibility of coordinating the Search and Rescue (SAR) effort to locate TPR Porter.\(^\text{128}\)

3.94 Immediately after the incident and the initial rescue operations were complete, an extensive search was commenced with all available assets attempting to find TPR Porter. A search plan was developed by KANIMBLA’s Navigator that was verified by the Navigation Officer in NEWCASTLE. This plan took into account known environmental conditions such as wind and current\(^\text{129}\). Additionally, AusSAR (the national search and Rescue Organization under the auspices of the Maritime Safety Authority) provided search information based on their environmental prediction model and with only minor discrepancies, it supported the plan being executed. Throughout the search effort, AusSAR continued to provide updated predictions\(^\text{130}\). A free floating dan buoy was deployed from KANIMBLA to facilitate tracking on radar systems and also provided accurate data on sea currents being experienced.\(^\text{131}\)

3.95 NEWCASTLE and SUCCESS were ordered to join the search at best speed. NEWCASTLE’s S70B Seahawk was launched and joined the search at 1825 relieving the last Black Hawk that had been conducting a visual search since the incident. As darkness set in, the S70B utilised the Forward Looking Infrared (FLIR) that enabled the search to be continued at night. That night the S70B flew 8.6 hours searching for TPR Porter. In addition

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\(^{128}\) Exhibit 145, Statement of CAPT Spedding, paragraphs 2 & 8
\(^{129}\) Exhibit 145, Statement of CAPT Spedding, paragraph 11
\(^{130}\) Exhibit 145, Statement of CAPT Spedding, paragraph 18
\(^{131}\) Exhibit 145, Statement of CAPT Spedding, paragraph 12
to the air asset, NEWCASTLE’s RHIBs were used until midnight investigating pieces of debris and a small oil slick.\(^{132}\)

3.96 The search for TPR Porter continued until 06 December 2006 having used all available assets including numerous sorties by RAAF AP3C Maritime Patrol Aircraft from 92 Wing based at Edinburgh, South Australia.

3.97 CAPT Speeding wrote in his statement:

"The assets involved in the SAR covered over 3400 square miles of ocean in an attempt to locate TPR Porter. Had TPR Porter escaped from the Black Hawk and been on the surface of the water, I have no doubt we would have found him."

3.98 CAPT Speeding is fully supported in his view by the Board.

**Finding:**

3.6 The search effort for TPR Porter by ADF assets was thorough and professionally conducted with a tremendous effort expended by many.

**Search for Black Hawk 221**

3.99 The Government in consultation with Defence determined that all efforts would be made to find, and if feasible, recover Black Hawk 221. It is assumed that the most pressing reason for doing so was to recover the remains of TPR Porter who it was thought likely to be trapped within the aircraft and especially so as the surface search failed.

3.100 At the time of the accident, KANIMBLA was in international waters in very deep water. The aircraft sank in approximately 2,500-3000m depth of water.

3.101 Black Hawk 221 is fitted with a flight data recorder (FDR) and fitted to that equipment is an Underwater Locator Beacon (ULB) that transmits an acoustic signal (37.5 KHz) to aid in underwater searches. The beacon has a life of approximately 30 days and is known as a ‘pinger’. A specialist receiver is necessary to detect the ‘pinger’.\(^{133}\)

3.102 The capability to locate and then localise the position of the ‘pinger’ does not exist in the ADF and the US Navy were requested, at cost, to assist in the search. Specialist

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\(^{132}\) Exhibit 145, Statement of CAPT Speeding, paragraph 16

\(^{133}\) [http://www.ntsb.gov/aviation/cvr_fdr.htm](http://www.ntsb.gov/aviation/cvr_fdr.htm)
equipment and personnel were flown to Australia and embarked in HMAS MELVILLE, a survey vessel based at Cairns.

3.103 MELVILLE with the USN supplied Towed Pinger Locator (TPL) and US TPL team of seven personnel embarked, arrived at the crash site 15 December 2006, day 17 of the 30 day ‘pinger’ life, and commenced survey operations to localise the FDR.

3.104 At 1000 15 December 2006, the MELVILLE gained detection of the FDR ‘pinger’ on the first pass over the position of the Black Hawk crash site. The next two days were spent localising the position of the FDR to within a 100 m radius circular error. Black Hawk 221 was determined to be at a depth of 2,600 m of water. Once the localisation was complete, MELVILLE went off task and proceeded in accordance with previous orders.

Recovery of Black Hawk 221 and Trooper Porter

3.105 CMDR Hawes was the Officer in Charge of the Black Hawk 221 Survey and Recovery Task which was appointed on 16 February 2007.134 Deep-water sweep equipment from the US Superintendent of Salvage and Diving was brought to Australia and embarked in MV SEAHORSE STANDARD.135 This equipment included a remote, unmanned vehicle called CURV III which can operate to a depth of 6,000 metres. The vehicle had five cameras, two manipulator arms and was able to be fitted with a basket.136

3.106 MV SEAHORSE STANDARD sailed from Sydney on 22 February 2007 and arrived on station 2 March 2007. The vehicle was launched within two hours of arrival and located the wreckage and TPR Porter after 29 hours search.137 The aircraft was found at a depth of 2,640 metres.138

Recovery of Trooper Porter

3.107 TPR Porter was found lying prone on the seabed immediately in front of the aircraft.139 There was a white RAAF ratchet strap running forward from the bottom of the port pilot door to the underside of his torso. This was not connecting him to the aircraft. His Black Hawk belt and helicopter restraint strop were attached to the floor of the aircraft and the belt buckle had been released. The CO₂ release toggle on his life preserving vest had been deployed with the CO₂ cylinder deployed. One side of his LPV had unfurled while the other

134 Exhibit 91, Statement of CMDR Hawes, paragraph 2
135 Evidence of CMDR Hawes T810.34-36
136 Evidence of CMDR Hawes T813.7-15
137 Evidence of CMDR Hawes T812.23-37; Exhibit 91, Statement of CMDR Hawes, paragraph 3
138 Evidence of CMDR Hawes T811.6-8 and T811.20-22
139 See Exhibit 52 Photograph – TPR Porter’s body adjacent to helicopter
remained in the stowed position. His Emergency Breathing Device had been deployed from its stowed position.\textsuperscript{140}

3.108 On 5 March 2007, the vehicle was launched again and recovered TPR Porter’s remains. They were in a very fragile state and CMDR Hawes estimated that 95\% of TPR Porter’s remains were placed in the basket. In the long transit to the surface some of the remains were unavoidably lost. TPR Porter’s remains were sealed in a bag and stowed in a temporary morgue in the ship. The embarked nursing officer estimated that 70\% of TPR Porter’s remains were ultimately recovered.\textsuperscript{141}

**Recovery of Black Hawk 221**

3.109 Black Hawk 221 lay on the sea floor inverted with the rotor head buried in the clay. In an ideal salvage of a helicopter, the recovery line is attached to the rotor head. This was not an option and utilising the CURV the recovery line was passed through the main cargo doors.\textsuperscript{142} CMDR Hawes in his statement describes the events that followed\textsuperscript{143}:

*Three attempts were made to recover the aircraft to the deck. The recovery strop sliced through the floor without dislodging the wreckage from the seabed on the first attempt. On the second (attempt) the wreckage was raised to the surface and broke up as it cleared the sea surface......the wreckage appeared to break its back and disintegrate, returning to the seabed.*

*The third attempt was successful. The wreckage was again inverted, but the broken back allowed approximately six inches of rotor head to be exposed. Two slings were placed through and around the rotor head, with the intention being to right the wreckage on taking the weight. An assessment was made that righting the aircraft would lead to the separation of the cockpit section. This was considered acceptable in the circumstances. As it eventuated 5.5 tonnes load was maintained through to a depth of 900 feet at which time the load reduced to 5.0 tonnes. This is assumed to be the point at which the cockpit broke away and returned to the seabed. The wreckage was recovered to the deck.*

*The cockpit was located flat level and upright....a second and successful effort was then made to extract the cockpit voice recorder (CVR).....the CRV was seen to jolt free from the stowed position at the 800 foot mark and return to the seabed. Despite the best efforts of the Salvor and ship’s staff over the next 16 hours the CRV remained unlocated. STANDARD proceeded off task at 2359 Friday 09 March 2007 and commenced passage to Noumea.*

\textsuperscript{140} Exhibit 91, Statement of CMDR Hawes, paragraph 6i; Evidence of CMDR Hawes T813.19-20; Exhibit 46, AEESO Aeronautical Life Support Equipment, paragraph 7.6.5; Mr Vitasz T497.12, T502.49

\textsuperscript{141} Exhibit 91, Statement of CMDR Hawes, paragraphs 6e, 6h and 6j

\textsuperscript{142} CMDR Hawes T814-4

\textsuperscript{143} Exhibit 91, Statement of CMDR Hawes paragraph 7-9

51
3.110 With the main part of the Black Hawk fuselage recovered, it allowed access to the Flight Data Recorder which in due course provided excellent post flight and accident analysis. Unfortunately, the Cockpit Voice Recorder having been lost in the recovery was not available for analysis.

3.111 The search for and recovery of Black Hawk 221 was quite a feat and the video of the robotic arm removing the CVR from the cockpit section was a vivid demonstration and example of the amazing use of technology and capability of the salvage system. It is unfortunate that during the recovery that the aircraft broke up when it breached the sea surface which ultimately affected the recovery of the CVR. With the benefit of hindsight and admittedly not having expertise in these matters, the Board suggests that it would seem logical that when the aircraft was near the surface (and before the weight rapidly increases when it transitions from the water), additional securing lines, or a cargo net, could have been attached to the aircraft. There may well be a plausible explanation why this did not occur. The Board is not aware of any.

Cause of Death – Trooper Porter

3.112 The post-mortem report prepared by Dr Duflou, Chief Forensic Pathologist, Department of Forensic Medicine NSW Health identified the following peri mortem injuries on the skeletal and incomplete remains (a) transverse fracture of the mid shaft of the right radius; (b) a partial fracture of the medial aspect of the right lower rib, possibly the 10th or 11th rib, laterally; (c) a fracture of the posterior process of the left talus of the ankle; in his statement TPR C stated “As we descended I looked right at TPR Porter. His legs were hanging over the port side landing gear and I did not want them to get caught if we hit. I was going to maybe warn him to pull his legs up, however we impacted onto the deck before I had a chance.” (d) a superficial undisplaced fracture of the right anterior superior iliac spine of the pelvis.

3.113 Dr Duflou gave the opinion that the direct cause of death on 29 November 2006 was: (a) combined effects of multiple injuries and drowning.

3.114 TPR Porter probably suffered a number of impact and flail injuries in the course of the aircraft’s crash sequence starting with the impact of it onto the deck of KANIMBLA. That impact was followed by the violent rotation as evidenced in Exhibit 1 with an apparent considerable clockwise centrifugal force and culminating with the injuries set out above.

144 Exhibit 1
145 A Board member described this as “Trout fishing 101”.
146 Exhibit 10, Statement of TPR C, paragraph 12
147 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 253
148 Exhibit 40, Medical Report SQNLDR Pascoe together with letter 7 June 2007, page 251
149 See also SQNLDR Pascoe T438

52
3.115 SQNLDR Pascoe came to the view that three of the four injuries being on the right side were consistent with injuries being suffered on that side by TPR Porter coming into hard contact with the left hand loadmaster’s seat and other structures to the right of his body during the crash sequence.\(^{150}\) The left hand loadmaster, CPL 13, said that he recalled TPR Porter being pushed or thrown into him at some stage.\(^{151}\) Whether or not other injuries were sustained can only be a matter of conjecture especially in relation to soft tissue injuries, given the state of TPR Porter’s remains at the time of recovery.

3.116 The injuries referred to above were not in themselves life threatening and were of the kind that could reasonably have been anticipated in the ordinary course to have led to a complete recovery.\(^{152}\) SQNLDR Pascoe agreed that TPR Porter having survived the initial impact died as a result of not being able to “potentially” get out of the aircraft quickly enough.\(^{153}\)

3.117 There is evidence pointing to TPR Porter having taken a number of conscious steps to try to escape the sinking aircraft, including having deployed his CO2 release toggle on his life vest, removing the EBA from its normal stowed position and releasing his safety belt buckle allowing his body, at some stage, to egress from the sunken aircraft.\(^{154}\)

**Repatriation of Remains – Trooper Porter**

3.118 CMDR Hawes related that on the return of MV SEAHORSE STANDARD to Noumea, the remains of TPR Porter were handed over for conveyance to Australia with proper ceremony and dignity.\(^{155}\) The Board has no other evidence relating to the repatriation of the remains of TPR Porter to Sydney (where the autopsy was carried out). The Board however is satisfied that TPR Porter was accorded all due respect and dignity.

**Findings**

3.7 TPR Porter’s injuries are likely to have hindered him in his efforts to escape the sinking aircraft.

3.8 TPR Porter’s cause of death was drowning.

3.9 TPR Porter’s remains were treated with due dignity and respect.

150 SQNLDR Pascoe T439
151 Exhibit 108, Statement of CPL 13, paragraph 20
152 SQNLDR Pascoe T446.29-42
153 SQNLDR Pascoe T420.39
154 Exhibit 91, Report of CMDR Hawes, paragraph (i); SQNLDR Pascoe T419.32
155 CMDR Hawes T817.39
SECTION 4

HELECOPTER DYNAMICS AND THE SPECIAL OPERATIONS APPROACH AND ASSAULTS

4.1 An analysis of aircraft performance and handling during the conduct of an SO assault approach is central to understanding Black Hawk 221's behaviour during its final approach path. Main Rotor Droop and Vortex Ring are two different helicopter phenomena that are particularly relevant to this analysis. To better understand this analysis and that of the SO assault approach in general, a basic exposition of these complex phenomena is therefore necessary. This Section of the Report explains each by way of groundwork for the detailed discussion and evaluation of the SO assault approach itself.

MAIN ROTOR DROOP

Introduction

4.2 In common with many other helicopters, the S-70A-9 Black Hawk helicopter is susceptible to main rotor droop\(^1\). Main rotor droop is a change in main rotor RPM (RPMR) following a collective pitch change. It can be positive or negative depending on whether the RPMR increases or decreases and is largely dependent on the engine and rotor governing characteristics peculiar to each type of helicopter. Main rotor droop can be either a steady state variation in RPMR following a collective pitch and power change, known as static droop, or it will be temporary in nature, known as transient droop, whereby the engine and rotor governing system is temporarily unable to keep up with the aerodynamics loads placed on the rotor system. The Black Hawk helicopter typically exhibits little or no static droop however it is susceptible to significant transient droop. For the purposes of this Report, the discussion of main rotor droop will be centred on droop of a transient nature whereby the engine and rotor system is temporarily unable to control the RPMR during large changes in aerodynamic loads experienced during a dynamic helicopter manoeuvre.

4.3 The AAIT report described main rotor droop:

"Main rotor droop is referred to as a reduction in main rotor revolutions per minute (RPMR) below that which the manufacturer has designated as the optimum for that particular helicopter and flight condition. Rotor droop occurs when the aerodynamic loads on the rotor system are exceeded. The droop can be transient, where short term demands on the rotor system are momentarily exceeded or it can be static, where the

\(^1\) LTCOL McCall T1727.36 and T1745.16; BRIG Bartels T1821.25
engine(s) do not have sufficient power to meet the long term demand of the rotor system.\textsuperscript{2}

Discussion

4.4 At the commencement of a flight the pilot sets the rotor speed to 100-101%\textsuperscript{3} and the two engines will then automatically provide sufficient power to maintain main rotor rpm (RPMR) at that level. In the event that the rotor speed commences to fall below 100% (for example by a rapid increase of collective and a consequent increase in drag\textsuperscript{4}) the engines need to respond by providing sufficient power to the rotors in order to maintain RPMR at 100%. If the engines cannot provide the power in a timely fashion\textsuperscript{5} then droop will occur from the 100% setting.

4.5 The operating range of RPMR for the Black Hawk is set out diagrammatically in Section 5 page 5-2 of the Black Hawk Flight Manual\textsuperscript{6}. The continuous operating range for the aircraft is between 91–105%. Transient droop is said to occur at 105–126% with 126% being the maximum rotor speed. The diagram indicates a “green area” between 95–100%, two “yellow areas” between 90–95% and 100–110% and two “red areas” below 90% and above 110%.

4.6 Any decrease from the 100% setting technically amounts to main rotor droop. The Black Hawk Flight Manual states the continual operating range of the engine at between 91-105%\textsuperscript{7}. While some witnesses\textsuperscript{8} referred to main rotor droop as including any deviation from the 100%, other witnesses considered that while the optimum flying level was always 100% episodes of main rotor droop should be considered as having occurred only when the warning horn is activated at 95\%\textsuperscript{9}.

4.7 While at 95% the aircraft is still within the manufacturer’s range for continuous operation. The degradation of rotor speed can be rapid and the horn, along with the change of colour of display in the cockpit, is designed to advise the pilot that there is a potential problem and that the pilot ought to act before further degradation places the aircraft out of its flight envelope. Below 95% is “...a very uncomfortable place to be”.\textsuperscript{10}

\textsuperscript{2} Exhibit 5 AAIT Report – paragraph 116
\textsuperscript{3} CAPT 6 T1368.8; LTCOL McCall T1755.5
\textsuperscript{4} CAPT 7 T899.7
\textsuperscript{5} CAPT 8 T881.33
\textsuperscript{6} Exhibits 93 (also part of Exhibit 213)
\textsuperscript{7} Exhibit 93 (also contained as part of Exhibit 213)
\textsuperscript{8} e.g. CAPT 6 T1367.32; LTCOL McCall T1755.27
\textsuperscript{9} CAPT 8 T832.14; MAJ 4 T1300.39; CAPT 10 T1394.21; CW5 King T2028.41 and T2054.30
\textsuperscript{10} BRIG Bartels T1793.39, T1793.28 and T1795.21, LTCOL McCall T1725.34 and T1750.11; SQNLDR Morris T1896.1.
Historical Appreciation of Main Rotor Droop

4.8 The potential for main rotor droop was appreciated at the time of acceptance of the Black Hawk Fleet by the ADF. In October 1990, the Royal Australian Air Force’s Aircraft Research and Development Unit (ARDU) was tasked to address this problem. ARDU assessed a number of situations in which the main rotor was prone to droop; evaluated the aircraft’s performance with and without a modified Hydromechanical Unit (HMU) and presented a formal report\(^{11}\).

4.9 SQNLDR Morris was a test pilot with ARDU involved in the flight trials and evaluation. His evidence was that if an aircraft suffered main rotor droop below 91% then the aircraft should be deemed unserviceable and not flown again until the aircraft has been the subject of mechanical examination\(^{12}\).

4.10 During the trials, test pilots attempted to cause main rotor droop by the rapid application of collective. This testing was conducted at an altitude sufficient to allow recovery once droop had occurred; it was performed in a gradual fashion commencing with the application of collective over six seconds down to the application over two seconds. It was observed that with rapid application of the collective over a two second period significant main rotor droop occurred. At one stage droop was down to 88% at which time the aircraft lost its generators with significant loss of electrical power to many of the operating systems\(^{13}\).

Fitting a Modified Hydromechanical Unit

4.11 As a consequence of the report a modified HMU\(^{14}\) was fitted to all ADF aircraft. This unit was the most advanced available solution at the time. Despite the improvement with the fitting of the HMU the problem remained albeit to a lesser degree. The conclusions of the ARDU report indicated that\(^{15}\):

> "5.1.1 Within the limited scope of this qualitative evaluation, the modified HMU failed to reduce the transient rotor RPM droop sufficiently to satisfy the operational requirements of the Army. During tactical approach and autorotational descent profiles, the effects of the modified HMUs were insufficient to prevent the NR from drooping below 95% NR. Below the 95% NR point the loss of rotor performance and the activation of the LOW NR warnings posed a flight safety hazard. Therefore, the modified HMU was unsatisfactory as a stand alone solution for transient droop reduction. However, throughout the role related transient droop testing, a general trend of droop improvement with the modified HMUs fitted was noted. It was also noted that engine and rotor acceleration following any droop was faster than with

\(^{11}\) Exhibit 273  
\(^{12}\) T 1895.18  
\(^{13}\) T 1896.16  
\(^{14}\) For a description of the function of the HMU see Exhibit 213 page 1-2-4  
\(^{15}\) Exhibit 273 pages 10-11
standard HMUs. This general improvement indicated that the HMU was producing the desired results, but only after the rotor had drooped to an unsatisfactory level. Given that it is impractical to totally eliminate transient rotor droop, the aim should be to reduce the droop to the minimum technically and practically possible. This could possibly be achieved by a combination of droop anticipation, using electrical inputs of rotor speed and collective position and rate to the Electronic Control Unit (ECU) combined with the increased engine acceleration provided by the modified HMU."

4.12 In the October 1990 ARDU Report summary stated\textsuperscript{16}:

"Even though it may not be possible to achieve a zero droop solution, further investigation into the methods of droop reduction required to achieve the minimum technically and practically possible level is recommended. A possible solution could be the use of digital inputs of collective position and application rate and rotor RPM in the Electronic Control Unit (ECU) in addition to the increased acceleration schedule HMU.

In conclusion, the modified HMU failed to reduce transient rotor droop to a satisfactory level and should not be considered as a final solution. However, as the modified HMU produced some droop improvement it should be fitted as soon as possible as an interim modification and as the basis of a more effective transient droop improvement solution."

Flight Manual Amendments to Avoid Main Rotor Droop

4.13 Although the modified HMU rendered some improvement in engine and rotor governing characteristics, it failed to eliminate main rotor droop and in its existing configuration, the Australian Black Hawk could not be fitted with DECU. Instead, amendments to the Flight Manual highlighting the issue and changing to aircraft handling techniques were recommended. This was to increase awareness of the issue and to detail handling requirements necessary to avoid circumstances that may lead to main rotor droop. SQNLDR Morris indicated that ARDU "recommended a two-stage collective application to ensure that the engine had caught up with the rotor before requiring a more rapid application of main rotor"\textsuperscript{17}. In the Black Hawk Flight Manual, rotor droop is referred to as part of the "manoeuvring flight characteristics" of the aircraft\textsuperscript{18}. A warning is there set out as follows:

\begin{center}
\textbf{WARNING}
\end{center}

"Rapid application of collective from very low power settings, especially if the rotor and Ng have split, may result in transient rotor rpm droop to 90% RPMR and below.

\textsuperscript{16} Exhibit 273
\textsuperscript{17} SQNLDR Morris T1888.40; and ARDU Report Exhibit 273
\textsuperscript{18} Exhibit 213 Section 6 pages 6-1 and 6-2
This transient rotor droop will result in increased coning angles and decreased control response. Apply collective judiciously until RPMR and Ng indications are joined."

4.14 Further the Flight Manual directs (in accordance with the 1990 ARDU report\(^\text{19}\)):

"To minimise transient rotor droop, avoid situations which result in rapid rotor loading from low Ng and torque conditions. Initiate manoeuvres with collective inputs leading or simultaneous to cyclic inputs. During approach and landing, maintain at least 15 to 20% TRQ and transient droop will be minimal as hover power is applied."\(^\text{20}\)

**Finding:**

4.1 The S-70A-9 Black Hawk helicopter, fitted with T700-GE-701A-1 engines, is susceptible to significant main rotor droop if mishandled by the pilot. Whilst an unsatisfactory characteristic, main rotor droop can be avoided if Flight Manual limitations and recommendations are adhered to.

**Incidences of, and Attitude toward, Main Rotor Droop at 171 Avn Sqn**

4.15 All pilots indicated that their training was to avoid main rotor droop wherever possible and that to experience main rotor droop was indicative of a mishandled approach\(^\text{21}\). The evidence suggests that while pilots say they fly to avoid main rotor droop it still occurs even with the best pilots flying to the best of their ability\(^\text{22}\).

4.16 All the pilots giving evidence stated that they had been involved in an incident of main rotor droop either as the flying or non-flying pilot\(^\text{23}\). While most reported incidents involved the termination phase of the Special Operations (SO) assault approach they also occurred in aircraft other than Black Hawk\(^\text{24}\) and in air mobile ("green role") quickstop approaches\(^\text{25}\).

4.17 The general attitude expressed to the Board by 171 Avn Sqn aircrew was that while main rotor droop was discouraged at all levels there was a level of acceptance of this

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\(^\text{19}\) SQNLDR Morris T1945.31
\(^\text{20}\) Exhibit 213 Section 6 pages 6-1 and 6-2
\(^\text{21}\) e.g. Exhibit 92 paragraph 24 CAPT 8 statement; CAPT 8 T826.42; CAPT 7 T898.5; MAJ 5 T998.12; WO2 T1059.1; CAPT 9 T1081.25; MAJ 2 Exhibit 110 paragraph 23, T1123.41; LTCOL 1 T1431.7; LTCOL McCall T1761.13
\(^\text{22}\) MAJ 5 T998.12
\(^\text{23}\) e.g. CAPT 8 – less than five times and never "in the red" T859.1 and T829.14; CAPT 7 – five or six times while at 171 T895.42; MAJ 5 – can only recall one back in 1997 or 1998 T1027.1; CAPT 9 – six times in career; three or four of those in Black Hawks – never lower than 92% T1076.6 and T1076.45; MAJ 4 – a number of occasions but never below 90% T1321.19; CAPT 6 –"rarely" Exhibit 132 paragraph 36, two to three times a year but not with horn sounding T137.32; CAPT 10 – four occasions since 2004 T1393.23 and T1394.45
\(^\text{24}\) e.g. CAPT 9 T1076.6
\(^\text{25}\) e.g. CAPT 10 – all of his four main rotor droops were in green role quickstops T1401.10
phenomenon as an unfortunate characteristic of the Black Hawk.\textsuperscript{26} The Board considers that this acceptance of main rotor droop, particularly when coupled with a general failure to report episodes of droop,\textsuperscript{27} is an example of ‘normalised deviance’ as discussed in Section 7 of this report.

Finding:

4.2 The general attitude of 171 Avn Sqn aircrew toward main rotor droop was that of an acceptance of it solely as a characteristic of the Black Hawk rather than a result of poor airmanship or of mishandling the aircraft.

VORTEX RING

4.18 Immediately prior to impact, Black Hawk 221 was descending at 1800 fpm\textsuperscript{28}, with an effective airspeed of less than 5 knots and with significant power applied. These conditions are within those described in the Flight Manual to be “most favourable” for developing Vortex Ring\textsuperscript{29}. As such, vortex ring is the second helicopter aerodynamic phenomenon appropriate to the accident that warrants explanation. According to SQNLDR Morris:

“Vortex ring is a condition where, in layman’s terms, the helicopter descends vertically at a speed that exceeds the amount of its own downwash, and I’ll attempt to illustrate that, if I can. If you imagine again just two of the rotor blades in cross-section there, the arrows I’ve tried to illustrate there indicate the amount of downwash generated by the rotor blade. The downwash is low near the rotor hub, because the rotational speed of the blade is low and it is a fixed blade; there is no twist or taper on the blade, so the area on the inboard section of the blade has low downwash.”\textsuperscript{30}

“The downwash created by the blade, the amount of air blown downwards by the blade as it passes through the air, increases as you go out the span of the blade. Towards the tip, the Black Hawk has a slightly swept rotor tip, so this tries to taper off the downwash

\textsuperscript{26} e.g. CAPT 8 Exhibit 92 paragraph 26, T826.19 and T874.37; CAPT 7 T944.13; WO2 12 T1059.10; LTCOL1 T1432.4

\textsuperscript{27} See Section 10 “Incident Management and Reporting within 171 Avn Sqn”

\textsuperscript{28} T Truong T1613.43 “I calculated it, and I think that at impact it was 1800 feet per minute; that was the rate of descent.” As determined from Photogrammetry the rate of descent was calculated as approx 1300 fpm whereas the rate of descent as derived from the rate of change of the FDR radar altimeter height over the last three seconds was 1800 fpm. The latter method was considered as producing the more accurate result due to the errors associated with the quality of the “camera orientation model” (Ex 151 “DSTO Accident Investigation Report” Paragraph 2.6).

\textsuperscript{29} Exhibit 101 and Exhibit 213 Chapter 6 page 6-2

\textsuperscript{30} SQNLDR Morris T1918.15
as it approaches the tip of the rotor blade."  

"If you imagine that same picture with the aircraft descending vertically, when the rate of descent equals or approximately equals the amount of that downwash, you start to get a bit of reverse flow up through the rotor blade. That reverse flow, if the rate of descent continues, ends up creating a vortex."  

"The two vortexes I've drawn there [Figure 4.1] - the outermost one is present in all hovering flight; it's a donut-shaped vortex that surrounds the rotor tip of the helicopter as it hovers, and that's the tip vortex. The vortex that you see developing in vortex ring state is where the aircraft descends and the inner vortex occurs, where it becomes a very high-energy circulation of air in the inner section of the rotor blade. That vortex develops and ends up reducing the amount of lift out of the rotor system as a whole."

"When vortex ring develops, all the studies suggest that a few things happen. One is you get significant blade flapping and it is aperiodic, which means that it doesn't happen at a particular point in the rotational path of the blade; it happens anywhere around the disk as the vortex builds and sheds. By "blade flapping", I mean the blade is moving in the vertical plane, either moving up or moving down. Some sections of the blade, you will get blade twisting and flexing, and you will get significant aircraft vibrations and significant aircraft motions, and also a reduced lift out of the rotor system itself."

"When vortex ring develops, the only way to recover is to lower the collective, so reduce the amount of induced flow or the amount of downwash you are generating. If you get rid of the downwash, you can get rid of the vortex ring, but that requires you to effectively enter what's called autorotation. You end up descending even faster. The other way is to get out of the hover, so increase your forward air speed. ...And the Black Hawk flight manual suggests a number of zones where vortex ring is likely and vortex ring is possible."  

Figure 4.1: Exhibit 177, Diagram of Vortex Ring by SQNLDR Morris

31 SQNLDR Morris T1918.27  
32 SQNLDR Morris T1918.34  
33 SQNLDR Morris T1918.41  
34 SQNLDR Morris T1919.4  
35 SQNLDR Morris T1919.16  
36 SQNLDR Morris T1919.27
4.19 The Black Hawk Flight Manual states:

"Vortex ring state describes an aerodynamic condition where a helicopter may be in a vertical or near vertical descent with power applied and little or no cyclic authority. Vortex Ring is possible at descent rates above 700 FPM and airspeeds from 0 to 20 KIAS and is likely at descent rates of about 1 500 FPM and airspeeds of 5 to 10 KIAS. Vortex Ring may also be encountered during any dynamic manoeuvre which places the main rotor in a condition of high upflow and low longitudinal airspeed." 

4.20 SQNLDR Morris went on to state:

"I must say, though, that both of those speeds, that guidance is given based on 100 per cent rotor RPM. As the rotor RPM decays, the amount of downwash you create also reduces, so your susceptibility to vortex ring increases...Certainly, the rotor droop to 80 per cent would make the helicopter more susceptible and would decrease those rates of descent required before the aircraft was likely or possibly going to encounter vortex ring at the reduced rotor RPM."

Findings

4.3 The descent was effectively near vertical in relation to the air mass in which Black Hawk 221 was operating, taking into account the apparent forward motion in relation to the ship as recorded by KANIMBLA's aft deck camera.

4.4 It is likely that at some point early in the descent possibly as early as the flare termination point, Black Hawk 221 entered a Vortex Ring state, thereby ending any chance of recovery.

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37 Exhibit 101 and Exhibit 213 Chapter 6 page 6-2
38 SQNLDR Morris T1919.42
39 SQNLDR Morris T1920.3
THE SPECIAL OPERATIONS ASSAULT

Introduction

4.21 As CAPT Bingley was conducting an SO assault approach at the time of the accident, this approach profile must be analysed in detail. The SO assault approach had its genesis as a standard helicopter quickstop manoeuvre. The SO assault approach as flown on the 29 November 2006 was a profile that was accepted by observers and crew as being normal up until the helicopter commenced a rapid descent and crashed into KANIMBLA’s deck. Upon analysis, that approach profile bore little resemblance to its origins, nor was it as described in doctrine. This part of the report chronicles the general development of the SO assault approach as it was presented in evidence before the Board. The SO assault approach as described to the Board is then analysed with respect to its conformance with extant doctrine, manuals and training curriculum.

4.22 The evidence before the Board revealed that all episodes of the main rotor droop came about during termination of an approach. When asked about his five episodes of main rotor droop CAPT 10 stated:

“Each situation was in the terminal phase of the approach, and by the terminal phase I mean in the final stages of the approach, we convert from actually flying to going through translational lift, or when you have no more wind effects on the rotor, to actually landing or roping or terminating to the hover.”

4.23 As most of the main rotor droop episodes occurred in the terminal phase of the SO assault, the Board considered that a more detailed analysis of the SO assault approach was warranted. Due to complexities and inter-relationship of issues associated with the analysis of the quickstop and the SO assault approach, all findings and recommendations relevant to the discussion are placed at the end of the Section.

Background

4.24 The rationale for the SO air assault is described within 5 Avn Regt 400 Series Standard Operating Procedures (SOPs). The basic planning philosophy is to ensure that the approach and termination can be conducted with maximum surprise whilst minimising risk to the aircraft and occupants. Among the subordinate philosophies underpinning the planning of an SO assault, two are particularly relevant: first and secondly

The overshoot plan is designed to ensure that all aircraft

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40 CAPT 10 T1395.5  
41 Exhibit 205 SOP 401.20
have the mutual space to overshoot if necessary without interference. The SOPs do not specify overshoot criteria. The air assault is used to position the aircraft for a number of SO activities.

4.25 The SO course of instruction (COI) lecture notes describe the SO assault as a multi-angle, non linear decelerative quickstop to the nominated landing point (LP) with the aim of positioning for an insertion. According to the lecture notes and echoing the requirements of the SOPs, the SO assault is to be conducted as fast as possible. The approach is recognized as being high workload and “crew co-ord intensive”. The SO assault uses a combination of the quickstop manoeuvre as referred to on the Black Hawk Standardisation Manual with parameters defined in the lecture notes. It is to be as fast as possible but “FIRST STRIKE”. It involves high workload and is “crew co-ord intensive”. FIRST STRIKE is said to mean that “...troops are delivered first go... the idea is to keep the aircraft under control and deliver the troops as smoothly and accurately as possible”.

4.26 There was confusion in some witnesses’ minds as to the differences between an SO assault approach and the quickstop. This would, in the minds of those witnesses, presumably raise doubts as to the applicability of the STANMAN’s quickstop wind limitations and other specific requirements when applied to the SO assault approach. CAPT 10, when asked whether the manoeuvre to be performed for the roping serial was a quickstop, replied; “No. It was a special operations assault.” CAPT 11 was adamant that “a quickstop is a different procedure”. MAJ 2, a more experienced Black Hawk pilot, reaffirmed that the SO approach was “still based on the fundamental quickstop” MAJ 4 was more specific:

“The SO approach profile is based on the quickstop. The difference being that the SO profile has the majority the deceleration done in approximate last thirds one quarter the approach and the SO profile is a precision approach(ing) [in] close proximity to obstacles.”

4.27 The quickstop manoeuvre will first be discussed and analysed in order to establish the baseline on which the SO air assault has been developed.

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43 Exhibit 205 SOP 401.20g. See also Section 2 for Boards finding in connection with Vortex Ring

40 Exhibit 102 SO lectures p.7
47 Exhibit 214 Chapter 15
48 Exhibit 102 SO lectures.
49 First Strike is discussed in more detail in paragraph 4.64 and following below.
50 Ibid p.7
51 MAJ 2 T1163.42 - .47
52 CAPT 11 T1248.9
53 MAJ 2 T1129.40
54 MAJ 4 T1316.47
The Helicopter Quickstop

4.28 The Standardisation Manual describes the quickstop as the primary deceleration technique used in terrain flight manoeuvring declaring it to be "the basis of all decelerative manoeuvres and may be employed in any combination to achieve the desired outcomes". The Manual refers to the quickstop procedure as having "...no strictly defined entry and exit parameters, nor change of direction, it is adapted to meet the situation at hand." For the purposes of standardisation, the quickstop is taught in three forms; into wind, turn and flare, and flare and turn. It further specifies that the turn and flare and the flare and turn quickstops are initiated out of wind and terminated into wind. For all three profiles taught, the standardisation manual specifies that "As the aircraft decelerates towards the ETL [effective translational lift] power must be applied to terminate the manoeuvre." "If you are slower than effective translational lift, the rotor is subject to its own downwash and the power requirements increase."

4.29 LTCOL McCall, a co-author of the Standardisation Manual, described the quickstop as taught to an ab initio Black Hawk pilot at AAvnTC as being a "fairly controlled manoeuvre where the lift vector or thrust vector is after the vertical to slow the aircraft. Power is introduced early to bring the aircraft as it goes through translational lift, and generally you want to be back into wind by the time you're getting close to or passing through translational lift, generally with a nose up attitude, with power coming up to stabilise the aircraft to continue whatever manoeuvre you are looking at, which is the intercept of the standard approach or back into terrain flight mode."

Analysis of the Quickstop

4.30 LTCOL McCall agreed that the standard quickstop is taught such that the helicopter will intercept a standard final approach profile at some point along the final approach path. He further added that the quickstop could also be terminated into another flight profile depending on the exit parameters selected for that deceleration. "But, as I said, is generally into wind. In fact, it must be or should be into wind." When asked, in reference to a turning quickstop, whether it would be normal to go directly from a peak of well developed flare to the hover, he stated:

"You can go to the hover. And if you're going to the hover, again, its a balanced turning manoeuvre and you want to be back into wind by the time you're passing through translational lift, because as you pass through translational lift your power

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55 Exhibit 214
56 Exhibit 214 chapter 15 paragraph 38, also replicated in Exhibit 100
57 Exhibit 214 chapter 15 paragraphs 34, 35 and 36
58 SQNLDR Morris T1912.2
59 LTCOL McCall T1729.27
60 LTCOL McCall T1762.33
61 LTCOL McCall T1763.10

65
requirements are increased significantly."

4.31 SQNLDR Morris asserted that the quickstop’s flare should be executed and terminated before the loss of effective translational lift:

"So normally a flare and turn quickstop, the final turning manoeuvre is conducted above 25 knots and you roll out, terminate pointing at the target and stabilise at the hover." 63

The SO Air Assault as Described in Evidence

4.32 Conventional air mobile operations (AMO) are conducted in support of conventional ground and combined forces. AMO used to exploit the manoeuvre advantage of the helicopter by being able to deploy forces quickly and across difficult terrain. Conventional AMO is not normally conducted to landing zones that are heavily defended as that is the realm of assault by SF. Conventional AMO are described in detail in 5 Avn Regt 300 series SOPs. 64

4.33

The conventional AMO typically flown using standard approach profiles 66 whereas the SO air assault employs an approach technique based on the quickstop. 67

4.34 The SO air assault profile was "formalised" after the 1996 Black Hawk midair collision. 69

"There were no parameters defining the assault profile and approaches were often flown at speeds in excess of 160 knots indicated air speed (KIAS)." 70

4.35 According to LTCOL 15, the formalisation process involved flying multiple approaches, at sea level, with nil wind, standard all up weight to achieve an optimum profile.

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62 LTCOL McCall T1763.19
63 SQNLDR Morris T1912.6
64 Exhibit 205
65 Exhibit 205 SOP 401.19
66 Exhibit 205 SOP 311 passim
67 MAJ 4 T1316.47
68 LTCOL 1 T1536.43
69 Exhibit 248 Statement of LTCOL 15 paragraph 4
70 Exhibit 248 Statement of LTCOL 15 paragraph 3
Speed was reduced to 100 KIAS for accuracy and safety because “...the terminations required high levels of pilot skill and left little margin for error” and provided “...more time for crews to identify their target... and provided a safety buffer for termination”.71

Detailed Description of SO Assault

4.36 The SO air assault approach is broken into four phases as shown in Figure 4.2. These are the approach, termination, insertion and departure phases:

Approach. The approach phase commences at the IP (Initial Point); the pre-nominated and usually readily recognizable point used to identify the commencement of the approach. This segment is usually flown at 80 to 100 KIAS and at a normal height of no lower than 100 feet above obstacles.72

![FLARE POINT](image)

![COMFORT ZONE](image)

![NO STAB ZONE](image)

![TGT](image)

**Figure 4.2:** SO Air Assault Termination Phase

Termination. The termination phase “commences at the flare point and is a multi angle non-linear decelerative quickstop to the nominated LP. It is conducted as fast as possible and, if fast-roping, the aircraft will need to be as low as possible for the insertion, however should not be less than about 15 ft. The flare is sedate initially, and developed more aggressively at the end. 80% of the aircraft energy is lost in the last 20% of the approach.”73 The termination phase is shown diagrammatically in Figure 4.2.

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71 Exhibit 248 Statement of LTCOL 15 paragraph 4
72 Exhibit 205 SOP 401.22
73 Exhibit 5 paragraph 101 and Exhibit 210 passim
**Insertion and Departure.** The insertion and departure phases are described as being the action of air landing, fast roping, rappelling, or dismounting from the hover and the subsequent departure from the objective.  

4.37 The flare point, marking the commencement of the termination phase, is nominally 800 meters from the objective and at a speed of 100 knots. The flare point is further governed by the "Standard Flare Point Formula" to account for factors such as aircraft weight, wind and target orientation. For each 10 knots of tailwind or headwind component, 100 m is either added or subtracted. A further 100 m is added for every 100 feet descent onto the target and 100 m is subtracted for each 100 ft of climb to the target. An extra 100 m is added for every 1000 pound gross weight above 18,000 pound and a further 100 m is added for every 1000 feet of pressure altitude above mean sea level. The final check is at 300 m to run where ground speed shall be no greater than 80 knots.  

4.38 The lecture notes describe the "comfort zone" at the end of the flare as "1/4 of the deceleration in the termination is conducted in the last 1/4 of the distance. As you approach the last 1/4 of the distance to run you enter the "comfort zone". As you approach the comfort zone you must be at a height and groundspeed combination that you can guarantee successful termination over the LP." LTCOL 1 added further clarification stating that:

"The application of comfort zone is principally to energy management and obstacle clearance. The expectation is that a pilot will fly the approach in a manner in which he is consistently reviewing his rate of closure, rate of descent, as supported by his crew, and ensuring that he maintains appropriate clearance from other aircraft and obstacles during the conduct of that approach to terminate at the point which he is briefed prior to the commencement of that approach."

4.39 The "No Stab Zone" as shown in Figure 4.2 "is an allowance of height under the aircraft, or between the aircraft and any obstacles to allow you to increase the nose-up attitude to account for any unforeseen difficulties to slow the aircraft down. So if you want to approach or change your approach point to something sooner, you need to decelerate the aircraft quicker and you need to increase the nose-up attitude. In order to do that, you need to make sure that the stab, or the stabilator, the aft end of the aircraft, is not going to strike anything underneath you, so it's typically a 40 to 50 feet buffer margin."

**Energy Management in the SO Assault Approach**

4.40 In response to a question as to why changes were required to the SO assault

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74 Exhibit 5 paragraph 101 and Exhibit 210 passim  
75 Exhibit 124 Statement of MAJ 4 paragraph 18  
76 Exhibit 5 paragraph 101 and Exhibit 210 passim  
77 LTCOL 1 T1442.36  
78 MAJ 4 T1335.29
approach, LTCOL 1 stated that "[w]e had had two occasions where energy had not been managed effectively." When considering the occasions referred to, this assertion is an understatement. The first was the loss of Black Hawk 221 itself and the second was a serious incident of main rotor droop leading to a significantly damaged aircraft. LTCOL 1's statement did however correctly identify energy management as a key issue during the conduct of the SO assault approach. The following paragraphs within this sub-section of the report further develop this concept.

4.41 The SO assault approach has been designed to transition from the cruise condition into a hover to achieve the desired role appropriate tactical outcome. During this process, a pilot must control the helicopter's considerable energy carefully through effective management of airspeed, height and rotor speed. This is a serious exercise as explained by MAJ 4:

"In a helicopter, you can't lose airspeed or decrease airspeed, decrease height and decrease rotor RPM all at the same time. Conservation of momentum or angular momentum through the disk means that if you want to rapidly decrease the airspeed and a height, then you will invariably increase RPM."

4.42 Carrying too much energy in the final phase of the approach can result in an overshoot or a go-around.

"The danger of conducting a go-around, though, is that it compromises live operational mission. The aim is to understand that you have to put the aircraft in a position to do the job over the target. If you end up too fast with rotor droop, or if you overshoot the target, then you're still putting people in the same - you're still having the same chance of mission failure, because you're giving the aim away, basically."

4.43 In the extreme, misjudging the energy management throughout the approach can lead to an erosion of safety margins; should a limiting factor be reached then there is a real possibility of an aircraft accident.

"Part of energy management is obviously management of the rotor RPM, how aggressively you are flaring the aircraft and how well you are controlling the rotor RPM." Any aggressive flaring manoeuvre in the helicopter will accelerate the main rotor, and the engine control units will see the acceleration and schedule the fuel to the engines back to a low setting. When subsequently power is required, the engines will not be to keep up, and that's when you see a decay in main rotor RPM."

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79 LTCOL 1 T1464.11
80 Exhibit 112; See paragraph 2.18 above and footnote 48 concerning MAJ 4
81 Exhibit 102, SO Techniques lecture page 9
82 MAJ 5 T969.30
83 SQNLDR Morris T1894.37
84 SQNLDR Morris T1894.37

69
"Energy, airspeed, height and RRPM, any two of the three will result in difficulties in termination. All three and it will be an interesting approach."

4.44 Prior to 29 November 2006, the two major methods employed to help in the effective management of helicopter energy during the SO approach were the use of the flare point formula and the application of the comfort zone. The flare entry gate and the flare point formula are in place to limit the total energy prior to commencing the flare whereas the purpose of the comfort zone is to balance the residual energy management with the requirement to precisely position the helicopter at termination. Should the pilot misjudge the approach then a go-around would be required. However, "[T]here's no definite criteria for a go-around". The extant energy management controls put in place for the SO assault approach will be discussed on the following paragraphs.

The Entry Gate and the Flare Point Formula

4.45 LTCOL 15 clearly recognized the need to control the helicopter's energy level during the termination phase of the SO assault when the approach was formalised. This resulted in the application of entry gate requirements for the flare point formula "which is a height and speed combination, to help crews control the speed of the approach". The flare point formula is used to adjust the entry gate to accommodate approaches under varying conditions.

"The initial gate was at the 800 m and it had some parameters, and there was a final gate; they formed the basis of a guide. They weren't defined standards. The basic (sic) for all these decelerative manoeuvres is the Stan Man, which is quickstop. These are techniques to achieve those standards"

4.46 The Board accepts that the notion of an entry gate to limit total energy during the final phases of an SO assault approach is a valid energy control mechanism. The Board accepts that the application of the flare point formula to address the effects of the wind is readily apparent for a straight in approach. Upon analysis however, the flare point formula is found to be ineffective under certain circumstances. Where the wind relative to the helicopter during the segment is different from the relative wind when terminating into the hover, such as during the conduct of a turning quickstop, the flare point formula as explained to the Board is no longer valid. Its application therefore during a turning or sliding approach is not appropriate. The SO training notes do not provide any clarity. The following paragraphs discuss this aspect.

4.47 The way the flare point formula is taught is generally as "one factor in a plethora of considerations that we are required to take into account". In the context of planning and

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85 Exhibit 5 paragraph 194
86 CAPT 7 T927.25
87 Exhibit 248 Statement of LTCOL 15 paragraph 3
88 MAJ 2 T1124.26
89 MAJ 2 T1282.24
90 CAPT 6, T1384-42
briefing, MAJ 4 went further to note that "no one needs to specifically raise the effect (of wind) once the speed and direction is known – it is accounted for in the standard flare point formula"\(^91\). LTCOL 1 was asked whether an out of wind quickstop was any different from a standard quickstop he replied:

"No, with the exception of the application of the wind to the approach formula and to the 300 metre point. It's not a different approach, no. Will it have a different effect on the aircraft? Yes."

4.48 To account for wind that may be encountered during the conduct of the SO assault the lecture package states that:

"the flare point is 800 metres plus or minus 100 metres for each 10 knots of wind or 100 feet climb/descent and each 1000 feet AMSL"\(^93\).

4.49 As explained by CAPT 11, this means that if there is a 10 knot headwind, the pilot must subtract 100 metres from the standard flare point, whereas if there is a 10 knot tail wind, the flare point would be called at the 900 metre mark\(^94\).

4.50 CAPT 7, when asked about his application of the formula on the flare point for BLACK 1's final approach he replied:

"As I recall, we were flying 100 knots indicated with a 5 knot headwind, which gave us a 100 knot ground speed, and we chose a 0.8 (km) flare point, or CAPT Bingley chose a 0.8 (km) flare point."\(^95\)

4.51 It is clear from this response that CAPT 7 had accepted that there was a 5 knot headwind during the run-in from the IP to the flare point although CAPT Bingley did not adjust the flare point in this instance.

The Comfort Zone

4.52 In addition to limiting total energy upon entry to the flare, LTCOL 1 also acknowledged the necessity of energy control throughout the flare.

"The application of comfort zone is principally to energy management and obstacle clearance. The expectation is that a pilot will fly the approach in a manner in which he is consistently reviewing his rate of closure, rate of descent, as supported by his crew, and ensuring that he maintains appropriate clearance from other aircraft and obstacles

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\(^91\) Exhibit 124, MAJ 4 Statement, paragraph 22
\(^92\) LTCOL 1 T1452.43
\(^93\) Exhibit 210, slide 12, “Landing Phase – Approach”
\(^94\) CAPT 11, T1237-19
\(^95\) CAPT 7 T919.43
during the conduct of that approach to terminate at the point which he is briefed prior to the commencement of that approach.”

4.53 The lecture notes refer to energy, airspeed, height and RPMR\(^{97}\) and that “... \(\frac{1}{4}\) of the deceleration in the termination is conducted in the last \(\frac{1}{4}\) of distance to run.”\(^{98}\) This deceleration formula exemplifies the fast nature of the approach and underscores the high workload of the pilot in the comfort zone. While the comfort zone is used to conceptualise the notion of energy control, it is not fully understood by all pilots at 171 Avn Sqn. CAPT 6 described the comfort zone as “how quickly and efficiently you can come into an approach and whether the aircraft will droop or not.”\(^{99}\) However, according to MAJ 2, the formula is not rigidly applied as “it’s just basically a concept or anecdotal requirement”\(^{100}\) and that “...a formulaic approach over the last portion of the assault is not encouraged”.\(^{101}\) These statements add to the air of uncertainty as to exactly what is required in order to fly the SO assault approach and its “comfort zone”.

“There isn’t a line that says – there isn’t a definition of exactly what the pilot is required to do at every point in the approach. There are entry gates and there is a termination requirement, but there isn’t a delineation of speed/altitude combinations that will tell him that he is scientifically in the comfort zone”.\(^{102}\)

4.54 Although the Board understands that the concept of the comfort zone is directed at energy control, the lack of adequate description and formalised parameters is such that it means different things to different pilots. LTCOL confirmed that a more experienced QFI is able to handle an approach better, develop the flare more quickly, and concisely position the helicopter in the hover more consistently than a junior pilot.\(^{103}\) He also agreed that one pilot may adopt a very aggressive\(^ {104}\) flare while another pilot might adopt much more conservative approach depending on the pilots’ individual comfort zones.\(^ {105}\) MAJ 4 also confirmed that a flare can be developed “...much later” by a pilot with a bigger comfort zone than those who are less comfortable with the manoeuvre.\(^ {106}\)

4.55 The AAIT formed the opinion that “...the procedure as described in the briefing notes leaves very little margin for error”.\(^ {107}\) CW5 King agreed that the SO assault approach “is an aggressive approach that has very small margin for error.”\(^ {108}\) In trying to replicate the accident approach in the simulator he “came up with a very aggressive approach in trying

\(^{96}\) LTCOL 1 T1442.36
\(^{97}\) Exhibit 103 Figure p.9
\(^{98}\) Exhibit 4, paragraph 197
\(^{99}\) CAPT 6 T1379.38
\(^{100}\) MAJ 2 T1134.14
\(^{101}\) MAJ 2 T1134.40
\(^{102}\) LTCOL 1 T1443.17
\(^{103}\) LTCOL 1 T1530.28
\(^{104}\) SQNLDR Morris T1942.30 defined an “aggressive” flare as one that is developed at a high rate.
\(^{105}\) LTCOL 1 T1443.9
\(^{106}\) MAJ 4 T1320.3 - .8
\(^{107}\) Exhibit 5, paragraph 197.
\(^{108}\) CW5 King T2030.39

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to stop, and it was almost impossible for [him] at that point to come to a stationary hover.”

He also did not think it was a good idea to have some pilots flying the manoeuvre very aggressively and with others flying a more conservative approach. He further commented on the comparison between the detailed formula to determine flare point for entry into the termination phase against the lack of detail for the flying of the termination itself.

“What I am driving at is that there appears to be not a whole lot of parameters towards the end that give an indication of how far you can go before you have to go around for any of those items... that I could see would give clear guidance as to how to proceed towards the end of the approach.”

4.56 SQNLDR Morris agreed with CW5 King and added another important aspect:

“The biggest issue I would have with that is that it's putting the focus back on just one crew member. You're saying, then, that the two pilots sitting in the front of the aircraft will have different expectations of how the manoeuvre should be flown and how it's likely to develop. That makes it very difficult for them to cross-check and monitor each other's performance during the approach. It seems to me to be a very subjective approach to the manoeuvre.”

4.57 The Board therefore noted two separate aspects resulting from how the SO assault approach has been described, taught and flown. The first is the absence of definitive standards whereby it becomes almost impossible for other crew members to closely monitor the performance of the flying pilot during the conduct of an approach.

4.58 The second point is the subjective nature of the approach itself will lead to pilots flying the SO assault approach at differing levels of aggression depending entirely on their experience, judgement and personal comfort. The lack of defined parameters when coupled with the operational pressure to conduct the approach as fast as possible with “First Strike” would over time lead to faster and more aggressive approaches. A very aggressive approach may ultimately expose the helicopter to its performance boundaries as the safety margins are progressively eroded. Despite the flare point formula aimed at limiting total energy at the start of the approach “you could still hit the entry gate and initiate the manoeuvre too aggressively.”

“You could overflare the aircraft initially, which would set you up at a slower speed earlier than you should be in that particular profile; and vice versa, you could develop it too slowly and hence have to compress more of the deceleration at the end. The only system that I saw that could possibly work would be to have, as I've tried to suggest,
some sort of minimum final leg length where the aircraft was wings level looking at the objective, where the crew could assess the closure rate, the energy, the height, and determine whether it's suitable to continue or not.” 115

4.59 While not specifically aimed at the quickstop or the SO assault approach the authors of the Standardisation Manual agreed with SQNLDR Morris’ proposal of having a minimal duration wings level final leg, suggesting that this should be done prior to the loss of ETL. The following extracts emphasise the importance placed on ETL:

“...flight should be at normal terrain flight altitude and airspeed to permit an approach to be initiated when landing point is identified and before the approach angle is intercepted. A late reconnaissance, preferably prior to loss of ETL, should confirm the location of hazards and general suitability of the CA.” 116

“Turning Approach. Planning considerations is for a straight in approach.... the aircraft should be aligned with final approach direction prior to descending below obstacle height and preferably before decelerating below ETL.” 117

OTHER ASPECTS ASSOCIATED WITH THE SO ASSAULT APPROACH

Go Around Criteria

4.60 While there has been an attempt to control the helicopter’s energy at the commencement of the flare by the inclusion of entry gate speed limitations and there was little guidance for the conduct of the flare, there was no guidance to govern whether an approach was to be continued or aborted. SOP’s do however specify the requirement for an overshoot plan. “The overshoot plan is designed to ensure that all aircraft have a defined overshoot direction and altitude that will ensure that they do not interfere with the other aircraft. Where necessary, additional control measures may be introduced to control the overshoot.” 118 Although not explicitly stated in evidence, the Board considers the required plan is based on tactical considerations and is not to cater for any performance or handling constraints. In any case, no go around criteria or specific safety considerations that would warrant a go around could be identified. 119 In essence, the approach is conducted according to the judgement of the flying pilot alone without parameters that the remainder of the crew can adequately monitor.

“...there should be some guidance given that if you exceed, or begin to exceed, there should be leading indicators that the approach should probably be terminated and you

115 SQNLDR Morris T1943.34
116 Exhibit 214, chapter 16 “Confined Area and Pinnacle Operations” paragraph 45a
117 Exhibit 214, chapter 16 “Confined Area and Pinnacle Operations” paragraph 45b
118 Exhibit 205, SOP 401.19g
119 Exhibit 5, paragraph 197
Although aimed at confined areas and pinnacle operations, the following airmanship considerations for tactical approach into a confined area (CA) as extracted from the Standardisation Manual would appear to also have application in the SO assault approach:

“The Aborted Approach – “Go Around” The reconnaissance and plan for a CA (confined area) must make allowance for the possibility that the aircraft will have to abort the approach. The abort path must be predetermined and briefed as part of the CA Plan. Unless Cat 4 performance is available, the abort should be conducted prior to the loss of ETL and in any case at such a time that the barriers/obstacles surrounding the CA will not prevent the aircraft from conducting the abort. As such the decision to continue below ETL, or go around, should be deliberately made. The decision to continue or abort must be clearly enunciated to the crew. If the decision is to abort, climb power must be applied and the attitude adjusted to ensure the aircraft accelerates and climbs. This should preferably be done prior to deceleration a low ETL.”

Speed versus Stability (or risk of being shot down versus risk of crashing)

Air mobile support to SF is detailed in 5 Avn Regt 400 series SOPs. The purpose of the 400 series SOPs is to provide a concept of how the SO squadron maintains the appropriate readiness posture, training regime and mission skills and in particular they detail training, battle procedure and mission planning. According to the SOPs, the major difference between conventional operations and air support to SF is that the force is delivered directly onto an objective that may be hostile. In particular, the SOP articulates is the key differences between the SO termination and the conventional termination as being the degree of precision of the approach and that the “assault and termination is conducted as fast as possible, whilst remaining under control, in order to maximise surprise and minimise exposure to the threat.”

So whilst I understand your suggestion that we should teach conservatism, and we do, we also teach the requirement to support the mission. We wouldn't be doing this if we didn't have a tactical reason to be doing it.”

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120 CW5 King T2023.8 - .12
121 Exhibit 214, Chapter 16 “Confined Area and Pinnacle Operations” paragraph 15
122 Exhibit 205
123 Exhibit 205
124 Exhibit 205 SOP 401.19
125 LTCOL 1 T1535.43
4.63 According to LTCOL U “there is a tradeoff there with speed coming in, because if you don’t come in at a required speed, you can get shot out of the air, which is not a good situation.” Notwithstanding, LTCOL U also asserted that the customer did not intentionally apply any direct pressure to achieve operational outcomes. This, and other evidence, indicated the existence of implied pressure: “it’s just an underlying tone that sometimes can affect that decision-making process.” Indeed LTCOL I agreed that there is an operational imperative to get in and get out fast. Further examples of this pressure are:

“The faster we do it and the lower we are, the less exposed the aircraft is to a threat.”

“There are tactical reasons why we have a slightly faster approach than normal - I wouldn’t say "faster" – a more positive approach than the normal to be able to put the aircraft in a position to allow it to do its job.”

4.64 The Briefing Notes give rise to the term FIRST STRIKE by stating that the aim of SO AMO is:

“To insert SF ground elements where they want to go, at the time they want to be there, as fast as possible, in as tactically sound a manner as possible while ensuring a first strike capability to...”

4.65 MAJ 2 interpreted FIRST STRIKE as meaning that “...troops are delivered first go... the idea is to keep the aircraft under control and deliver the troops as smoothly and accurately as possible.” This statement exposes the natural tension between the two requirements of FIRST STRIKE even though both are clearly aimed at optimising safety. On one hand, there is pressure to place the helicopter in an accurate, safe and stable hover. Opposing this is the requirement to conduct the approach as quickly as possible.

CAPT 6 recognized this tension stating that “we are constantly trying to balance efficiency of getting in quickly with the safety of getting in conservatively” SQNLDR Morris understood the necessity of FIRST STRIKE and advocated the focus “...initially should be to get a stable platform... when I talk about stabilising at the hover, if you arrive at the hover, very, very aggressively.

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126 LTCOL U T1642.33
127 LTCOL U T1643.28 (“Sir, I don’t think any pressure is applied. We all do the planning process and the risk management process together. We’ve learnt that over many, many years. We learned that over previous accidents, that we actually are all in the same organisation together. Therefore, pressure - no. But pilots - I said previously that we will get in and do our appreciation together. People understand the requirements. So not directly pressure, but pilots will understand requirements, and I was referring to judgement I think at that time. That is why their judgement about - if they need to use alternatives, who have an understanding of that as well.)
128 CWS King T2052.17
129 LTCOL 1 T1537.30
130 SGT AB T1688.44
131 MAJ 5 T1029.7
132 Exhibit 102 SO AMO lectures p.4 (the remainder of the aim is not quoted so as not to in any way compromise SO tactics)
133 MAJ 2 T1163.42 - .47
134 CAPT 6 T1382.33
4.66 The definition of FIRST STRIKE does not include a statement giving primacy to one requirement over the other. MAJGEN Fraser exemplified an outcome of the competing tensions by reference to the following:

"The US Army has lost 130 helicopters on operations in Afghanistan and Iraq since 2001. The US Marine Corps has lost 20 helicopters. Very few of these were destroyed by enemy action."\textsuperscript{136}

The Turning SO Assault Approach

4.67 Throughout the hearing, the Board heard extensive evidence that the SO assault approach could take many forms. The most common form discussed and the approach briefed and flown by both GOLD and BLACK formations on the 29 November 2006 was the turning approach.\textsuperscript{137} It is clear that the technique used to fly the manoeuvre finds its roots in the ‘turn and flare’ or ‘flare and turn’ quickstop as discussed earlier. Apart from its accepted use on this occasion, its doctrinal heritage is less apparent.

4.68 LTCOL 15 assisted in formalising the tactics, techniques and procedures for aviation support to special operations.\textsuperscript{138} According to MAJ 2, ‘[t]he lectures have developed over time as a result of our own experience as well as a number of personnel who attended overseas military organisations who do similar roles. From that, they were able to develop a set of tactics, techniques and procedures that we apply to our local environment.’

4.69 The concept of a turning assault approach as flown by 171 Avn Sqn was new to CW5 King.

\[\text{"It was my lack of understanding when I read the (AAT) report of the term "the turn and flare and the flare and turn".} \]

\textsuperscript{135} SQNLDR Morris T1901.36
\textsuperscript{136} Exhibit 179, Further statement of MAJGEN Fraser, paragraph 39
\textsuperscript{137} Examples are: MAJ 4 T1263.1 “We changed the serial construct with a turning approach to simulated roping points on the aat deck”, MAJ 4 T1302.4 “I personally find the turning approach easier to fly.” CAPT 7 T952.39
\textsuperscript{138} "we’re taught to – you’ve demonstrated the variety of approaches and that particular technique is demonstrated."
\textsuperscript{139} Exhibit 248 Statement of LTCOL 15 paragraph 4
\textsuperscript{140} MAJ2 T1119.9
\textsuperscript{141} Exhibit 183 Statement of CW5 King, paragraph 4
\textsuperscript{141} CW5 King T2051.29

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Now, there is always a possibility that due to a particular target or a particular set of obstacles, or whatever the case may be, you may have to make a heading change towards the end of your approach, and you’re at a safe speed to manoeuvre at that point, and it should be a minor change, however you have to manoeuvre to get in.”

4.70 The evidence presented by CW5 King was however consistent with the planning philosophy embedded within the 5 Avn Regt SOPs:

“Minimise Turns
The aircraft are aligned on the approach direction as early as possible as the assault troops will be unsecured.”

4.71 The standard practice of the US Special Forces and the SOPs is also entirely consistent with the tactics and techniques as described in the SO briefing notes. and innumerable diagrams portraying the final approach segment as a straight line. 144

4.72 The SO briefing notes make no mention of the turning SO assault approach. The turning SO assault approach as described to the Board and as flown by CAPT Bingley on 29 November 2006 is not supported by doctrine and is contrary to the planning philosophies that underpin AMO support to SF. The turning SO assault approach profile is a technique that is not conducted within the US Special Forces. 145

4.73 It must therefore be assumed that this technique was not sourced from the US but has grown from local experience.

4.74 While the Board can see the operational utility of conducting a turning quickstop in a tactical scenario, it is not used by US Special Forces and its application is not described in procedures or supported by doctrine. Nowhere in the supporting documentation are the turning approaches such as flown on 29 November 2006 described or even mentioned.

4.75 The Board concludes therefore that the turning SO assault approach has developed over time as a deviation from normal processes.

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142 Exhibit 205 SOP 401.20c
143 Exhibit 102 “Special Operations Techniques” page 12
144 Exhibit 102 “Special Operations Techniques” and “Special Operations AMO” passim
145 CW5 T 2045.39
External Validation

4.76 The Board also noted that outside of internal squadron testing and an oblique reference to ARDU test pilot exposure during an equipment evaluation in preparation for the 2000 Olympics\textsuperscript{146}, there has been no formal test and evaluation of the SO approach to ascertain absolute control, power and performance margins for the Black Hawk during the execution of this manoeuvre.\textsuperscript{147}

Rotating About the Tail Wheel

4.77 The briefing notes also make reference to transitioning into the hover by rotating about the tail wheel.\textsuperscript{148} MAJ 4 explained with the aid of a model Black Hawk helicopter:

There are two ways to terminate the aircraft, and the one that is most instinctive to pilots is as you are coming in to the LP, which we will say is just here (indicating the ground position in front of the helicopter), is to increase the nose-up attitude and then just adopt the hover attitude from there. The problem with that technique is that you will invariably be approaching lower and endanger this part of the aircraft (indicating the tail) when you do it, and a sudden change from this attitude to this attitude (indicating) when increasing collective will most likely induce transient rotor droop. However, if you come in slightly higher and then, as you approach your LP, rotate about the tail wheel, and then down into the LP and your hover height, you will increase the safety margin under the aircraft, the no-stab zone, and during this stage you are actually lowering collective slightly. So at the critical stage when the disk is becoming unloaded, you are not demanding power from the engines at the same rate as with the other technique. However, once the aircraft has come through the hover attitude, you then demand power and you've given the engines a chance to wake up and respond to the increase in power demand. That is why we teach transition to the hover by rotating about the tail wheel.

4.78 Rapid rotation of the aircraft around the tail wheel at the end of the quickstop will increase the up flow through the rotor system and although power demands will remain low initially, a rapid application power will still be necessary to achieve the hover attitude and to arrest any residual rate of descent. This effect will not be as significant if conducted while the helicopter is at airspeed above ETL.

\textsuperscript{146} BRIG Bartels T1798.19
\textsuperscript{147} MAJ 5 T1025.7
\textsuperscript{148} Exhibit 102 "Special Operations Techniques" page 9

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FINAL ANALYSIS

4.79 The Board identified major differences between the tactics and techniques defined in the SOPs and Standardisation Manual and those current flown and accepted during the conduct of the SO assault approach. At the root level, the major differences identified are: poor energy management in the latter stages of the termination, lack of go-around criteria, the acceptance of a tailwind as an operational norm, the use of turning and sliding approaches and the lack of emphasis placed on ETL in the termination phase of the approach. With hindsight Brigadier Bartels agreed that the SO assault approach hadn’t been fully standardised and had possibly evolved into something that had become more aggressive. The AAIT formed the opinion that “...the procedure as described in the briefing notes leaves very little margin for error.” The Board was concerned as to how a seemingly standard approach could become one that would “leave very little margin for error” despite the application of energy management principles. The following paragraphs offer the Board’s consideration on how this may have occurred.

CONCLUSIONS

4.80 The SO assault approach as flown up until the 29 November 2006 was a highly dynamic and very difficult manoeuvre to fly. The termination phase required high pilot workload as the aircraft was “...manoeuvred in all three axes from high pitch and role attitudes with low power to a level attitude, zero speed hover or touchdown. This manoeuvre is very difficult to fly smoothly because control limits and aircraft limits can be reached and there is a large amount of cross-coupling between control axes.” The termination phase of the SO assault became even more demanding for the flying pilot if the manoeuvre is flown more aggressively as pilot workload increases.

4.81 The tactics and philosophy specified in 5 Avn Regt SOPs associated the conduct of flying operations in support of SF do not involve turning approaches for example and indeed suggest that “the bulk of the personnel in the SO squadron do not require additional qualifications to perform the squadron mission.” By inference, the requirement for the development of specialist approaches unique to the SF mission seems to have grown over time. In response to a question about the extensive use of exceptions to the embedded requirements normally required by the Standardisation Manual during the conduct of the SO assault approach, MAJ 2 stated ” The whole purpose for which we are there is to achieve a tactical objective...” By citing such reasons of tactical advantage, the Board believes that the emphasis balance has subtly shifted from stability to speed at 171 Avn Sqn. This change in emphasis, when coupled the extensive use of exceptions to the Standardisation Manual’s
requirements, has allowed the SO assault approach to mutate from the application of a standard quickstop manoeuvre into one that somehow avoids all the specified quickstop limitations.

4.82 With ever growing confidence in their own ability, the pressure of operational imperatives and a trust in the inherent Black Hawk helicopter capabilities, the importance seems to have shifted to an emphasis on achieving "surprise, shock action, [and] saturation of an objective". The SO assault approach therefore became a flying technique that ignored many accepted airmanship considerations and one that relied almost exclusively on the judgement of the flying pilot to safely complete without the benefit of third-party assessment and established go around criteria. This set of circumstances inexorably led to an approach that was no longer safe and repeatable.

4.83 The Board accepts that limitations placed on the entry gate conditions and the application of the flare point formula at the time were intended to limit the amount of total energy, however they did not limit the possibility for the flare to be developed very late in the termination phase. Particularly, and given the absence of performance parameters, extremes of attitude could be readily developed at very low airspeeds. Furthermore, as the flare could be aggressively developed to an airspeed lower than that required for ETL, the aircraft became increasingly exposed to conditions ideal for an episode of main rotor droop. Any inadvertent descent during the flare, or the subsequent nose over to the hover attitude, particularly if rapidly rotating aircraft around the tail wheel, would further compound this situation. In addition to main rotor droop, entry into a vortex ring state under these circumstances became a distinct possibility.

4.84 The quickstop manoeuvre is well defined in the Black Hawk Standardisation Manual as are the techniques and airmanship requirements associated with terrain flying and conducting tactical approaches. Likewise, the associated embedded requirements laid out the Standardisation Manual have obvious applicability to the conduct of the SO mission. The Board believes that the basic techniques and airmanship lessons as described in the Black Hawk Standardisation Manual need to be re-learned by 171 Avn Sqn and re-applied to the SF mission. In particular, basic airmanship principles must be re-applied to the SO assault approach.

Findings:

4.5 The SO air assault has been allowed to develop with a number of significant differences from the standard quickstop and these disparities have, over time, become accepted as normal. The SO assault approach had become inadequately defined and had

\[156\] LTCOL 1 T1471
\[157\] Exhibit 213, page 6-1 and Exhibit 214 chapter 15 paragraph 34, 35 and 36
\[158\] Exhibit 213, page 6-2

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not been validated. Safety margins to allow for safe and repeatable terminations had not been developed and tested, nor were go-around criteria specified. The SO assault approach techniques carried out by 171 Avn Sqn at the time of the accident regularly placed the aircraft in a flight regime where main rotor droop may occur.

4.6 The concept of the "comfort zone" is too subjective and provides little guidance for the safe execution of the SO assault manoeuvre. When conducting the SO assault approach the high pilot workload, coupled with exclusive reliance on the judgement of the flying pilot throughout the comfort zone and the lack of defined performance parameters give rise to an unacceptable level of risk. Under these circumstances, performance monitoring by the other aircrew is extremely difficult, if not impossible, becoming an ineffective risk mitigating mechanism.

4.7 The application of the flare point formula, such as under the circumstances of Black Hawk 221's final approach, ignores the effect that a tailwind may have on energy management during termination. As the flare point formula is applied using only the wind component in the direction of the run in, the application of the flare point formula during the conduct of an approach that involves changes in direction such as turns and slides is not valid.

4.8 There remains an uncertainty amongst aircrew at 171 Avn Sqn as to the primacy of stability over speed with respect to aircraft safety. In the absence of such clarity, there was evidence of the prevailing pressure to achieve the mission as quickly as possible. A few extra seconds taken in flying a slightly more conservative approach would make a significant improvement in the safety margins for the approach when compared with the anticipated minimal increased risk of exposure to enemy action.

4.9 Conducting turns during an SO assault approach, whilst allowed for by the Standardisation Manual, is contrary to the tactics and doctrine as described in both Standard Operating Procedures and the SO Training Briefing Notes.

4.10 In order to comply with intent of the Standardisation Manual, the quickstop must be conducted such that the helicopter completes the flaring manoeuvre before losing effective translational lift.

4.11 Basic airmanship considerations specified in the Black Hawk Standardisation Manual have not been fully applied when developing tactics and techniques for the SF role even though the applicability should have been obvious.

4.12 Rotating about the tail wheel directly into the hover at the end of a quickstop manoeuvre may further increase the risk of exposure to main rotor droop and possibly vortex ring due to the increased up flow through the main rotor system, particularly if executed rapidly.
Recommendations:

4(a) The SO assault approach should be re-developed to incorporate the basic airmanship considerations considered essential by the authors of the Standardisation Manual and the tactics brought into line with the “Air Mobile Support to Special Operations Forces” SOPs (400 Series).

4(b) The SO assault approach should be subjected to regular external validation.

4(c) The extensive use of exceptions to the embedded requirements of the Black Hawk Standardisation Manual must be eliminated. Other than under extraordinary circumstances, the embedded requirements must be applied.

4(d) The Standardisation Manual should be amended to emphasise the need to complete the quickstop flare prior to the loss of translational lift and subsequent transition into the hover. Interpreting this requirement for SO approaches, the flare may be terminated directly into the hover only if the head wind component maintains the helicopter in effective translational lift. In all cases, including terminations downwind, the flaring manoeuvre should be completed before effective translational lift is lost.

4(e) The Black Hawk Standardisation Manual should be amended to include a section dedicated to the conduct of flying operations in support of SF. Care must be taken to ensure that this section does not merely reflect unsafe practices which have evolved.
SECTION 5

THE SPECIAL OPERATIONS COURSE OF INSTRUCTION

INTRODUCTION

5.1 According to LTCOL 1, the SO training conducted by 171 Avn Sqn and the associated training packages are World’s best practice\(^1\). BRIG Bartels further explained that the subject matter, including the SO assault approach, has been validated through normal audit processes which included specialist overseas familiarisation trips, feedback from customers and by benchmarking with other forces.\(^2\)

“There’s a whole series of things that I know do happen: making sure that the customer - ie, special forces - are happy with what’s happening is the first one. That gets covered in post-exercise reports after each activity, and that’s a very important form of validation and a very good document for capturing validation data. Additionally, again, a very, very useful validation technique is benchmarking against other services. We have benchmarked our training against that is conducted by US, UK and Canadian forces, and that data is captured in post-activity reports from the overseas visits.”\(^3\)

5.2 The Black Hawk mid air collision of 1996 was the catalyst for a review of SO Flying. A review of tactics and procedures took place; a Course of Instruction (COI) for aircrew was formulated; a pre-requisite standard of aviation experience was established before further qualifications could be obtained. During the development of the course, information was sourced from coalition specialist organisations.\(^4\)

5.3 Special Operations training was the subject of much discussion during the hearing. This section of the Report explores the development, status and adequacy of the SO training course.

COURSE DEVELOPMENT

5.4 Prior to the initiatives outlined above, there were no formal qualifications or training for SO aircrew. Air mobile crews were constituted for a 2-3 week period annually to conduct SO flying.\(^5\) Entry to 171 Avn Sqn to commence training now requires 500 hours of military flying, 50 hours on type and 30 hours on night vision devices (NVD). Aircraft captains

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\(^1\) Exhibit 137, Statement of LTCOL 1, paragraph 13, LTCOL 1 T1521.45 and LTCOL 1 T1544.4
\(^2\) BRIG Bartels T1805.12 - T1807.44
\(^3\) BRIG Bartels T1807.34
\(^4\) Exhibit 248 LTCOL 15 paragraph 4,
\(^5\) MAJ 2 T1116.28

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require 1000 hours with 200 hours NVD and 30 on type. While most aircrew had the prerequisite experience, CAPT 8 was an exception who entered the Squadron with flying hours in the low 400s although SO training was not undertaken until requisite hours were achieved.

5.5 The SO Flying Techniques are taught as part of a Course of Instruction (COI) conducted by 171 Avn Sqn for new aircrew. The COI involves a 2-3 week course dependent on numbers. The course includes 5 day and 5 night sorties with ground lectures. Pilots are assessed with an initial sortie by a QFI and during the course by an aircraft captain. At the conclusion of the course a further assessment is undertaken by a QFI to ensure required standards. In obtaining the qualification pilots tend to fly with different captains. The training course has undergone numerous iterations all of which have received the approval of the Commandant of AAvnTC in 2001 and 2002.

5.6 The lecture notes are changed from time to time to incorporate improvements. The Board has in its possession three different iterations of the briefing notes associated with SO training. MAJ 5 indicated that the Exhibit 5 briefing notes for the COI were two iterations old and that the current notes are incorporated in Exhibit 102 (Restricted). Neither Exhibit 5 nor Exhibit 102 contains explanatory notes and so much of the specific detail required for a complete understanding of the course is missing. Exhibit 210 does contain explanatory notes but is clearly a very old and incomplete version.

5.7 The board heard about to separate aspects of the COI throughout the hearing. The first was the adequacy of the COI with respect to preparing students for the SO mission. The second issue was the formalisation of the COI into a Training Management Plan (TMP). Although there is considerable overlap in the subject areas, these issues will be discussed in turn in the following paragraphs.

ADEQUACY OF THE COURSE OF INSTRUCTION

5.8 Air mobile support to Special Forces doctrine was developed and detailed in 5 Avn Regt 400 series SOPs. The purpose of the 400 series SOPs is to provide a concept of how the SO squadron maintains the appropriate readiness posture, training regime and mission skills and in particular they detail training, battle procedure and mission planning. The doctrine does not envisage a significant flying training burden, instead it places emphasis on

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5 MAJ2 T1116.44  
6 CAPT 8 T820.43  
7 MAJ 2 T1117.25 - .35  
8 CAPT 8 T823.3  
9 LTCOL 1 T1493.15 - .21  
10 MAJ 5 T966.30  
11 MAJ 5 T967.30 - .42  
12 Exhibit 248 Statement of LTCOL 15 paragraph 4  
13 Exhibit 205  
14 Exhibit 205 SOP 401 passim  
15 86
the planning and execution of tactics rather than on learning new or different flying techniques:

"While the bulk of the personnel in the SO Sqn do not require additional qualifications to perform the squadron mission, designated aircrew undertake an intensive training and qualification regime to ensure that they are capable of planning and executing missions in support of SF." ¹⁶

5.9 BRIG Bartels agreed with this precept: SO training was more to do with the application of skills already learned:

"The SO course or the SO profile - this isn't teaching people a whole new series of flying skills. Those flying skills are pre-existing. All it is doing is utilising a pre-existing skill set in a different environment and in a different way. Say, for example, through the normal pilot continuum, our pilots are taught close formation and they're taught a number of battle formations, so they have the skills to fly in formation. On the special operations course, we teach them some adjusted formations. That's an example. It's not a new skill; formation flying is a skill which they already have. It's just contextualising it for a particular type of approach profile."

5.10 The lecture slides and notes as a general proposition provide "...clear, concise, well structured... and comprehensive training".¹⁷ The thoroughness of the lectures and training, however, can really only be tested by sitting in on the lectures and training because "...without the dialogue it is impossible to determine with effectiveness of the instruction".¹⁸ In early 2007 BRIG Bartels attended 171 Avn Sqn and was present for a short time while the course was being conducted and received a full brief on it. He was "...impressed by the preparation, content and presentation".¹⁹

5.11 LTCOL Choice, the Deputy Commandant of AAvnTC, stated that the 171 Avn Sqn SO COI had been forwarded to AAvnTC for review in December 2006 with a view to the course becoming a TMP.²⁰ While principally concerned about transitioning the COI into a TMP, LTCOL Choice indicated that initial analysis of the 171 SO COI by training development staff raised a number of criticisms with respect to the adequacy of the COI:

a The course was developed by a reverse engineering approach – the course identified a need and worked backwards rather than first identifying the competencies that are required and then identifying the skills, knowledge and attitudes to support the competencies.²¹

¹⁶ Exhibit 205 SOP 401.12
¹⁷ Exhibit 175SQNLDR Morris statement paragraph 16
¹⁸ Exhibit 183 CW3 King statement paragraph 4
¹⁹ Exhibit 165BRIG Bartels statement paragraph 11-12
²⁰ Ibid T1411.16
²¹ LTCOL Choice T1411.33 - 1412.14
b The course “...on the job training requirement” was not properly detailed or defined.22

c The course lacked proper formatting and the standard information including instructions to trainees, a detailed syllabus and a course diagram.23

d That in a memorandum of 30 April 07 to the Commander of 16 Brigade, COL Greenland the Commandant AAvnTC, had written that the COI had deficiencies and was not sufficiently robust to conduct training and did not provide a clear baseline in which to develop a business case for training command.24

5.12 The criticisms were not unchallenged. The following facts are apparent from an overall view of the evidence:

a The COI had been received by MAJ Williams a Training Development Officer of the AAvnTC out posted at Townsville. He had received the COI earlier in 2006 and had worked on the course and assisted developing and improving it.25

b The SO flying course had been the subject of competency analysis and a significant input from subject matter experts and others with a view to aiding development of a TMP.26

c It was the view of 16 Brigade that the COI that presently exists is “absolutely” satisfactory.27 The course is robust and one of the best BRIG Bartels has seen and on conversion to a TMP would not see significant changes to the conduct phase of the course.28 This opinion is shared by COL Greenland and LTCOL 1.29

d The course of instruction is otherwise a suitable training course to be delivered by the Squadron.30

e The AAvnTC has had an involvement in the development of the COI for many years with continuing involvement via out-posted personnel.31

5.13 Notwithstanding this weighty support, the Board still questions the adequacy of the course content. Witnesses before the Board gave evidence that some key aspects of the SO assault approach as flown by CAPT Bingley were not specifically covered by the SO course

22 Ibid T1412.21 - .28
23 Ibid T1412.21 - .28
24 LTCOL Choice T1413.30 - .40
25 Ibid T1777.2: T1779
26 BRIG Bartels T1803.40 - 1804.6
27 Ibid T1804.38;
28 Ibid T1805.7.
29 COL Greenland T1780.10 - .20; LTCOL 1 T1493.40
30 Ibid T1779.16
31 LTCOL 1 T1493.22 - .25
of instruction. In particular, there appeared to be an absence of curriculum covering downwind terminations, turning approaches and sliding turns. When asked whether quickstops that terminate downwind were taught, MAJ 5 responded:

_We don't deliberately go in and train on them and say, "The aim of this course is to do a down-wind quickstop." When we conduct an approach, there are some areas where we conduct our training where we have only one direction to train due to limitations in active ranges, and things like that. In that case, you may end up with a tail wind, and then we use the flare formulas and the guides._

5.14 On the same topic CAPT 9, a recent graduate of the SO techniques course, stated

_"I don't think that was covered on the transition, just because of the assumption of previous knowledge. And on the SO course itself, no, not as a separate sequence. All the approaches are to targets. It may be discussed, but it's not flown as a separate training sortie."_

5.15 Similarly when asked about side slipping the aircraft and the application of sliding turns as part of a quickstop manoeuvre, LTCOL 1 replied:

_It's not a specific approach. It's not a specific different kind of approach; it's a technique that's utilised to assist in the deceleration of the aircraft, and it's something that aircrew are aware of through the flight manual. I'm not sure whether it comes out in any particular course other than through the flight manual...Again, the slide is applied wherever it needs to be applied to support the deceleration of the aircraft. A sliding turn is not a specific manoeuvre that's taught._

5.16 From the evidence presented, there appeared to be a marked difference between the expectations of the SO training sponsors and the perceived requirements of those currently carrying out the SO role. Inadequacies or failures in the feedback mechanisms are plausible reasons that training sponsors in the chain of command would be unaware of the gradual introduction of more demanding tactical flying techniques.

5.17 The Board considers that the SO training lecture notes, while closely reflecting the SO philosophies and doctrine as detailed in the SOPs, do not cover, in any detail, the type of approach techniques flown by CAPT Bingley on 29 November 2006. The Board is therefore concerned that many of the current flying techniques have developed beyond that required by the doctrine. Specific examples are turning approaches, sliding turns and out of wind approaches. None of the COI briefing notes provided to the Board make any detailed reference or give meaningful instruction with respect to these examples. _"It's a point that's
deadline was not met._

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32 MAJ 5 T1022.20
33 CAPT 9 T1084.42
34 LTCOL 1 T1547.45
35 Feedback mechanisms such as validation, audits and reviews are discussed in greater detail in Section 10
"Incident Management and Reporting within 171 Avn Sqn".
brought up by the aircraft captain when he’s instructing, but it’s dependent on the aircraft
captain pointing that point out\(^{36}\) is an example that suggests a heavy reliance on experiential
transfer of information in an ad hoc way. Rather than being based on specific curriculum
requirements, the impromptu nature of this form of training could explain the apparent gaps in
the recent graduates’ knowledge of these ‘new’ techniques.

5.18 The Board considers that status of the COI, when compared with current flying
practices at 171 Avn Sqn, is further evidence of the normalisation of deviance associated with
the SO assault approach as it has evolved.\(^{37}\)

**FORMALISATION OF THE COURSE**

5.19 A COI is designed to meet a unit need; in the aviation context a COI is specifically
designed to address a particular competency with a list of particular sorties and course work.\(^{38}\)
A Training Management Plan (TMP) on the other hand, identifies not just a competency
requirement but analyses entry and exit requirements in relation to the course and ensures the
allocation of funding and resources. The consequent course is designed by training managers
with input from subject matter experts.\(^{39}\) The current COI was considered to be inadequate
for the purposes of a TMP.\(^{40}\) As a consequence a direction was made for the 171 Avn Sqn
COI to be developed into a TMP in May 2006\(^{41}\) with the proposal to include SO in the TMP
air mobile package that is currently managed by the AAvnTC.

5.20 It is desirable for the course to be formalised and upgraded to TMP status. As at the
date COL Greenland gave his evidence (25 August 2007) he was of the opinion that the
upgrading of the COI to TMP status could be achieved, should resources were allocated, by
December 2007.\(^{42}\) Once a TMP, the Commandant AAvnTC grants permission to conduct the
course and an external validation of the course after its conclusion is completed.\(^{43}\)

5.21 The Board recognizes that the referral of the COI to the AAvnTC by BRIG Bartels as
evidence that the formalisation process is now underway.

**Findings:**

5.1 The Special Operations course of instruction, while meeting the original intent as
described in SOPs, falls short with respect to the specialist SO flying techniques as they
have evolved.

\(^{36}\) MAJ 5 T1022.20
\(^{37}\) See also Section 4 “Helicopter Dynamics and Special Operations Approach” and “Section 7 Normalisation of
Deviance”
\(^{38}\) LTCOL Choice T1406.46 - 1407.5
\(^{39}\) COL Greenland T1776.3 -.10; Exhibit 164, Format for Training Management Package
\(^{40}\) COL Greenland T1778.15
\(^{41}\) COL Greenland T1777.15: BRIG Bartels T1801.35
\(^{42}\) COL Greenland T1781.12 and T1781.25
\(^{43}\) COL Greenland T1782.43
5.2 The Special Operations course of instruction has not been formalised despite being in place for more than a decade.

Recommendation:

5(a) The course of instruction should be formalised as soon as possible to ensure proper design, resourcing and validation.
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SECTION 6

AVIATION RISK MANAGEMENT

INTRODUCTION

6.1 The circumstances of the loss if Black Hawk 221 must be examined in the context of the principles, mechanisms, imperatives and models of Aviation Risk Management (AVRM).

6.2 Aviation Risk Management is described in the booklet Aviation Safety Management Systems in the ADF – A Commander’s Guide published in December 2003\(^1\) as “the proactive process by which hazards are identified before activities are undertaken, and appropriate mitigators put in place”. AVRM has existed in some form since man first took to the skies. Intuition and gut feeling provided the earliest examples of AVRM. More recently and especially since the Australian Army Black Hawk accident in June 1996, significantly more formal processes have been developed and adopted across the three services\(^2\). On 17 July 2001, DI(G) OPS 40-2\(^3\) was issued to formalise and rationalise the subject area across the entire ADF. That DI(G) is complementary to separate Defence Instructions for the services\(^4\) and is based largely on the Australian & New Zealand Standard 4360-1999 – Risk Management. Australian Army Aviation has adopted DI(AF) OPS 1-19 Royal Australian Air Force Aviation Risk Management\(^5\) for their use.\(^6\)

6.3 The aim of AVRM as written in DI(G) OPS 40-2 is “...to support operational decision making to achieve Service and ADF aviation operations in a manner that enhanced combat power and readiness while mitigating the risk of preventable loss or damage to personnel and equipment.”\(^7\)

6.4 There are three principles fundamental to achieving the aims of AVRM\(^8\):

a. *Do not accept unnecessary risk.*

b. *Accept risk only when the benefits outweigh the costs*

c. *Make risk decisions at the appropriate level.*

6.5 Finally, DI(G) OPS 40-2 provides the following précis regarding Risk Management

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\(^1\) Exhibit 171, Aviation Safety Management Systems in the ADF – A Commander’s Guide
\(^2\) Capability Through Risk Management – AVRM Operator Handbook; admitted to BOI as Exhibit 285
\(^3\) Exhibit 126, DI(G) OPS 40-2 ADF Aviation Risk Management
\(^4\) Ibid paragraph 18
\(^5\) Exhibit 205, DI(AF) OPS 1-19 Royal Australian Air Force Aviation Risk Management
\(^6\) Exhibit 205, SI(5 AVN) OPS 6-101A, paragraph 1
\(^7\) Exhibit 171, Aviation Safety Management Systems in the ADF, paragraph 6
\(^8\) Ibid paragraph 8

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Culture⁹:

"AVRM relies upon the maintenance of an effective risk management culture, wherein all those associated with ADF aviation operations value the contribution that risk management makes to mission success and force preservation. The acceptance of risk does not equate to recklessness or a cavalier attitude to the risks intrinsic to the ADF aviation operations. The risk management process will only enhance combat power in an environment in which risks are managed to achieve the objective with acceptable residue risk. If commanders create an environment that is either risk averse or where risks are ignored (inadvertently or deliberately), mission success and force preservation objectives will be compromised."

AVRM DURING OPERATION QUICKSTEP

6.6 The Army Air Element embarked in KANIMBLA for Operation QUICKSTEP had numerous regulations, instructions, orders and guides that detailed the application of AVRM. These include:

a. DI(G) OPS 40-2, ADF Aviation Risk Management;¹⁰

b. DI(G) OPS 28-2 ADF Flying Safety Philosophy, Organisation and Responsibilities¹¹

c. DI(AF) OPS 1-19 Royal Australian Air Force Aviation Risk Management¹²

d. Chief of Army Directive 2/98 – Army Risk Management¹³


g. SI (5 AVN) OPS 6-101A Aviation Risk Management¹⁶

h. Operation QUICKSTEP OPORD TG 01/06 dated 15 November 2006¹⁷

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⁹ Ibid paragraph 9
¹⁰ Exhibit 126
¹¹ Exhibit 205
¹² Exhibit 205
¹³ Exhibit 283
¹⁴ Exhibits 268 and 274
¹⁵ Exhibit 171
¹⁶ Exhibit 205
¹⁷ Exhibit 76
6.7 In broad terms documents g. – j. provided the 'operational' guidance for AVRM to the personnel of the 171 Avn Sqn Det. The remaining documents provided the higher level (strategic) direction and guidance.

6.8 The Operation QUICKSTEP OPORDER\textsuperscript{20} provided a risk management plan for the entire force during Operation QUICKSTEP and did not just focus on aviation. This document is co-signed by both the Commanding Officer of KANIMBLA, CMDR Bannister and Commander of the Army Task unit embarked (including 171 Avn Sqn), LTCOL U. Of particular note is that within the Risk Assessment Summary the risk of "Drowning if helos ditch in water" was identified\textsuperscript{21}. Prior to that document being promulgated, 171 Avn Sqn had produced their own Risk Management Plan\textsuperscript{22} for use during Operation QUICKSTEP. This was to supplement the Standard Mission Risk Profiles (MRP) compiled by 5 Avn Regiment\textsuperscript{23} that form the basis of day to day AVRM. These MRPs for the most part had been published in April 2004. The utility of Standard MRPs is that for common operational and flying scenarios (nominal missions)\textsuperscript{24}, a full risk assessment or Risk Management Plan (RMP) does not need to be completed from scratch prior to each event.

6.9 The Board here states its view that the danger of such standard profiles is complacency through regular acquaintance, and then over familiarisation, with the subject matter. This needs to be guarded against by continual review and education at all levels.

AVRM AS APPLIED TO THE FLIGHTS ON 29 NOVEMBER 2006

6.10 Prior to any flight being authorised a risk profile is to be completed and notated in the Flight Authorisation sheet – OA82\textsuperscript{25}. For a nominal mission, a formal risk assessment is not required and the appropriate MRPs are to be used and listed. This was the case for Black Hawk 221 flight pm 29 November 2006. The following MRPs that were considered to be appropriate for the sortie, notated as serials 87-91\textsuperscript{26}, are summarised below:\textsuperscript{27}:

\textsuperscript{18} Exhibit 128
\textsuperscript{19} Exhibit 127
\textsuperscript{20} Exhibit 76, OP QUICKSTEP OPORD TG 01/06 dated 15 November 2006
\textsuperscript{21} Ibid
\textsuperscript{22} Exhibit 128, 171 Avn Sqn Risk Management Plan for OP QUICKSTEP dated 07 November 2006
\textsuperscript{23} Exhibit 127, 5 Aviation Regiment Mission Risk Profile (MRP) Register
\textsuperscript{24} Exhibit 205, SI (5 AVN) OPS 6-101A, paragraph 22
\textsuperscript{25} Exhibit 129, Flying Authorisation Sheets, page 11 – OA 82
\textsuperscript{26} Ibid
\textsuperscript{27} Ibid
No. | Objective | Risk | Residual Risk
---|------------|------|----------------|
1  | a/c operations by day | Low  | Low |
3  | a/c operations by night | Medium | Medium |
7  | Multiple a/c operations | Medium | Medium |
11 | a/c operations whilst deployed onboard a ship | Medium | Medium |
13 | Special Operations | High | High |
14 | Hot refuel | Medium | Low |
18 | ABS operations | Medium | Medium |
n/n | RMP – OP QUICKSTEP | High | High |

6.11 In evidence, MAJ 3 highlighted the process that should occur as to the use of the MRPs in the mission planning. He stated:

"During the planning of any of the serials, they will go through the MRPs. They will go through the MRPs to ensure that there actually is an MRP that covers what they want to conduct in a sortie. And those MRPs are available, located in the same place as the flight authorisation book. Mostly, individuals will remember the MRP numbers and MRP titles as they exist in our booklet. Now, that's only a result of familiarity by doing them a number of times. It is not my expectation they will learn them by rote. In fact, that will not be the case. They should consult the table, when they come to fill out the flight authorisation based on the requirements for their particular sortie."²⁸

6.12 MAJ 3 further said how the MRPs would be raised at the Flying Orders:

"Normally, one of the last things that is briefed at orders is, "And the risk assessment for this is A, B, and C." It would be "This is a fast roping serial. This is covered under MRP X, Y and Z and the residual risk is low, medium, high", whatever it happens to be."²⁹

6.13 MAJ 3 was asked by the Board:

Do you think it is possible that having these standard mission risk profiles that were drafted a number of years ago, a certain level of complacency and formality comes into it where we know they're there, they're on the bookshelf and, over time, the dust starts to gather on that bookshelf and it becomes in some way a box ticking exercise for this type of activity?"³⁰

²⁸ MAJ 3 T2102.3-15
²⁹ MAJ 3 T2102.27-31
³⁰ CMDR Rourke T2132.41-47
6.14 MAJ 3 answered:

"Firstly yes I do. I am also aware that completely separate to this Board, a reasonably recent safety audit conducted by 16 Brigade came to a similar conclusion I believe."\(^{31}\)

6.15 It was then put to MAJ 3 that "...a lot of the tactical level briefings regarding safety of the mission, not the mission itself, but the safety aspects, were just glossed over."\(^{32}\) MAJ 3 responded:

"I can see, as an independent third party, how that would be observed."\(^{33}\)

6.16 AVRM as stated earlier in this section is "the proactive process by which hazards are identified before activities are undertaken and appropriate mitigators put into place."\(^{34}\) The manner in which AVRM was being conducted on the 29 November 2006 by 171 Avn Sqn was inadequate to achieve this aim.

6.17 The MRPs and RMPs do identify known risks for particular flying activities and if need be, those risks have been mitigated against to reduce the overall level of risk. For example, the RMP at the Operation QUICKSTEP OPORD\(^{35}\) identifies the risk of drowning if a helicopter ditches as HIGH, having a likelihood of POSSIBLE and the consequence CATASTROPHIC. By applying the following mitigators, the residual risk has been reduced to MODERATE (medium). They were: full safety briefings, all personnel to wear life preservers, aircraft doors to remain open when flying over water, minimise exposure to over water flight and all personnel to be HUET trained.

6.18 However, what was missed in the application of AVRM were the additional safety considerations for that particular sortie, the ‘tactical’ application of AVRM. There is no evidence that AVRM processes were appropriately applied to cater for the variables on the day, being the weather, the relative wind and therefore tailwind termination, the rate of ships drift, the fact that KANIMBLA would be not making way and would be ‘static’, the additional weight of passengers, seating of the passengers, the type of profile and manoeuvre that was going to be flown and that the aircrew had not flown to a ‘static’ target for some time.

6.19 If the AVRM processes had been applied correctly, hazards associated with these conditions could have been established and efforts made to reduce the overall level of risk. The only evidence of any risk mitigation being briefed was MAJ 3 stating at Flying Orders that "...we haven’t done this in a little while. Let’s make this an 80 percenter and creep up on it"\(^{36}\) (or words to that effect).

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\(^{31}\) MAJ 3 T2133.1-4  
\(^{32}\) CMRD Rourke T2133.14-17  
\(^{33}\) MAJ 3 T2133.18  
\(^{34}\) Exhibit 171, Aviation Safety Management Systems in the ADF – A Commander’s Guide  
\(^{35}\) Exhibit 76, Operation QUICKSTEP OPORD TG 01/06 dated 15 November 2006  
\(^{36}\) MAJ 3 T2076
6.20 Notwithstanding that direction given by MAJ 3, CAPT Bingley, in the Board’s view, seems either not to have heard it, or if he did he ignored it, but appears certainly failed to fly in compliance with the direction or its spirit. It is otherwise dangerous for the Board to speculate.

6.21 The AAIT made the finding that:

"The AAIT could not ascertain what AVRM processes were applied specifically to this SO assault serial. A thorough application of AVRM processes at the tactical level should have identified the risks that the flight crew were likely to encounter during the mission execution." 37

6.22 GPCAPT Lee in his statement said 38:

CAPT Bingley’s excellent flying record, his professionalism, and the very high regard within which he was held in the squadron, do not indicate that he would have intentionally and knowingly, accepted the extremely high level of risk inherent in flying the training mission in the way he did under the prevailing conditions, and in a manner which would unnecessarily endanger his crew and passengers.

In my view, the most opposite explanation is that CAPT Bingley, and his crew, simply did not fully understand, appreciate, or perceive the extremely high level of risk involved in flying the mission in the way that he did under the particular circumstances and environmental conditions pertaining at the time. If he had been aware of the potential outcome it is most unlikely that he would have operated in the manner that he chose to do.”

6.23 The Board agrees with the observations in the paragraphs above.

Finding

6.1 The tactical application of AVRM was not adequately processed and thus failed to identify and address numerous hazards which cumulatively had a direct causal effect on the loss of Black Hawk 221.

Recommendation

6(a) The continued education and emphasis of AVRM at all levels should be a high priority.

37 Exhibit 5, AAIT Report
38 Exhibit 170, Statement of GPCAPT Lee
6(b) **Leadership must actively discourage the application of AVRM from becoming an administrative ‘box ticking’ exercise.**

**ACCEPTANCE OF RISK IN TRAINING**

6.24 The Black Hawk sortie on 29 November 2006 had been deemed a HIGH risk activity according to the MRPs that were in force for that particular flight. The 171 Avn Sqn Detachment Commander, MAJ 3, was authorised to approve up to HIGH risk and he did so.

6.25 The question needs to be asked: when would the benefits of a training flight be worthy of placing air crew and passengers in a high risk situation? Logically the answer is never. Accepting the key AVRM principle of accepting risk only when the benefits outweigh the costs, this can be the only answer. To accept HIGH risk, there must be an essential outcome worthy of that risk. For example, if not doing the activity would place others in even greater risk, such as could be imagined in a rescue mission; that would be acceptable. A training sortie could never satisfy that requirement.

6.26 ‘Train as you fight’ is a phrase often touted and in broad terms it is agreed to. However, there are limits to that and there are methods to achieve effective military training without unduly exposing personnel to unnecessary risk. By not accepting HIGH risk for training activities, does not indicate a risk averse mentality but rather it is about minimising unnecessary risks which may impact on force preservation and task achievement. Any exception to this would need to be extraordinary and if that were the case, a full risk assessment should be completed justifying the benefits and how they outweigh the costs. Approval should only then be considered at a high level.

6.27 Of note and the Board was pleased to see that COMDT 16 Bde (Avn), BRIG Bartels, issued a revised instruction dated 30 July 2007 stating that:

> AAAvn units are authorised to conduct training at an overall ‘Medium risk’ level, subject to the condition that risk to safety is at the ‘Low Risk’ Level. For operations, authorised risk levels for all risk dimensions will be specified in the COMD’s directive to the OP COMD. In all cases, risk levels higher than those authorised must be referred to the COMD 16 Bde Avn for approval.

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39 Exhibit 127 - 5 Aviation Regiment MRP Register. MRP No.13 indicates that risk is assessed as being HIGH for capability, mission, safety and PR/ Morale
40 Exhibit 205 – SI (5 AVN) OPS 6-101A Aviation risk Management
41 Chief of Army Directive 2/98 - Army risk Management
42 SI(AVN) OPS 6-101 Army Aviation Safety Management dated 30 July 2007
Finding

6.2 Acceptance of HIGH risk in regards to safety is intolerable for training activities unless in extraordinary circumstances. Then, the benefits in accepting that risk must be clearly understood and justified in a detailed risk analysis.

Recommendation

6(c) ADF should not accept HIGH risk (regarding safety of personnel) for any training activity. Any exception must be justified through the detailed risk analysis and approval considered at a high level.
SECTION 7

NORMALIZATION OF DEVIANCE

INTRODUCTION

7.1 “Familiarity breeds contempt” is a well known aphorism. The general truth embodied in it is that the reason for and importance of an exception to a rule diminishes with the frequency of its application. Respect is thereby lost for the rule. This phenomenon can also be known as ‘normalization of deviance’.

7.2 In the light of this Inquiry, the Board has concluded that many instances of normalization of deviance have occurred at 171 Avn Sqn.

7.3 Group Captain (Dr) Lee, an eminent psychologist and internationally recognised expert in aviation human factors\(^1\) provided the Board with the following explanation of the phenomenon:

“Over time, operational personnel develop informal and spontaneous group practices and shortcuts to circumvent deficiencies in equipment design, clumsy procedures or policies that are incompatible with the realities of daily operations, all of which complicate operational tasks. These informal practices are the product of the collective know-how and hands-on expertise of a group, and they eventually become normal practices. This does not, however, negate the fact that they are deviations from procedures that are established and sanctioned by the organisation, hence the term ‘normalization of deviance’. In most cases normalized deviance is effective, at least temporarily. However, it runs counter to the practices upon which the system operation is predicated. In this sense like any shortcut to standard procedures, normalized deviance carries the potential for unanticipated ‘downsides’ that might unexpectedly trigger unsafe situations.”\(^2\)

7.4 Several witnesses for example stated, and exposed their awareness that they sometimes fly on the brink of acceptability. CAPT 6: “On Special Operations approaches, we are often on the edge of the performance envelope”\(^3\). When questioned however, CAPT 6 was unwilling to admit that he meant that 171 Avn Sqn flies beyond the capabilities of the aircraft. “You’re still operating within the operating limits of the aircraft, but inherently trying to get the maximum out of the aircraft”\(^4\). He stated that he considered himself a conservative pilot\(^5\).

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1 Exhibit 170, GPCAPT R Lee CV
2 Exhibit 170, Statement of GPCAPT Lee
3 Exhibit 132, Statement of CAPT 6, paragraph 36; CAPT 6 T1376.18
4 CAPT 6 T1376.26
5 CAPT 6 T1380.6
7.5 LTCOL Glenn McCall, the SO1 Standards at Headquarters 16 Bde (Avn) described normalised deviance thus:

"Pilots or aircrew eventually become inured or start to underestimate the level of complexity of the tasks that they are operating in, and they start to become comfortable in ranges of operations which aircrew should still not underestimate what they're doing."

If everyone starts to feel that they're comfortable and that there are no red flags being identified, that there are no hazards being identified, that's where the risk shift starts coming in. Authorising officers, aircraft captains, individual crew members start to identify that their level of skill, their understanding of the mission, is such that they don't see anything wrong."

7.6 In this section, examples of normalized deviance will be covered in some detail. In particular, 171 Avn Sqn's attitude to wind, aircraft manoeuvring standards, acceptance of Operational Contingency Loading (OCL) as the operational norm and the misunderstanding of Ship Helicopter Operating Limits (SHOL). 171 Avn Sqn's attitude towards acceptance of main rotor droop has been covered in Section 4 and is another unfortunate example of normalized deviance.

**ACCEPTANCE OF TAILWIND AS AN OPERATIONAL NORM**

7.7 MAJ 4 listed a range of occurrences which could mean that terminating with a tail wind is required as the safest approach – the tactical situation, target construction, nature of the surrounding terrain, airspace restrictions, proximity of threat weapon systems, and the troop dispositions on the ground. Accordingly, he concluded that it is necessary to train and practise terminating with a tail wind. Similar views were expressed by other aircrew from 171 Avn Sqn. Accepting the proposition however, does not and should not mean that flying in an out of wind condition becomes the norm. This appears, as stated, to be the position at 171 Avn Sqn. In further support for this proposition the Board notes there is no indication in the SO Techniques Course of Instruction lecture package (as at 29 Nov 06) that the default Airmanship position is termination into wind. Rather, the flare point formula appears to be presented as an objective mathematical calculation that will enable the pilot to fly in any wind condition.

7.8 In evidence, CAPT 11 by his answers displayed what at times appeared to the Board to be nonchalance with respect to wind:

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6 LTCOL McCall T1722-32
7 LTCOL McCall T1723-32
8 Exhibit 124, MAJ 4 Statement, paragraphs 20 and 21
9 Exhibit 132, CAPT 6 Statement, paragraph 12; Exhibit 123, CAPT 11 Statement, paragraph 8
10 Exhibit 210, *Special Operations Techniques*
Q. Were you aware at the time that you were doing the walk-through that if you came down the active side port side and terminated to a hover over the flight deck, you would be terminating out of wind?

A. No, I was not.

Q. When you conducted your walk-through, did anyone raise with you that as you terminated turning left over the flight deck, something along the lines of, "Gentlemen, we will now have a tailwind"?

A. No, sir.

Q. Is that something that would have been of importance to you?

A. Myself, sir, I don't believe it's of great importance, no.

Q. Why is that?

A. Because we can still adjust the approach as required to counter for any tailwind or wind effect on the aircraft on the day. 11

7.9 General acceptance of tail wind as a normal operation is further evidenced by the words of aircrew when relating their prior experiences:

"I have personally conducted assaults operating at 19,500 to 20,000 lbs gross weight with a 30 knot tail wind." 12

"10-15 knots of tail wind is not considered to be detrimental to any approach, you just fly more conservatively, and 10 to 15 knots is not an issue for the Black Hawk. It can hover with a 45 knot tail wind at 20,000 pounds, which is in the Flight Manual" 13.

"The wind limit for the Black Hawk is 45 knots. I have hovered with a 20 knot tail wind, and all it means is that I flared earlier to slow and compensate for the greater power requirement on the aircraft in the final termination." 14

"That amount of wind (10 to 15 knots) is not a great deal of tail wind for the Black Hawk helicopter ... I have flown serials on other occasions where we were terminating with a tail wind in excess of 25 knots." 15

11 CAPT 11 T1232.39
12 Exhibit 124, MAJ 4 statement, paragraph 20
13 CAPT 6, T1363.36, referring to Exhibit 133
14 Exhibit 123, Statement of CAPT 11, paragraph 7
15 Exhibit 132, Statement of CAPT 6, paragraph 12

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We've already conducted approaches with 30 knots of tail wind, but it means that you have to modify the rate of deceleration, the point at which you decelerate and how you conduct the approach in terms of the rate of closure. You have to make adjustments, but the aircraft is capable of handling that tail wind on the day, easily.  

7.10 MAJ 4 gave evidence on 18 July 2007. He dismissed the tailwind as contributing in any way to the CAPT Bingley's accident: "I do not think that a 5 to 7 knot tailwind component caused the accident. I have personally flown with tailwind components much larger than 5 to 7 knots in much heavier aircraft and have not had an incident or an accident such as this, and I've done so on many occasions." MAJ 4 made this statement despite the fact that he had in fact experienced a similar incident in East Timor on the 23 June 2007, less than four weeks prior to his giving evidence. The Aviation Safety Occurrence Report described the incident as being a heavy landing following an episode of main rotor droop during the termination phase of an SO assault approach in the presence of a light tailwind component. The aircraft was substantially damaged. While MAJ 4, the aircraft captain, appeared less than clear about the details of the incident while giving evidence, it was equally apparent that he did not really appreciate that the presence of a tailwind may have contributed to either incident. CAPT 10, MAJ 4's co-pilot in East Timor, could not recall whether there was a tailwind or not. This further indicated to the Board the apparent lack of importance or lack of emphasis by aircrew placed on the presence of a tailwind during the conduct of an approach sequence.

Standardisation Manual

7.11 The Black Hawk Standardisation Manual, Chapter 2 deals with Airmanship Standards. Paragraph 10 lists nine "Embedded Requirements" which must be applied to all flying sequences. Of note, paragraph 10(e) requires that "Aircrew must always operate into wind unless a manoeuvre specifically calls for an out of wind condition. Pilots must always be aware of approximate wind direction and strength." (Emphasis added)

7.12 As the regulator of standards at 16 Bde (Avn), LTCOL McCall described how this embedded requirement should be interpreted:

"In my opinion, if a flying sequence calls for an out-of-wind condition, this must be referred to in the flying brief to aircrew and consequent adjustments required to the flying sequence must, by regulation, be briefed in the Approach Plan, this opinion is

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16 MAJ 2 T1155.26
17 MAJ 4 T1305.38
19 Exhibit 112, "The approaches were conducted IAW mission orders. Forecast wind on the evening was 050M/10 kts. Approach direction was 170M and speed from the IP was 100 KIAS. Actual tailwind component on approach as indicated by IAS/GS differential varied between 0-5 kts."
20 CAPT 10 T1401.42
21 Exhibit 161, AAP 7210.015-16
further supported by Standards and Guidance and specific Warnings throughout Chapter 16, 'Confined Area and Pinnacle Operations'. ... To operate 'out of wind' without some form of specific risk management plan is contrary to published guidance. 22"

7.13 The embedded requirement within the Standardisation Manual states that aircrew must always "operate into wind unless a manoeuvre specifically calls for an out of wind condition" 23 further explaining that "into wind means the wind is within plus or minus 30° of the aircraft's heading." 24 (emphasis added)

7.14 CAPT 11’s evidence as to non-conformance with the Standardisation Manual speaks for itself:

Q. My final question is, as a flying pilot making your approach and knowing that you were going to be terminating with a tailwind, did it concern you at all that you would be flying in contravention of what's in the Stan Man regarding quickstops and that it says in black and white that termination should be into a headwind for a turn and flare or flare and turn?

A. The quickstop is a different procedure as applied to what the SO profile is.

Q. Could you explain that, because we had a witness last week who said that it was pretty much the same manoeuvre.

A. A quickstop is used, but we have to obviously alter that profile for what we do. The procedures are generally used, but in terms of quickstop, in the numbers, ours are higher. We can't - I'm just trying to get my wording right. The procedure is used, but in terms of for what we're doing and the role, then a tailwind component is acceptable. 25

Q. So, as I understand it - and perhaps you can correct me if I'm wrong - when looking at the requirements that the Stan Man says for a quickstop, you also take into account the embedded requirements also set out in the Stan Man, taking into account the type of task you're required to perform. In this case, you were required to perform a task which involved a tailwind application and it was a task that was involved as part of training for a potential mission. Accordingly, therefore, a quickstop or quickstop-type manoeuvre can be used with a tailwind, taking into account those embedded requirements. Do I understand that as being the general framework?

22 Exhibit 158, LT COL McCall statement paragraph 13
23 Exhibit 96, paragraph 10(e)
24 Exhibit 96, note 2
25 CAPT T1247.2
A. That's how I take it, sir.\textsuperscript{26}

7.15 CAPT 6 seemed unsure why there were embedded requirements in the Standardisation Manual with regard to the wind. What he was able to try to explain on the subject was:

\textbf{Q.} Given that you have provided us Exhibit 133, and I accept that the Black Hawk has a downwind tailwind capability, as a non-pilot, one thing I'm still struggling with is the bit in the Stan Man which, when it talks about quickstops, says specifically they are not to be terminated downwind. Now, I know there's the embedded thing which says you should always do things into wind unless there are specific reasons where you can do it downwind.

\textbf{A.} Yes.

\textbf{Q.} If the Black Hawk has such a great downwind capability, why is it even mentioned in the Stan Man not to do it? As a pilot, could you explain that to me?

\textbf{A.} The wind is a contributing factor, but it does mention in the Stan Man, I think it says operate into wind unless the manoeuvre specifically calls for an out-of-wind condition. It is in the airmanship. And depending on the tactical scenario, it may not be feasible to terminate into wind.

\textbf{Q.} I am happy with that as an embedded requirement, and you've shown us a graph here which says that the helicopter is very capable. But for the quickstop manoeuvre in particular, why does it actually say in the manual not to terminate downwind? You already have the bit in the embedded stuff, so why even put that line in, do you think?

\textbf{A.} Because a quickstop is such a dynamic manoeuvre, and wind will be an increasing factor than a normal approach.

\textbf{Q.} It's always going to be a factor in any type of flying, but I'm just saying for this manoeuvre, the quickstop manoeuvre, you terminate into wind or you turn and flare or flare and turn, and for the last two, you do the final termination phase into wind. I'm still trying to come to grips with why we all think it's quite acceptable to not abide by that rule, or if it is okay to ignore that rule, why have that rule anyway?

\textbf{A.} I'm unsure why the rule is actually in there. But we have a requirement that sometimes we have to accept that we can't terminate into wind.\textsuperscript{27}

\textsuperscript{26}CAPT 11 T1249.30
\textsuperscript{27}CAPT 6 T13082.39
7.16 CAPT 6, whilst able to correctly identify the reason for the embedded requirements with respect to the quickstop, to the Board’s mind, was unable to link these same requirements with the conduct of an SO assault approach; an approach that is arguably more “dynamic” than the quickstop.

7.17 This evidence reveals to the Board an element of pride in an ability to have successfully operated in high tail winds, and a perception that great airmanship comes from flying the aircraft at its limits, rather than being slavish to the rules.

7.18 In discussing aircrew deviating from the Airmanship Standards in Chapter 2 of the Standardisation Manual, LTCOL McCall raised the warning in paragraph 54 of this same chapter:

“Some pilots when faced with various pressures may sacrifice Airmanship Standards in the belief that such standards are secondary to other considerations. This is not acceptable. Airmanship Standards are designed to ensure safe and efficient operation of the aircraft at all times.”

7.19 The combination of these factors over time contributed to an actual drift away from safe flying practice with respect to wind. This is because the boundaries defining normal safe activity have widened to encompass conduct and conditions which should not be so classified.

7.20 Finally it was put to MAJ 3 “...if it’s unknown that you are going to have a downwind final component for the termination phase, should you not then brief the worst case, as we military men often do, and presume that you may have one (tailwind) ......” He replied; “Sir, with the benefit of hindsight, I will do it from now on.” 28

Analysis

7.21 Whilst MAJ 4 maintained that terminating with tail wind should be avoided if possible29, other evidence illustrated a degree of what the Board characterizes as “nonchalance” in relation as to termination in and out of wind condition.30 The fact that no specific plan was adopted for the potential of an out of wind condition on 29 Nov 06 leads to the conclusion that the potential risk associated with such flying is not adequately recognised in practice.

7.22 The Board accepts that the Black Hawk is capable of handling tailwinds, including downwind approaches, under certain conditions. The Board however states that these

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28 MAJ 3 T2132  
29 Exhibit 124, MAJ 4 Statement, paragraphs 20  
30 Exhibit 124, MAJ 4 statement, paragraph 20, CAPT 6, T1363.36, Exhibit 123, Statement of CAPT 11, paragraph 7, Exhibit 132, Statement of CAPT 6, paragraph 12 and MAJ 2 T1155.26, etal
circumstances should be the exception. A thorough assessment of the requirement and the associated risks should be carried out prior to undertaking such manoeuvres. In the presence of a tailwind, the approach sequence must be modified so as to be more conservative than if conducted into wind. The Board does not doubt that 171 Avn Sqn personnel hold a genuine belief that this Airmanship Standard underpins all their flying. However, the evidence indicates that the “if possible” partial exemption in paragraph 10(e) (pilots may fly with a tail wind if “a manoeuvre specifically calls for an out of wind condition”) has taken on a life of its own. Put simply, the desire to prepare for occasions when the exemption may have to be exercised, has led to the exemption becoming a part of normal flying operations.

Finding:

7.1 171 Avn Sqn has experienced normalised deviance with respect to conducting assaults, hovering, and terminating with varying amounts of tail wind. Over time the special consideration normally afforded to the effect of a tail wind in the final phases of an approach has been replaced with trust in pilot ability and an overconfidence in the Black Hawk’s performance under such circumstances.

Recommendation

7(a) The Standards Manual policies and procedures must be adhered to. Any departure from those procedures must be fully validated and documented prior to operational use.

EROSION OF THE STANDARDS

7.23 According to LTCOL 1, MAJ 2 “is the most experienced Black Hawk pilot and special operations pilot in the ADF” 31 and is the custodian of the Unit’s flying standards both by virtue of his position and the delegation from his CO.

7.24 According to MAJ 2, the SO assault approach is a low-risk manoeuvre. 32

Q. In terms of the flying alone, how would you rate this particular serial in terms of risk?

A. Risk - the manoeuvre is low risk. Where the high risk comes from is the consequence part of AVRM, and that is to do with how many people are on board, so the potential for fatalities. So once you include the passengers and you go to many fatalities, then you move into the catastrophic consequence, and that’s where the risk increases from there.

31 LTCOL 1 T1523.25 and Exhibit 137, statement of LTCOL 1, paragraph 11
32 MAJ 2 T1159.10
Q. So in terms of manoeuvre, this particular manoeuvre, as compared to other manoeuvres conducted by 171 – are there more high-risk manoeuvres that you would conduct?

A. As I said earlier in evidence, if you’re at any of the air mobile squadrons, you can do it at any air speed and at 50 feet, so our parameters are actually higher for entry than we’re entitled to do for normal operations.

Q. And that would reduce your risk?

A. It makes the risk an increased risk because I’m closer to the ground and I can do it at higher speed, but that manoeuvre on its own - if you took away the passengers and I did it in a benign environment, it’s a low-risk manoeuvre. However, if I was to do it over a built-up area with a full complement of soldiers on board, then the risk would change because of the consequence, not the manoeuvre. 33

7.25 In MAJ 2’s opinion, there is no difference in the degree of difficulty between standard approaches, quickstops and SO assault approaches.

Q. In your estimation, there is no increased judgment required to execute a tactical approach versus a standard helicopter approach?

A. No, a tactical approach requires more, but not the difference between a quickstop and the type of approach you’re suggesting that we do.

Q. The quickstop that I’m talking about and referred to in the Stan Man refers to one that intercepts finals.

A. No, not the Stan Man. I think you’re referring to the pilot handling note, sir.

Q. So you don’t believe there is an increase in judgment required on behalf of the pilot to execute a manoeuvre that terminates in the hover from a significant nose-up and potentially a significant bank angle over that required for a quickstop which has you terminating wings level?

A. No, I don’t.

Q. Is it possible then that the current SO approach actually exposes the helicopter to conditions that promote rotor droop?

A. Only in the same manner as the quickstop does, being the manoeuvre that it’s based on.

33 MAJ 2 T1159.33
Q. I am having a bit of difficulty understanding how a different manoeuvre that’s based on something that’s simpler is not more difficult, nor does it expose the helicopter to increased edge of the envelope influence?

A. I disagree that it’s the edge of the envelope, and with a quickstop I can actually execute it at greater speeds and at lower altitudes. I don’t see how the assumption is that it is a less dynamic manoeuvre than an SO approach.

Q. I put it to you that the dynamic nature of the manoeuvre is not in the entry conditions but the termination conditions. One is that you’re actually terminating to the hover from - in this particular case, the incident aircraft was at least 20 degrees nose up, 43 degrees left angle of bank, indeterminate amount of sideslip on, engines producing no torque. I find it difficult to understand how that may not be an area that would not promote and expose the aircraft to increased risk of main rotor droop. Can you comment on that?

A. Are you saying that in terms of the SO approach that we conduct, that would be more dynamic in those circumstances, or with reference to the quickstop, because the quickstop is the same manoeuvre; it’s the basis of what we are doing and it is not necessarily more dynamic than the Stan Man that we are adhering to. I can potentially use the same fundamentals to do an approach that is not associated with SO.34

7.26 MAJ 2 agreed that the activity conducted on 29 of November 2006 fell within the techniques as taught and set out in the 5 Avn Regt SOPs and met the Standardisation Manual requirements.35 Furthermore while under cross-examination, MAJ 2 managed to perplex the Board by appearing to argue both sides of an issue with regard to compliance with the Standardisation Manual requirements.

Q. GPCAPT Fielder asked you about the standards manual, and you indicated that the limitations in the standards manual did not mean a successful termination in all circumstances.

A. Correct.

Q. What are the circumstances in which a successful termination would not occur but applying the standards that are in the manual?

A. The combination of environmental - the manner in which you fly the aircraft may not result in a successful termination unless you fly the aircraft smoothly and accurately. The conduct of an approach at sea level and one at a high-density altitude is a case in point. Having the right power if you make a mistake, assess the

34 MAJ 2 T1171.32 - T1172.37
35 MAJ 2 T1150.28
wind incorrectly, you may end up in a situation where the aircraft has an unsuccessful outcome, even though all of the stated parameters are met.

Q. But in those circumstances, the outcome that you refer to, would it not mean you would be looking at power or you would be looking at something else and adjusting that to ensure compliance with the requirements of the standards manual?

A. For instance on the power issue, if you had OGE plus 5, which is cat 4, going into a certain area, if you had a change of wind or you didn't assess it correctly, even though you have the minimum power as stated in those manuals, it doesn't guarantee that you'll have a successful termination. For instance, if there's a local change in temperature which invalidates your power - there are circumstances where it won't guarantee a successful termination, based purely on a set of parameters.

Q. But that is up to the flying pilot to make the allowances as to the relevant conditions that he might meet to ensure compliance with the specifications or the limitations in the standards manual?

A. The standards manual says if you are not assured with that power, you need to make a judgment or an assessment based on the environment as you see it.

Q. You need to make a judgment or an assessment to ensure compliance with the standards in the manual?

A. Well, for the successful outcome.

Q. By that application of the standards in the manual to the circumstances that you might meet, you would expect a successful outcome?

A. Correct.36

7.27 MAJ 2's evidence at best was unhelpful: was he being defensive of the SO assault approach, the standard for which he is responsible, or did he genuinely think that the SO assault approach is a low risk manoeuvre that is no more difficult to fly than the standard approach? It is difficult for the Board to determine. MAJ 2's evidence would suggest, whether he was conscious of it or not, that he had little concern about the SO assault approach techniques used and the degree of judgement required to perform the manoeuvres. Indeed MAJ 2 was protective of his entitlement to use the exceptions within the embedded requirements of the Black Hawk Standardisation Manual.

"The Stan Man gives me - within the embedded requirements, I'm allowed to exercise

36 MAJ 2 T1183.31 – T1844.33
my judgment if I need to make the approach out of wind, it's clearly enunciated in that portion, and the Stan Man indicates that I can use a number of combinations to achieve that. So having substantiated the requirement to do an out of wind termination and considering all the other relevant environmentals, I'm entitled to employ that technique.  

"I'm not sure what the other Stan Mans contain, sir, but the training at the school involves interception at the normal line. However, within the Stan Man I'm entitled to execute that approach."  

7.28 While MAJ 2 has successfully passed his annual QFI assessments, the Board noted that these tests were based on his ability to teach sequences and transfer information to a student with the aim of ensuring that learning will take place when he is instructing. The Standards Officer performing MAJ 2's most recent check was NOT as qualified and the selected serials are not normally related to the SO role. The annual QFI check is based on assessing the QFI's instructional ability and not on assessing the actual manoeuvres being flown. It is therefore reasonable to assume that the SO assault approach, accepted as being a legal and authorised approach by current SO aircrew, has not been validated outside of 171 Avn Sqn for some considerable time. Without external validation it is possible that any deviance from the originally authorised SO assault approach standards, as described in the 5 Avn Regt SOPs, could pass undetected. Also of interest to the Board were comments made by LTCOL McCall about MAJ 2's previous performance as an SO pilot.

Q. One thing that is a little concerning is that you said that MAJ 2 had modified his behaviours and attitudes. Can you expand on that as to what you mean and what standard you're gauging that from?

A. MAJ 2 was an SO pilot, prior to leaving, in Townsville. MAJ 2, as I remember back in history - and I can't tell the time - by COL 1, if I remember correctly, was removed from flying status for incidents associated with the way he flew, so he was controlled by his supervisor. MAJ 2 had a time period outside the Defence Force. When he came back in, he and I had a fairly frank discussion, and I told him (a) what I thought of him, (b) how he was generally thought of as a pilot in the ADF, and he basically said, "The attitudes and the considerations I had before I left, I've" - you know, he pretty much said that he's taking things much easier; he's not taking things personally and he understands that he has to give himself the safety factors, that he has to be more considerate of the air frame and considerate of those individuals around him. He can be a fairly prickly character, but I have confidence in his skills and abilities in the aircraft.

37 MAJ 2 T1170.22
38 MAJ 2 T1171.4
39 LTCOL McCall T1769.2
40 LTCOL McCall T1768.42
41 LTCOL McCall T1768.24 and T1769.11
42 LTCOL McCall T1769.17-1769.45
Q. Nevertheless, someone who has been put on notice in the past would probably be on best behaviour when being further assessed?

A. That's what happens when Standards turns up, sir.

7.29 The Board is of the opinion that the standard SO assault approach has transformed over time and has become a more difficult manoeuvre to judge and to fly accurately. The mutated SO approach technique had thus far gone unnoticed and/or unchecked by the Unit Standards Officer and has not been formally validated or subjected to any external review for some considerable time.

SLIDING TURNS AND SLIDE APPROACHES

Sliding Turns

7.30 A sliding turn has been described to the Board as a manoeuvre used to “wash off the excess speed by slipping the aircraft”\(^{43}\) According to LTCOL 1, “the slide is applied wherever it needs to be applied to support the deceleration of the aircraft”\(^{44}\). He went on to say that a “sliding turn is not [a] specific manoeuvre that's taught”\(^{45}\) but “it's something that aircrew are aware of through the flight manual. I'm not sure whether it comes out in any particular course other than through the flight manual.”\(^{46}\) The Board could find no reference to a sliding turn in the Black Hawk Flight Manual.\(^{47}\) The flight manual does however make reference to the Black Hawk's sideward and rearward flight speed limits that maybe interpolated to provide side slip limits at various airspeeds.\(^{48}\) The approximate angles for various airspeeds are further articulated by SQNLDR Morris in his opinion on the subject:

“In the Black Hawk, one of the problems with the sliding technique is that there are no sideslip limits specified for the aircraft. The lateral limit I believe for the Black Hawk is 35 knots, so you would have to then look at, if you are slipping the aircraft, how much slip you can apply before you exceed the lateral velocity limits of the aircraft. If you are at 100 knots, 20 degrees would be your maximum slip; something like 24 degrees at 80 knots. Sikorsky don't specify a sideslip limit because they don't necessarily expect you to sideslip the aircraft, so it's an unusual thing to do, I believe.”\(^{49}\)

\(^{43}\) SQNLDR Morris T1912.31
\(^{44}\) LTCOL 1 T1547.45
\(^{45}\) LTCOL 1 T1547.46
\(^{46}\) LTCOL 1 T1547.37
\(^{47}\) Exhibit 213 passim
\(^{48}\) Exhibit 213 page 5-10
\(^{49}\) SQNLDR Morris T1912.34
Slide Approaches

7.31 According to 5 Avn Regt SOPs, one of two different approach types may be flown in support of a Fire Support mission.\textsuperscript{50} one being the standard SO assault approach and the other a slide approach that should be used \textsuperscript{51} so engage targets prior to the aircraft arriving at the target.\textsuperscript{51} \textsuperscript{51} the aircraft is slowed down early with “a level attitude and constant deceleration”. MAJ 4 described the slide approach as:

\textit{a straight-in approach in which the aircraft is kicked out of balance at some stage in the approach, typically as the aircraft is coming through around about 50 knots so that you do not exceed the sideways flight limits of the aircraft, and the additional drag put in place by the aircraft being out of balance is used to slow the aircraft down, rather than increasing the angle of pitch or angle of bank.”} \textsuperscript{52}

7.32 As the position is approached the aircraft is slewed away from the target \textsuperscript{53} In essence the aircraft is terminated slightly short of the landing point, with the nose of the helicopter pointing away from the target, thereby allowing unfettered view of the target area. Outside of the fire support mission, SOPs make no other reference as to the application of the slide approach. The slide approach is not described nor referenced in the Black Hawk Standardisation Manual.\textsuperscript{54}

7.33 The SO Training Briefing Notes specify that either a standard or the slide approach may be used \textsuperscript{55} and go on to say that “smooth is essential” for the termination phase.\textsuperscript{55} The illustrations accompanying the lecture slide entitled “Slide Approach” depict the aircraft as being slewed away from the target in a similar manner as described SOPs.\textsuperscript{56} The SO Training Briefing Notes do not make reference to the application of the slide approach outside of its utility as a technique. In particular, it is not referenced anywhere in the SO Training Briefing Notes as a SO assault approach technique.\textsuperscript{57}

Analysis

7.34 Scrutiny of the SO Briefing Notes, Black Hawk Flight Manual, Black Hawk Standardisation Manual and the SOPs reveals that the slide technique only has application in the role.

Although its application as an energy management technique to

\textsuperscript{50} Exhibit 205, SOP 413 paragraph 413.21b
\textsuperscript{51} Exhibit 205, Annex B to SOP 413 passim
\textsuperscript{52} MAJ 4 T1327.19
\textsuperscript{53} Exhibit 205, Annex B to SOP 413 paragraph 2
\textsuperscript{54} MAJ 4 T1327.33
\textsuperscript{55} Exhibit 102 “Support by Fire Techniques” page 11
\textsuperscript{56} Exhibit 102 “Support by Fire Techniques” page 12
\textsuperscript{57} SQNLDR Morris T1944.15
slow the aircraft down is recognized, this is not the purpose of the slide approach and its depiction in the SOPs and SO Briefing Notes.

7.35 LTCOL 1 did not accept the existence of a slide approach in the formal sense, explaining that "sliding is a procedure that could be utilized by any pilot, be they air mobile or special operations, in the conduct of their approach.

In contrast to this view, many witnesses described the slide approach as being an alternative to the SO assault approach technique. MAJ 4 stated that the slide approach "is primarily taught.

When asked whether a slide approach was appropriate to use in the circumstances that existed on 29 November 2006, he replied that "it was one of two basic options - that or a turning approach." With respect to training, MAJ 4 went on to say that while the sliding approach "is taught specifically, students are told that it can also be used for an assault approach on a confined target, and I also myself demonstrate and get them to fly a slide approach." 61

7.36 Under cross-examination, MAJ 4 went on to say:

Q. Also in response to MAJ Campbell's cross-examination, a slide approach is taught during the SO approach techniques?

A. That's correct, sir.

Q. We have previously heard evidence here by some students that it is not taught and, indeed, it's something that they have observed senior pilots conducting. Would you like to add to that?

A. The only thing that I can think is that they haven't been shown a slide approach in their course in the context of assault. They most definitely would have been shown, and conducted, a slide approach as part of an SBF. 62

7.37 With respect to whether the slide approach is taught during the SO Training Course, LTCOL 1 stated:

Q. We've heard the training aspects. What I'm getting at is why would some people be offered training in a standardised course and others not? In particular, let's have a look at a sliding approach where one pilot, who was a recent graduate, said he was not taught a sliding approach, and yet it is used as a regular approach technique. Why would that be the case?

58 LTCOL 1 T1523.3
59 MAJ 4 T1302.36
60 MAJ 4 T1302.42
61 MAJ 4 T1333.40
62 MAJ 4 T1327.3

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A. Sliding is a procedure that could be utilised by any pilot, in the conduct of their approach for the purpose of reducing rate of closure, decelerating more effectively.

Q. Should they not be taught that, then?

A. On the special operations qualification course?

Q. As a helicopter pilot.

A. Should they not be taught to slide the aircraft at some point in their training?

Q. Yes. If it's to be used as an advanced technique, I would assume that it should be taught at some point. Would that be a fair assumption?

A. I'm not sure whether it is taught at some point or not, to be honest with you, sir.63

7.38 When asked about the advantages and disadvantages of the slide approach MAJ 4, he stated that the "advantages are primarily visual cues oriented. Due to the reduced requirement to increase the nose-up attitude, it is easier for the pilot to remain in contact with his landing markers for longer during the approach.

7.39 A more serious problem with the slide approach was identified by SQNLDR Morris. When asked to offer an opinion as to whether a sliding turn could possibly introduce cross-coupling effects such as shielding the stabilator and giving unwanted feedback through other controls, he opined that the "cross-coupling in the mixing unit of the Black Hawk is a left pedal to lateral cyclic cross-coupling. That feeds in lateral cyclic if left pedal is introduced. So it does increase the amount of handling required by the pilot, if you are sideslipping."65 He further confirmed that the cross-coupling effects would be exacerbated if the rate of application was increased.66

7.40 MAJ 4 is the only witness to suggest that the slide approach could be considered as an alternative to the standard SO assault technique and he stated this on many occasions.67

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63 LT COL 1 T1522.43  
64 MAJ 4 T1334.8  
65 SQNLDR Morris T1944.23  
66 SQNLDR Morris T1944.31  
67 MAJ 4 T1271.37 ("Because the airframe clearance from the ship, whilst not below any specific limits, was relatively close and constrained the approach style to a slide approach or a slow turning approach."). MAJ 4 T1285.21 ("I didn't conduct a slide approach. I conducted a turn over the top of the deck whilst decelerating the aircraft, so was a constant turn rather than a slide."). MAJ 4 T1302.36 ("It [a slide approach] is primarily taught as a technique."). MAJ 4 T1302.42 ("Yes, it [a slide approach] was one of two basic options - in a or a turning approach"). MAJ 4 T1303.4 ("I personally find a turning approach easier to fly than a slide approach"). MAJ 4 T1333.3 ("It [a slide approach] can be used for either"). The following are references where the slide approach, in the context of an
On the other hand, LTCOL 1 seemed perplexed with the concept of a slide approach in the context of an SO assault. The Board could therefore not determine whether:

a. MAJ 4 was rationalising CAPT Bingley’s flying technique as demonstrated during the accident serial, or

b. MAJ 4 firmly believed that the slide approach is an alternative assault technique, or

c. the use of the Fire Support Slide Approach as an SO Assault Approach and the sliding turn as a decelerative technique within a turning quickstop were becoming normalised over time.

7.41 While the sliding turn is acknowledged by the Board as a being general flying technique used to decelerate a helicopter, its use as such has not been promulgated in any extant Black Hawk manuals. The only authorised application of this flying technique is as part of an approach. The Fire Support Slide Approach, as described in the SOPs and the SO Briefing Notes, bears no resemblance to be approach flown by CAPT Bingley on the 29 November 2007.

Findings:

7.2 The Fire Support Slide Approach, when used in the context of an SO assault, is not a legitimate application of the procedure.

7.3 The current use of the “Slide Approach” in the context of an SO assault, more likely than not, has come about as a “normalised deviance” of the standard Fire Support Slide Approach.

7.4 Due to the adverse effects of control cross-coupling, and the associated increase in pilot workload, the use of the sliding turn as a decelerative technique in the Black Hawk can be hazardous; particularly when applied to a dynamic manoeuvre such as the quickstop and the derivative SO Assault Approach.

Recommendation:

7(b) The slide slipping or sliding manoeuvre should not be used in the context of a quickstop, and in particular the Special Operation Assault Approach unless there is formal flight test validation.

assault, is the subject matter: MAJ 4 T1271.39, MAJ 4 T1272.9, MAJ 4 T1302.47, MAJ 4 T1303.47, MAJ 4 T1303.13 and MAJ 4 T1334.2

LTCOL 1 T1522.43 and LTCOL 1 T1523.3
ACCEPTANCE OF OPERATIONAL CONTINGENCY LOADING AS AN OPERATIONAL NORM

Operational Contingency Loading – Increased Risk

7.42 On 29 November 2006, the SASR passengers in Blackhawk 221 were restrained in a manner known as Operational Contingency Loading (OCL), using ‘helicopter restraint strops’ (HRS) which attach to the floor of the aircraft. OCL is a generic term for the carriage of passengers in Army aircraft where they are not properly seated nor restrained on approved aircraft seating. The use of OCL is limited as it increases the risks to passengers in the event of an aircraft accident. As the name suggests its use is for operational contingencies.

7.43 The sortie flown on the afternoon of 29 November 2006 was not an ‘operational contingency’.

7.44 Had the Troopers in the rear of the aircraft been properly seated and harnessed when Black Hawk 221 crashed, it is very likely that their injuries would have been significantly less. That the Troopers ‘should’ have been seated and harnessed will be discussed in detail later. Nonetheless, SQNLDR Pascoe, an Aviation Medical specialist and a member of the Accident Investigation Team, was asked:

‘if TPR Porter had been secured in a proper aircraft seat and with harnesses, rather than sitting on the floor of the helicopter and connected only by a strop, would you say it likely that his injuries would, on the balance of probabilities, be less severe than they were?’

He answered; “certainly”

Policy Governing OCL

7.45 The overarching extant policy for OCL is Deputy Chief of Army Directive 18/98 signed by MAJGEN P.J. Abigail on 25 September 1998. It states that:

Troops are deemed to be in an OCL configuration if one or more of the following criteria are met:

(i) The removal of some or all of the seats is required to enable troops and equipment to be loaded to the maximum capacity of the aircraft (combat loading).

69 CMDR Rourke T446-7
70 SQNLDR Pascoe T447
(ii) The carriage of a greater number of passengers than the aircrafts maximum approved seating allows (combat loading).

(iii) The carriage of troops unseated and/or unrestrained during takeoff, landing or operations below 1000 feet above ground level is required due to the nature of the activities being undertaken, even though the number of troops is within the aircraft's seating capacity (live hoisting, rappelling, fast roping, suspended extraction, support operations and water insertion).\textsuperscript{71}

7.46 On 10 May 1999, the then LCAUST, MAJGEN J.C. Hartley made an amendment to the Annex to DCA directive 18/98, but there were no major changes relevant to this discussion.

7.47 SI (AVN) OPS 3-107\textsuperscript{72} is promulgated under the authority of DCA Directive 18/98. It largely re-states the requirements for OCL in training from the DCA Directive.

7.48 As at 29 November 2006, 171 Avn Sqn was operating under 5 Avn Regt's publications and regulations, namely SI (SNAV) OPS 3-107\textsuperscript{73}, as 171 Avn Sqn's own SI (AVN) were only promulgated in January 2007.\textsuperscript{74} It states that for Special Forces Fire Support Operations, passengers must be restrained with an "individual restraint ... attached at all times".

7.49 5 Avn Regt SOP 413, Aerial Fire Support\textsuperscript{75} was also applicable to 171 Avn Sqn on 29 November 2006. Annex A illustrates where the fire support cabin layout for Black Hawk, and where snipers, sniper reserves and the sniper safety supervisor should be located. It clearly shows snipers sitting on the floor of the aircraft behind a sniper bar, with their legs hanging out of the cabin door onto a step.

Nature of the Activity Being Undertaken

7.50 In determining whether the SASR troops in Blackhawk 221 should have been in an OCL configuration, the key is the nature and purpose of the activity being undertaken. The five surviving soldiers all concurred that their understanding of the activity was that it was to be ‘dry’ Aerial Fire Support training without weapons.\textsuperscript{76} This is supported by the OC SAS Recovery Squadron, CAPT T, who stated that:

\textsuperscript{71} Exhibit 281 at paragraph 3(d)(3)
\textsuperscript{72} Exhibit 162
\textsuperscript{73} Exhibit 205
\textsuperscript{74} http://intranet.defence.gov.au/armyweb/sites/171AVN/comweb.asp?page=69731&Title=Standing%20Orders
\textsuperscript{75} Exhibit 205
\textsuperscript{76} Exhibit 237, Statement of CPL A, paragraph 6; Exhibit 154, Statement of TPR B, paragraph 4; Exhibit 10, Statement of TPR C, paragraph 2; Exhibit 238, Statement of TPR D, paragraph 2; Exhibit 9, Statement of TPR E, paragraph 2
“Each training exercise we planned had specific mission oriented objectives. ... We knew that the aviation guys from 171 Avn Sqn were going to be flying so we decided to use this as an opportunity to do sniping and AFS drills. The flying exercise on 29 November 2006 was a dry run incorporating procedural calls, in plain camouflage gear. The aim was to cover off on their procedures in the air, and practise using the intercom and radio systems on board the aircraft. Even during dry runs, the aircraft captain makes live calls as if he is doing it for real, which provides good practice for the troops in the back.”

7.51 CAPT T’s reference to “covering off on their procedures in the air” is in relation to the practical component to some sniping training that the SASR contingent had done prior to 29 November 2006. Likewise, one of the SASR Patrol Commanders embarked in KANIMBLA, SGT AB, explained that:

“All the members of that team that were in that aircraft on the day had passed a formal theory written test to ensure that they knew all the safety aspects of the activity, and then they were going up to do some dry rehearsals. All training we do is graduated, so it starts from the theory, then you will do dry practices and then live practices, both by day and night, and you’ll always go dry before doing it live. ... Some of them were about to undertake the sniper course. Some of them had been pulled off the sniper course to go on the task.”

7.52 TPR E had a unit video camera with him on the aircraft during the serial for Image Capture And Transfer (ICAT). His task was to film the close-up perspective of KANIMBLA as a target vessel as a training aid. CAPT T noted that this was a normal SASR training aid, with the film being used later to discuss techniques.

Requirement for the Activity

7.53 In more general terms, LTCOL U described the troops as doing “operational training for an operational capability” which consisted of “sniper serial visualisation”. He viewed this training as essential for the Task Force’s capabilities for the operation. Both LTCOL U and SGT AB expressed concerns about the degradation of the troops’ skills after a month at sea. Apparently there had been little opportunity for SASR training prior to 29 November

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77 Exhibit 246, Statement of CAPT T, paragraph 6-7
78 Evidence of TPR C, T168.27-33, Exhibit 10, Statement of TPR C at paragraph 2
79 Evidence of SGT AB, T1693.31-47
80 Exhibit 9, Statement of TPR E paragraph 3, Evidence of TPR E, T128.32-33
81 Exhibit 247, Statement of SGT W, paragraph 6
82 Exhibit 246, Statement of CAPT T, paragraph 6
83 Evidence of LTCOL U, T1620.44-47 and T1621.39-41
84 Evidence of LTCOL U, T1632.10-12
85 Evidence of LTCOL U, T1630.8-25; 1631.27-34; Evidence of SGT AB, T1696.25-33
2006 because of poor weather. KANIMBLA’s Operations Officer also stated that often training and activities had to be cancelled due to weather.

7.54 LTCOL U implied that had the SASR troops not been onboard the Black Hawks for these serials, special flights would have had to be scheduled for the required training. The presence of the troops was therefore maximising the use of the air assets for multiple requirements and purposes.

**Authorisation for OCL in Training**

7.55 The DCA Directive provides details when OCL may be authorised for training. One of those allows SF Fire Support Operations when “required training to reach OLOC (Operational Level of Capability)”.

7.56 The Operation QUICKSTEP OPORD executed by CO KANIMBLA and Commander Task Unit (CTU) 636.2.1 (LTCOL U) on 16 November 2006 defined the objective of Operation QUICKSTEP as conducting Special Recovery Operations capability. The activity being conducted by SASR personnel in BLACK 1 on 29 November 2006 comes within the training objectives necessary to be “postured for mission success on OP QUICKSTEP”. Accordingly, the Board accepts that the dry AFS training being performed was within the authorisation guidelines in the DCA Directive although the activity was maintaining OLOC rather than reaching it. However, the Board is not convinced that it should have been approved.

**Finding:**

7.5 OCL was within current guidelines for use in Blackhawk 221 on 29 November 2006.

**Normalised deviance – use of OCL**

7.57 The Board accepts that the use of OCL with Special Forces passengers would occur more frequently than with other Army personnel. However, each occasion must be taken on

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86 Evidence of SGT AB, T1696.25-33
87 Exhibit 26, Statement of LCDR Stringer, paragraph 17, see also Exhibit 246, Statement of CAPT T at paragraph 5; Evidence of WO2 F, T213.22-24
88 Evidence of LTCOL U, T1643.5-12
89 Evidence of SGT AB, T17017.8-14; Evidence of LTCOL U, T1643.5-12
90 Exhibit 76
91 Exhibit 76, paragraph 1e and Annex B Appendix 1
its merits and AVM properly applied to take into account the heightened risks associated with OCL. Although it is inconclusive, it is doubtful that this occurred on 29 November 2006 and that one of the fundamentals of AVM (Accept risk only when the benefits outweigh the costs\textsuperscript{92}) was not adhered to. This is the intent of the DCA Directive 18/98 and SI (AVN) OPS 3-107.

7.58 The Board believes that the use of OCL on Operation QUICKSTEP betrays a misunderstanding of this intent. Both documents emphasise that commanders at all levels are to be cognisant of the risk level inherent in loading troops in an OCL configuration. The fact that only very limited activities are authorised in OCL, and the approving authority for such airborne activities is Unit CO upwards, highlights the seriousness with which OCL should be considered.

7.59 Further, SI (AVN) OPS 3-107 also points out\textsuperscript{93} that aviation unit commanders must bring the risks inherent in OCL to the attention of commanders of supported formations. That is, the Aviators need to keep the Troopers informed of the additional risk.

7.60 When discussing risk, OCL and the HRS it is worthwhile to highlight the views of SQNLDR Pascoe. In cross examination the following dialogue was recorded:\textsuperscript{94}

\begin{quote}
A. "...Certainly you can get injuries as a result of seats breaking, but, again, in the process, potentially that seat breaking may reduce the force being transmitted to the body."

Q. "It's better to be in a seat strapped in than on the floor with a strop?"

A. "Certainly, because, again, it goes back to the principles of reducing the force and increasing the time for stopping, because, again, if you think about it, if you're on the end of a single-point strop, as the aircraft slows down over a particular time period, the human body could continue to move at the same speed and then, all of a sudden, is jolted to a stop when you get to the end of that strop, which is not really keeping them tightly restrained."

Q. "Nevertheless, just on the other point, is it your understanding for operational purposes that that is the mechanism used by the Special Air Services Regiment for this sort of serial or training that was being conducted?"

A. "Yes. They were certainly operating within their normal operating procedures, and there's a thing called operational contingency loading, which allows passengers to be completely unrestrained in the back of the helicopter. In fact, the SAS troopers had this helicopter restraint strop specifically designed for them in their operations,

\textsuperscript{92} Exhibit 171 - Aviation Safety Management Systems in the ADF – A Commander’s Guide
\textsuperscript{93} Exhibit 162 at paragraph 9
\textsuperscript{94} SQNLDR Pascoe T447-27

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because I guess they were operationally contingency loading frequently, and if you have no restraint whatsoever, then you can obviously just fall out of an aircraft. So I believe that the design of this strap is mostly to prevent that very thing, just falling out of an aircraft, doing your operations normally."

Finding

7.6 The use of OCL for 171 Avn Sqn activities when working with Special Forces has become the 'norm' and there is little 'contingency' about it. The operating culture of SASR and 171 Avn Sqn has shifted to normalise the use of OCL as a common activity. As highlighted in the more general discussion of normalised deviance generally above, when this occurs, the ability of the participants to identify and mitigate risks is compromised. Normalised deviance in respect of OCL is highlighted by the evidence before the Board.

7.61 The standard seating arrangement for the Black Hawk helicopter as detailed in current operating procedures for 171 Avn Sqn when conducting SO, is to have four UH-60 seats fitted athwartships at the rear of the Black Hawk cabin.95 This is contrary to any of the three seating plans (providing seating for ten personnel) that are detailed in the Black Hawk Flight Manual.96 It certainly indicates that the standard posture for carrying Special Forces is OCL.

7.62 It has been determined that the four Black Hawk aircraft deployed for Operation QUICKSTEP were fitted out in the standard SO configuration with the four UH-60 seats fitted athwartships at the rear of the aircraft and that additional seats were not embarked in KANIMBLA.97 As such the choice came down to flying with passengers in OCL or being restricted into seating passengers in the rear four seats only. By not taking the additional seats for the Black Hawk in KANIMBLA, essentially forced the use of OCL whenever troops were embarked, regardless of the risk assessment. If the additional seats could not be taken on the deployment for whatever valid reason, the Commander must accept a loss of flexibility in the aircraft’s use and this certainly does not justify using OCL unnecessarily.

7.63 While the Board accepts that the use of OCL was within current guidelines for the flight on 29 November 2006, it does not believe that Operational Risk Management and AVRM were properly applied. Given that the serial was a 'dry run' only 98, the Board questions whether the serial aims could have all been or very nearly all met with all or at least some of the personnel properly seated and harnessed. If that was the case, that should have been the approach taken.

7.64 Equally, the serials on 29 November 2006 were only going to include the AFS and

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95 SOP 401 – Part of Exhibit 205
96 Black Hawk Flight Manual - AAP 7210.015-1 Sect 1 Chap 1
97 TELCON – MAJ 3 / LCDR Probert – Secretary 20 November 2007
98 Exhibit 246, Statement of CAPT T, paragraphs 6-7; The flying exercise on 29 Nov 06 was a dry run incorporating procedural calls, in plain camouflage gear. The aim was to cover off on their procedures in the air, and practise using the intercom and radio systems on board the aircraft.
sniping training if there was time after completing the training that 171 Avn Sqn was trying to achieve. The Board’s view of AVRM is that if serial aims could not have been met from the seated position that consideration should have been given to putting the troops into the seats until the commencement of the AFS training, or that the aircraft land back onto KANIMBLA and embark the troops when needed. Having the troops in the higher risk OCL configuration for the entire duration of the flights on 29 November 2006 demonstrates to the Board that proper AVRM was not properly conducted for that sortie. This is especially pertinent noting that the flight in question was already deemed to be ‘high’ risk in accordance with the relevant MRP.\(^9\)

7.65 A further example of normalised deviance in relation to OCL is the evidence of TPR E. His statement notes that he was sitting on a seat in the left rear of the aircraft. He was not strapped in using the seat harness, but was attached by a helo strop with an attachment clipped to the floor.\(^10\) A harness would not have precluded TPR E’s completing his ICAT role in any way.\(^11\) That TPR E did not harness himself in the seat when he easily could have, suggests that his personal ‘safety culture’ is misaligned. The Board also concludes that TPR E’s actions are indicative of the general culture surrounding OCL in SASR. Likewise, at the tactical level, the aircraft crew were responsible for instructing TPR E to use his harness.

7.66 The Board is of the view that by embedding the use of OCL for SO as standard may have exacerbated the normalising of the misunderstanding of what OCL is – contingent.

Seating Arrangements in ADF Black Hawks

7.67 If Black Hawk helicopters were fitted with seats that enabled the passengers to perform their ‘contingent’ duties, that is, seats that are ‘fit for purpose’, the need for OCL and attaching personnel to the helicopter with a strop would be largely diminished or totally negated. The exception is in the circumstance where seats are removed to allow the maximum number of passengers to be carried (combat loading).

7.68 It has already been discussed that ‘contingent’ loading has become commonplace\(^12\), and particularly so when flying the Special Forces. Given that, the importance of fitting seats that are fit for purpose becomes a duty of care obligation of the employer (Army) to; take all reasonably practical steps to protect the health and safety at work of its employees.\(^13\)

7.69 There are numerous seating options that are currently available for the Black Hawk

\(^{9}\) Exhibit 127, MRP No. 13
\(^{10}\) Exhibit 9, Statement of TPR E, paragraph 4
\(^{11}\) Exhibit 247, Statement of SGT W, paragraph 6
\(^{12}\) See e.g. paragraphs 7.62 and following above
\(^{13}\) Occupational Health and Safety Act, 1991 – Section 16(1)
helicopter using two different seat variants (S70 and UH60 seats). It seems that the available Black Hawk seating is inadequate for the current employment. The challenge becomes designing seats that are ‘fit for purpose’ that will enable greater flexibility in the missions that can be completed in a seated, harnessed and safer way.

7.70 LTCOL U, the TU Commander embarked in KANIMBLA provided the following point of view when asked about seating arrangements:

A. ...if there are better solutions, we should look at those. But, again, the seating is not an uncomplex equation.

Q. I agree with that. Flexibility is key.

A. Correct, but if it made it safer, as with the capability process, we should do those things.

7.71 Accordingly, the Board’s opinion is that the ADF should investigate the possibility of designing passenger seating and harnesses that are fit for purpose and will enable embarked troops to perform the tasks required of them in a safer way.

7.72 The exception would remain when the seats are removed to allow the maximum number of passengers to be carried (combat loading). In this situation, a commander is faced with the choice of combat loading in OCL or taking fewer troops fully seated and harnessed, which is fundamentally a trade off between operational capability and safety. Succinct guidance needs to be provided to assist him or her in this decision. However, this posture should not become a ‘normal’ event and should only be used in extremis, in true ‘contingent’ circumstances and when the benefits outweigh the costs.

Findings:

7.7 In all likelihood the injuries to the passengers of Black Hawk 221 on 29 November 2006 would have been significantly less if they had been appropriately seated and harnessed rather than attached via a helicopter restraint strop.

7.8 It can be reasonably assumed that had TPR Porter been seated and harnessed the

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104 S70 seat is a crash worthy seat that is designed to enable packs to be carried by the occupant. The second type, the UH 60 seat, has no allowance for back packs. The advantage of the UH-60 seats is that they are smaller and lighter. There are three seating plans (providing seating for ten personnel) that are detailed in the Black Hawk Flight Manual.

105 LTCOL U T1644-36

106 Exhibit 171 - Aviation Safety Management Systems in the ADF – A Commander’s Guide. A fundamental principle of AVRM is that a risk is only taken when the benefit outweighs the cost.
injuries he sustained would have likely to have been less severe and as such his chances of escaping the sinking aircraft would have been significantly improved.

7.9 If AVRM had been properly applied so that the risk could be reduced to as low as reasonably practicable, approval for OCL would not have been given. However, given that the more appropriate seats were not available, the option to apply AVRM fully was taken away.

7.10 The risk to TPR E could have been reduced given that he was seated and could easily have been harnessed.

7.11 That current seating arrangements in the Black Hawk helicopter when in OCL do not provide adequate safety for its passengers and are not fit for purpose for some of the roles that the passengers are required to perform.

Recommendation:

7(c) That a design review be conducted to determine whether seats can be developed that will enable at least some of the roles that currently see Black Hawk passengers in OCL mode, be conducted in a seated, harnessed and safer posture.

7(d) Spare seating should be taken on deployments to allow the Commander of the Aviation Forces the maximum amount of flexibility in aircraft use whether it be for operations or continuation training.

7(e) A review of OCL requirements for Black Hawk operations be conducted to ensure that safety of passengers is not being unnecessarily compromised or sacrificed in trying to gain operational capability. The need is to provide safe operating systems and that any contingent loading should only be considered in operational extremis. The review should ensure that ADF complies as best it can and certainly within the spirit and intent of current OH&S requirements.

SHIP HELICOPTER OPERATING LIMITS

7.73 For the Black Hawk helicopter operating to LPA ships the development of SHOLS was comprehensive and thorough through the previously described first of class flight trials.

7.74 The Board accepts that as a matter of strict interpretation the SHOLS did not apply to the serials to be flown on 29 November 2006. Further the Board accepts there needs to be flexibility for 171 Avn Sqn pilots because of the nature of SO flying. However, the failure of the detached flight to refer to the SHOLS as a guide or indication for parameters for the flying serial displays a lack of understanding of the deviation and purpose of SHOLS.
7.75 The answer of pilots to questioning on this aspect in the evidence before the Board provides a basis for assessing an aspect of the “culture” within 171 Avn Sqn.

7.76 MAJ 2 described the SHOLS in the following terms –

“The SHOLS are for land launch on board the Navy vessels, and there is a set of circumstances, weights and winds which allow the aircraft to recover with an appropriate safety margin. With respect to the activity on the 29th, the actual incident profile, the SHOLS don’t apply to those.” 107

7.77 MAJ 2 was specifically asked why the VERTREP SHOL would not be used as a guide for operations he stated –

“Because we’re not conducting a VERTREP sir... we have no requirement to adhere to the VERTREP or SHOLS for the conduct – it’s purely a command approval to conduct rope insertions forward or aft. We have no requirements to adhere to those... because the target or the ship or the objective is just considered a confined area... that’s how we assess it.” 108

7.78 MAJ 3 in reference to SHOLS stated –

“...There are some SHOLS, but they are normally just pitch and roll limits. The training that we were conducting was not a launch and recovery, nor was it a VERTREP. It’s effectively a utility operation, which does not require a SHOL.” 109

7.79 MAJ 4 referred to the communications with the XO of HMAS NEWCASTLE and the preliminary planning to conduct the assault training to that ship. It will be recalled these communications were referred to in the SITREP of MAJ 3 and MAJ 4 of 28 November 2006 110 which stated in part –

“At the time of writing the conduct of the ASLT TRG 2 NEWC has been approved, however, it is the opinion of XO NEWC that the vessel must be underway IOT provide “safe” winds across the deck. Further avenues are being pursued to dispel this misconception.”

7.80 MAJ 4 explained the SITREP as follows –

“I can’t remember the details of the conversation, but the intent from XO NEWCASTLE appeared to be that he wanted to apply the ship’s helicopter operating limits to the conduct of assault serials, and I was trying to convince him that they did not apply in

107 MAJ 2 T1149.41-46
108 MAJ 2 T1178.27 - A7
109 MAJ 3 T2119.15
110 Exhibit 125, SITREP 28 November 2006 signed off by MAJ 4

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this case because we were not conducting a landing; we were conducting a hovering operation over the vicinity of the forecastle.”

7.81 Whilst it may have been the position that XO of NEWCASTLE believed the ship had to be in SHOL for helicopter operations\textsuperscript{111} the cautionary approach demonstrated was appropriate. As noted by SQNLDR Morris, Army aircrews are relatively inexperienced operating from ships\textsuperscript{112} and

“...the RAN are the subject matter experts regarding the operation of helicopters on and around ships and if they are concerned enough about the wind over the deck to cancel flying, then their concerns are worth listening to. The lack of relative wind should have been acknowledged as a significant hazard during the mission briefing and mitigating steps should have been implemented...”\textsuperscript{113}

7.82 The SHOL for “helicopter operations at anchor/buoy or not making way” are revealing. Within the particular SHOL is a warning that reads as follows –

“The intent of the instruction regarding the conduct of helicopter operations at anchor/buoy or not making way is not to avoid achieving a SHOL. Where a SHOL can be achieved it is to be achieved and used.”\textsuperscript{114}

7.83 The evidence of 171 Avn Sqn pilots indicates that the above warning received little or no regard. Indeed the evidence before the Board is that the SHOLS were not referred to even as a guide for operations on 29 November 2006.

7.84 SQNLDR Morris noted –

“A number of SHOLS are presented in ABR 5419 for launch, recovery and VERTREP for Black Hawk on KANIMBLA. While the SHOLS do not necessarily apply to the fast roping profile being flown by Black 1, it is interesting to note that the maximum tail wind considered acceptable is 15kt for any launch, recovery or VERTREP in the medium weight category.”\textsuperscript{115}

7.85 Of particular relevance is the SHOL dealing with operational utility evolutions.\textsuperscript{116} As noted by SQNLDR Morris –

“These chapters allow approaches to any part of a stationery ship but caution that consideration must be given to the effects of significant turbulence, that a thorough AVRM assessment is essential to mitigate the heightened risk level, that a thorough

\textsuperscript{111} MAJ 4 T1262.14
\textsuperscript{112} Exhibit 175, Statement of SQNLDR Morris, paragraph 21
\textsuperscript{113} Exhibit 175, Statement of SQNLDR Morris, paragraph 23
\textsuperscript{114} Exhibit 212, ABR 5419 Vol 1 Rev2 Chapter 10
\textsuperscript{115} Exhibit 175, Statement of SQNLDR Morris, paragraph 21
\textsuperscript{116} Exhibit 212 ABR 5419 Chapter 6
briefing is essential and that, while no SHOL limitations apply, limitations to power available and hover references should be expected.\(^{117}\)

7.86 SQNLDR Morris commented that a little lateral thought by the Squadron would have led to a conclusion that they were to undertake flying that had a similarity to some SHOLS. He stated that reading the VERTREP SHOL should have started to "ring a few alarm bells" for operational utility evolutions.\(^{118}\)

7.87 Criticism in hindsight is easy. However, the Board is persuaded that the criticism here raised of the failure of the detached flight to consider SHOLS is not one only available in hindsight. The warning set out above is clear. The SHOLS should have been viewed by 171 Avn Sqn pilots as a "bible" for flying to and from the ship. The failure to refer to SHOLS in any way on 29 November 2006 and the evidence of pilots as to why they were not referred to is suggestive of avoidance of SHOLS rather than an approach of due consideration.

7.88 This ignorance of the SHOLS and their importance, discloses a potential "cultural" element in relation to the approach of 171 Avn Sqn to SO flying i.e. "we can handle it" - "we understand it even when it's to ships" - is an approach that is likely to lead to a failure to consider flying fundamentals.

7.89 Furthermore and noting that one of the roles of 171 Sqn is to tactically deploy SF personnel to non naval vessels by fast rope and other means, a generic SHOL that took into account the vagaries of differing ship types would be beneficial.

**Finding:**

7.12 On 29 November 2006 the SHOLS were not referred to.

**Recommendation**

7(f) For training evolutions with RAN Ships the SO Assault should utilise the Utility Evolution SHOL for that particular class of ship in accordance with ABR 5419.

7(g) A generic SHOL should be developed for use when deploying SF to non naval vessels.

**NORMALISED DEVIANCE – OTHER EXAMPLES**

7.90 The examples in this section have been covered in some detail but there are other examples of normalized deviance that have been covered elsewhere within this Report. They

\(^{117}\) Exhibit 175, Statement of SQNLDR Morris, paragraph 21
\(^{118}\) SQNLDR Morris T1905.30 - .47

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are:

Inadequacy of the Flying Orders process (Section 8)

Improper application of AVRM (Section 6)

Aviation safety reporting (Section 10)

7.91 The phenomena of normalized deviance is not the exclusive problem and concern of just 171 Avn Sqn. It is common in all walks of life and certainly there would be many other areas of the ADF where examples could be found. The issue becomes how to avoid it and this comes down to leadership, adherence to regulation and rules, effective audits and checks from external agencies, a healthy safety culture and vitally; the effective application of operational risk management.
SECTION 8

BRIEFINGS ON 29 NOVEMBER 2006

INTRODUCTION

8.1 Prior to the Black Hawk sortie taking place on the afternoon of 29 November 2006 a number of briefings took place. CAPT Bingley, and commonly all the aircrew, would have participated in the Aviation Orders Group, a formal briefing for all those flying. Further he would have led a less formal but important crew brief prior to launch that specifically covered his aircraft’s sortie. Finally he would have conducted an inflight brief prior to commencing the approach to KANIMBLA. Additionally, CAPT Bingley attended the Ships Flying Brief which covers the ship / helicopter aspects of the sortie. The Aviation Orders Group and the Ships Flying Brief are covered in some detail below.

AVIATION ORDERS GROUP

8.2 The extant Standard Operating Procedures (SOPs) in use on 29 November 2006 were those of 5 Aviation Regiment. SOP 401, Airmobile Support to Special Operations Forces\(^1\) outlines the aim of SO aviation orders and briefings as “to ensure that all crews and the supported unit have a common mental model of the upcoming mission and are fully prepared to respond to unexpected contingencies”.

8.3 The Aviation Orders Group on 29 November 2006 was conducted by CAPT Bingley.\(^2\) MAJ 3 and members of 171 Avn Sqn present at Orders on 29 November 2006 found them to be professional, thorough and routine\(^3\). The delivery of Aviation Orders as a process would generally take between 15 and 25 minutes.\(^4\)

8.4 MAJ 4’s description of Aviation Orders in the SMEAC format (Situation, Mission, Execution, Administration, Command)\(^5\) indicates it was conducted in accordance with the requirements in 5 Avn Regt SOP 407 Annex A, Special Recovery Operations Airmobile Orders\(^6\).

8.5 In his evidence as a Subject Matter Expert in the AAIT, MAJ 5 concluded that the orders and the mission packages were in accordance with the 5 Aviation Regiment SOPs

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\(^1\) Part of Exhibit 205, folder of doctrine
\(^2\) MAJ 4 T1264-36, WO2 12 T1036-40
\(^3\) WO2 12 statement paragraph 16; WO2 12 T1036-44; MAJ 3 T2075-24
\(^4\) CAPT 8 T835; WO2 12 statement paragraph 16
\(^5\) Exhibit 124 MAJ 4 statement paragraph 15, T1266-16
\(^6\) Part of Exhibit 205, folder of doctrine
8.6 While the evidence of those present at Aviation Orders on 29 November 2006 was that the proceedings were standard, the evidence of the actual content of the Orders diverges in a number of respects.

8.7 SOP 401 *Airmobile Support To Special Operations* states: \(^8\)

> "The AEC (Air Element Commander – MAJ 3) is responsible for ensuring that all crew members receive the necessary briefings for the conduct of the mission."

### Aviation Orders and the Mission Package

8.8 MAJ 3 stated that Aviation Orders would normally follow the information provided in the written mission pack so that nothing is left out. 5 Avn Regt SOP 408, *Special Operations Mission Package* confirms at paragraph 408.2(a) that the SO Mission package should “coincide with the chronological order of a SO Mission and work in parallel with the Mission Orders”.

8.9 It is the evidence of CAPT 8\(^9\) that the mission package consisted of orders for each serial to be performed. There were numerous assault diagrams presented as evidence to support this.\(^10\)

8.10 The mission package for 29 November 2006\(^11\) was prepared prior to Aviation Orders. MAJ 4 stated how he had commenced typing up the information for the graphical representation of the conduct of the approach. He handed over the task to CAPT Bingley for constructing the mission package, who then in the presumed normal course would have delegated the inputting of information into the computer pro forma to the more junior pilots.\(^12\) CAPT 11 indicated that he had assisted in the planning on 28 November 2006, and his involvement consisted of preparing the mission package.\(^13\) MAJ 3 has confirmed that this was standard procedure to distribute planning duties amongst the pilots due to fly in the mission.\(^14\)

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\(^7\) MAJ 5 T963-43 and T972-43  
\(^8\) Exhibit 205 (part of) SOP 401  
\(^9\) CAPT 8 T835-30  
\(^10\) Exhibit 94  
\(^11\) Exhibit 94  
\(^12\) MAJ 4 T1263-40 and T1264-19  
\(^13\) CAPT 11 T1229-31  
\(^14\) MAJ 3 T2113-45
Time of the Aviation Orders Group

8.11 The actual time that Aviation Orders occurred is unclear. MAJ 4’s evidence was that Aviation Orders could occur either before or after the Ship’s Flying Brief. He was unable to recall which occurred first on 29 November 2006\textsuperscript{15}. The evidence of Navy personnel in KANIMBLA is that the Ship’s Flying Brief took place at 1400, followed by Flying Stations at 1430.\textsuperscript{16}

8.12 In his statement, CAPT 7 puts Orders at 1230\textsuperscript{17} while CAPT 9’s recollection is 1300\textsuperscript{18}. Similarly, MAJ 3 put Orders immediately before the Ship’s Flying Brief at 1230 or 1300.\textsuperscript{19} CAPT 10’s evidence was that Orders occurred in the late morning.\textsuperscript{20} WO2 12 estimated Orders later, at around 1400.\textsuperscript{21} The Mission Package contains a section entitled “Key Timings (Local)”.\textsuperscript{22} It specifies that OGP (Orders Group) was to be at 1300. The timing for the rehearsal is not set out. Despite the usual vagaries of human memory, the exact timing is of little relevance.

Finding

8.1 The Board accepts that Orders were completed in a timely fashion.

Seating and Active Side

8.13 In the list of items to be briefed at Orders contained in SOP 407, one of the preliminary matters to be considered, is seating arrangements. The matter of landing direction is also addressed in SOP 407 in the Execution section of Aviation Orders. These two matters appear not to have been briefed at Aviation Orders, and some related confusion seems evident.

8.14 The evidence of CAPT 7 was that –

\begin{itemize}
  \item \textquoteleft\textquoteleft The orders were given that during the approach, the active side would be nominated by the flight lead\ldots My understanding from the orders and the briefing I'd been given
\end{itemize}

\textsuperscript{15} Exhibit 124 MAJ 4 statement paragraph 14; T1266-10
\textsuperscript{16} Exhibit 74 CMRD Bannister statement paragraph 12; Exhibit 83 LEUT Clarke statement paragraph 2; Exhibit 131 LS Kuen statement paragraph 5; LS Kuen T1342; Exhibit 26LCDR Stringer statement paragraph 12; LCDR Stringer T312; Exhibit 184 MAJ 3 statement paragraph 25
\textsuperscript{17} Exhibit 98 CAPT 7 Statement paragraph 10
\textsuperscript{18} Exhibit 107 CAPT 9 Statement paragraph 7
\textsuperscript{19} MAJ 3 T2078-6
\textsuperscript{20} CAPT 11 T1230-15
\textsuperscript{21} WO2 12 T1056.36-39
\textsuperscript{22} Exhibit 94, page 4, \textit{Wave 1 and 2, Groupings dated 29 November 2006

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by CAPT Bingley was that we would fly approaches as dictated by flight lead, so whether that be down port side or starboard side would be altering during the conduct of that mission.”

8.15 Supporting this view of what was briefed is CAPT 8’s understanding that flight lead would designate the active side once airborne. CAPT 9 recalled from Orders that the active side would be nominated from the Initial Point in. WO2 12’s evidence was also that “we were briefed that we could fly both sides”.

8.16 Beyond this general guidance about active side, the evidence suggests that all further decision making was made on a formation or crew basis at the post-orders walk around. The evidence also suggests that the decision-making process within GOLD 1, GOLD 2 and BLACK 2 differed from that of BLACK 1 (A25-221).

8.17 The Flight Lead of the GOLD formation and pilot of GOLD 1 was MAJ 4. His evidence was unequivocal:

“I didn’t (brief a tailwind scenario at my rehearsal) because I had intended to do my approaches down the starboard side of the ship turning right across the deck”.

8.18 It was the view of MAJ 4 that the purpose of the serials were primarily to

“expose the aircraft captain to stationary targets. Once that had been done, there was an option for the co-pilots to conduct approaches”.

8.19 As Lead Planner and Second in Command of the 171 Avn Sqn detachment, his view of the aim must be given some weight.

8.20 The pilot of GOLD 2 was CAPT 6. He recalled that:

“MAJ 4 and I decided to sit in the right-hand seat, and therefore we decided in that rehearsal brief that the first approach we would fly down the right-hand side of the ship.”

8.21 His co-pilot, CAPT 10 confirmed that he knew he would be sitting in the left-hand seat and that the active side would be starboard, “immediately as Orders concluded”.

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23 CAPT 7 T917-9 and T917-24
24 CAPT 8 T845-5
25 CAPT 9 T1070
26 WO2 T1038-18
27 MAJ 4 T1337-29
28 MAJ 4 T1338-1
29 CAPT 6 T1357-21
30 CAPT 10 T1388-7 and T1388-29

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8.22 The pilot of BLACK 2 and Air Element Commander, MAJ 3, showed some uncertainty as to when he decided to sit in the right seat.\textsuperscript{31} However, BLACK 2's co-pilot (CAPT 11) stated that he knew that he would be sitting in the left hand seat and that the port side would be the active side when BLACK 2 did their walk through. He participated in the walk through on the basis that he would be the Flying Pilot for the first serial.\textsuperscript{32}

8.23 In contrast to this evidence of advance planning, the evidence of the surviving aircrew of BLACK 1 was that little was briefed in the walk-through regarding the active side for the first serial. CAPT 7 states that:

\textit{"I couldn't say that CAPT Bingley was particularly going to fly the first serial because he was in the left seat"}\textsuperscript{33}.

8.24 WO2 12 concurred and went so far as to describe the choice of active side as \textit{"fairly fluid"}\textsuperscript{34}.

8.25 There also appears to have been a lack of coordination between the two aircraft in the BLACK formation with regard to seating and active side. MAJ 3 stated that he did not discuss with CAPT Bingley who was going to sit where in BLACK 1.\textsuperscript{35} CAPT Bingley sat in the left hand seat while MAJ 3 sat in the right hand seat. Having the Aircraft Captains in differing seats within the one formation would not have achieved the aim of the activity as explained by MAJ 4 above in paragraphs 8.18 and 8.19.

8.26 The GOLD formation filled in the gaps in the flexible arrangements for active side choice by deciding together where to sit and how to fly during the walk through. The SO Techniques Lectures\textsuperscript{36} at Exhibit 102 notes that the aim of the Mission Package is to ensure a common mental model. The example of the GOLD formation indicates that those details not provided for in the Mission Package or Orders were amplified by the Flight Lead and Aircraft Captains to ensure a common mental model of the serial.

8.27 However, the BLACK formation did not coordinate the seating of their Aircraft Captains so that similarly experienced pilots would be flying the same approach in tandem. The BLACK formation did not plan for a known active side which the aircrew could mentally prepare for prior to the serial.

\textsuperscript{31} MAJ 3 T2124-22
\textsuperscript{32} CAPT 11 T1231-39 and T1232-30
\textsuperscript{33} CAPT 7 T917
\textsuperscript{34} WO2 12 T1039
\textsuperscript{35} MAJ 3 T2124-22
\textsuperscript{36} Exhibit 102, lesson on \textit{Special Operations Staff Planning} slide 16
Finding

8.2 Seating arrangements were unlikely to have been discussed at Orders. There was thus an inconsistency between aircrews at the subsequent Crew briefs.

Recommendation

8(a) If seating arrangements may impact on the conduct of a serial, this information will assist in the ‘mental model’ and therefore should be briefed at Aviation Orders as required by 5 Avn Regt SOP 407.

Lateral Distance From Ship On Approach

8.28 The Mission Package has no reference to the lateral distance at which the aircraft were to fly from KANIMBLA to the Landing Point on the ship’s aft flight deck. The evidence suggests that the clearance from the ship was not briefed at Aviation Orders. CAPT 8’s judgement was that

“If (lateral distance) is in the Orders, then it would be generally reflected on the mission pack. ... I would expect such a distance to be briefed in Orders”.

8.29 Three of the junior co-pilots recalled that lateral distance from the ship “would have been briefed”, “was briefed on previous missions”, and “is usually briefed”. Of the more experienced aircrew, WO2 12 stated that there was no specific brief on how far BLACK 1 would fly from the superstructure. MAJ 4 and MAJ 3 both felt that specific distances may not have been briefed for the first serial, but that they had been briefed for the Fire Support serial that was to follow. In his statement, MAJ 4 said it was briefed at 1½ rotor lengths.

8.30 In the absence of specific recollections of whether lateral distance was briefed and if so, what the distance was, the evidence otherwise reveals a variety of “normal” safety margins for how the 171 Avn Sqn generally flies. CAPT 6 stated that

“We have to be greater than one (rotor diameter from the ship), but you can go out to your desired distance to achieve what you need to get onto the roping point”.

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37 Exhibit 94
38 CAPT 8 T840-43
39 Exhibit 107 CAPT 9 Statement paragraph 8
40 CAPT 7 T906
41 CAPT 8 T851
42 WO2 12 T1034
43 MAJ 4 T1272; MAJ 3 T2117-3
44 Exhibit 124
45 CAPT 6 T1357-40

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8.31 Having originally estimated her gut feeling that the lateral distance would have been no closer than three rotors\textsuperscript{46}, CAPT 8 put the standard distance as:

"Two rotors is a minimum of how we fly, you know, formation "no closer than" so that's like a minimum margin".\textsuperscript{47}

8.32 In the absence of lateral distance being briefed, other aircrew stepped back from the reliance on standard practice, relying instead on the airmanship of the active side pilot and loadmaster. MAJ 4 expressed the view that as there was no default margin for 171 Avn Sqn contained in SOPs:

"It is the judgment of the aircraft captain and crew."\textsuperscript{48}

8.33 Similarly, CAPT 7 saw no need for a minimum margin to be briefed for the assault:

"I think airmanship dictates that you wouldn't fly close enough, that close to a ship".\textsuperscript{49}

8.34 In his statement, WO2 12 specified that a normal part of the walk-through in the hangar was for the pilot to say:

"when we are going to flare, how high he wants to be when roping, how far away from the superstructure, and post action recovery".\textsuperscript{50} (emphasis added)

8.35 Yet WO2 12 testified that in relation to the first serial for 29 November 2006, the airmanship of the pilot was the primary factor in judging lateral distance:

"It's a pilot and loadmaster decision on what we call the near side, or the side closest to there, and it would be their decision as to whether they thought it was safe enough for them to continue to make the turn that we had to do to get to our point on the ship. There wasn't any mention of that. It was always the same as when we fly around near trees, you have it as a safe distance. You don't go under 10 feet, which is just a safety distance to allow for drift ..."\textsuperscript{51}

For single-aircraft ops ... the aircraft captain may (tell the loadmaster the lateral distance from ship to aircraft), especially the junior pilots will, but normally the senior captain just flies his line. So long as that appears safe to the loadmaster on the close side, then we'll just look for drift towards that target or, if he's drifting away from it, just to tell him that he's drifting left or right of his line."\textsuperscript{52}

\textsuperscript{46} CAPT 8 T840-1
\textsuperscript{47} CAPT 8 T857-14
\textsuperscript{48} MAJ 4 T1360-9
\textsuperscript{49} CAPT 7 T903-40
\textsuperscript{50} Exhibit 106 WO2 12 Statement paragraph 21
\textsuperscript{51} WO2 12 T1034-34
\textsuperscript{52} WO2 12 T1036-5
8.36 The 10 feet safety distance to which WO2 12 is referring most likely comes from SI (5 AVN) OPS 3-212, *Minimum Obstacle Clearance*\(^5^3\) or the Black Hawk Standardisation Manual\(^5^4\). This distance is referring to safe distances when the aircraft is slowly manoeuvring in the hover rather than flying past an obstacle at speed conducting an approach.

8.37 The SO Mission Package is designed for efficient use of references to doctrine rather than spelling out the details for every mission. However, the 171 Avn Sqn Det had been unable to practise assessing rotor distances and safe clearances from obstacles for the previous month. There was thus a lack of currency.

**Finding**

8.3 *The briefing of the flying serial should have encompassed discussion on lateral distance from the ship. In light of the lack of currency for such serials, that distance should have been of a conservative nature.*

**Ship Not Making Way – Static Target**

8.38 KANIMBLA was drifting and not making way. The ship was thus to simulate a static target for the purpose of 171 Avn Sqn’s training, a point that MAJ 3 recalls CAPT Bingley specifically briefed:

“*(CAPT Bingley) said, "This target is static. This ship is not making way. We will be approaching and bear that in mind. Remember what you see is not going to be what you’ve seen in the last iterations."*\(^5^5\)

“My recollection is that when he outlined the circumstances of the training, which is normally done at the very beginning, it was stated then that the ship would not be making way and that, clearly, then people have to make adjustments and understand that what they are seeing won’t necessarily be the same as what they saw a week ago or two weeks ago. I can’t recall his exact words, but he absolutely made reference to the fact that the ship was not making way and that, "You need to be very guarded in what you are seeing and pay a lot of attention to those cues that you’re looking for." He also made reference to the fact that, "You have at least the length of the ship that will assist you in gaining some of those cues."*\(^5^6\)

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\(^5^3\) Part of Exhibit 205
\(^5^4\) Exhibit 214, AAP 7210-015-016, Chapter 2, paragraph 22
\(^5^5\) MAJ 3 T2105-16
\(^5^6\) MAJ 3 T2105-29

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8.39 On the evidence, MAJ 3 appears to be the only member to recall this aspect of the Orders. CAPT 7 and CAPT 8 on the other hand, both stated that they were unaware that the purpose of the training was to approach a static target, nor did they recall this being mentioned at Orders. Both CAPTs 7 and 8 did their crew briefings with CAPT Bingley.

8.40 In the light of this inconsistency of evidence, a plausible explanation to the Board’s mind is that the ‘static target’ situation was not adequately (if at all) briefed at Orders, but rather MAJ 3’s recollection came from when CAPT Bingley presented the initial plan to him or that he briefed it himself during his individual crew brief. In support of this interpretation is the fact that MAJ 3’s co-pilot, CAPT 11, was the only co-pilot to recall a briefing on the implication of not making way. CAPT 11’s recall of the matter was:

“Our crew rehearsal was in depth because the approach was different to what we had done previously. We were approaching the ship from the bow, which was different for us as previous approaches had been from the stern. The big factor in this is that in previous approaches from the stern, the ship had been underway at 10 to 15 knots and there was always a relative wind on the nose. The ship this time was going to be stationary in the water; therefore we would not be approaching a moving vessel as we had done previously.”

Finding

8.4 It is likely that the two factors, first that the ship would not be making way and secondly the purpose of the training was to approach a static target, were not emphasised at Orders. However, CAPT Bingley, who was involved in planning the mission, would have been well aware that the ship would not be making way and that the purpose of the sortie was to practise against a static target.

Ship’s Drift

8.41 The serials on 29 November 2006 were planned to be conducted to a static target to overcome the perceived lack of recency in such approaches. Accordingly, at 1403 KANIMBLA’s engines were declutched and at 1412 her shaft brakes were engaged. The evidence of LCDR Collins indicated that KANIMBLA had drifted 600 yards in a westerly direction from the time BLACK 1 launched at 1556 to the time of the accident at 1611.

57 CAPT 7 T906-44
58 CAPT 8 T836-38
59 Exhibit 123 CAPT 11 Statement paragraph 4
60 LCDR Collins T608
61 LCDR Collins T620.34
8.42 The evidence does not support a conclusive view as to whether the ship is likely drift was briefed in Aviation Orders. Some of the junior aircrew, CAPT 7\textsuperscript{52}, CAPT 8\textsuperscript{63} and CPL 13\textsuperscript{64}, could not recall whether anything was said about the drift or movement of the ship.

8.43 WO2 12 stated that BLACK 1 had set up the GPS to calculate drift\textsuperscript{65} and then took two GPS points during an initial 3-4 minute circuit around the ship\textsuperscript{66}. Although this was contradicted by CAPT 7, several others of the aircrew recalled logging two GPS points prior to flying to the IP, although these were expressed as getting a more accurate fix rather than calculating drift\textsuperscript{67}.

8.44 MAJ 4 recalled that during either the OC’s brief or the Safety Officer’s brief:

“it was highlighted that the ship is not a fixed target and that use of the GPS is mainly a back-up tool; ... and that this would be a mainly visually assessed approach”\textsuperscript{68}

8.45 The evidence from aircrew in GOLD 1 and 2 and possibly BLACK 1 that two GPS points were logged suggest that the ships drift may have been briefed as recalled by MAJ 4.

**Finding**

8.5 When a ship is used as a “static” target, it is in reality not static. It remains susceptible to the forces of wind and current.

8.6 It does not appear to have been appreciated by 171 Avn Sqn how KANIMBLA would lie in the water relative to the wind while drifting. Not knowing this, compromised 171 Avn Sqn’s ability to best brief how the wind on 29 November 2006 would most likely be coming around the ship as the target.

**Recommendations:**

8(b) When ships are used to simulate static targets the ramifications of it should be emphasised to the aircrew at Aviation Orders. This would include information such as how the ship will likely lie in the prevailing conditions and noting that a GPS point (to mark the position of the ship) will become less accurate with time and the primary method of distance calculation should be based on visual cues.

\textsuperscript{52} CAPT 7 T900
\textsuperscript{53} Exhibit 92 CAPT 8 Statement paragraph 16
\textsuperscript{64} Exhibit 108CPL 13 Statement paragraph 5
\textsuperscript{55} Exhibit 106 WO2 12 Statement paragraph 27
\textsuperscript{66} WO2 12 T1040-19 and T1054-38
\textsuperscript{67} CAPT 6 T1363-31; CAPT 9 T1071-29; MAJ 4 T1284-20
\textsuperscript{68} MAJ 4 T1281
Wind

8.46 All those present at the Aviation Orders on 29 November 2006 recalled that wind was briefed, as it always was.

"Wind was always specifically briefed at the end of the 'Situation' section of orders. Wind was briefed relative to the target, eg. on 29 Nov 06 it was briefed as "Red 150 at 10 knots"."

"Wind is always briefed in Orders and I remember it was briefed on this occasion. The wind was coming from the port aft quarter which I confirmed on deck during my start up".

"Wind was briefed as light and variable from the stern port quarter".

"The weather was a light wind ... no greater than 10 knots ... from my understanding it was going to be swinging through about 120 degrees on the (port) side of the ship".

8.47 Uncertainty exists as to who delivered the weather briefing. Recollections vary between one of the co-pilots, a loadmaster, CAPT, MAJ.

8.48 5 Avn Regt SOP 402, Priority Information Requirements lists the six key areas of information required for accurate and effective mission planning of SO aviation activities. The SOP concludes that "The chances of mission success would be reduced without the information listed above". One of the six priority information requirements is:

(e) weather on the target (wind, cloud, rain)

8.49 In his evidence, LTCOL 1 described briefing wind for a land-based target:

"If you’re conducting an approach to a land-based target that won’t be changing orientation and you have the forecast wind, my expectation is that is that wind would absolutely be considered in the planning for the conduct of that mission. It would be
briefed during the Orders group, and if there was a significant effect upon the operation, the Authorising Officer or the Safety Officer would raise, at the completion of Orders, wind as an issue. I say that for a land-based target.”

8.50 He differentiated this from briefing wind onboard a ship:

“Unfortunately, there's no knowing what the ship's head will be at the time that you're actually conducting your activities to the ship, and it might in fact change during the conduct of your flying serial. So the wind briefed whilst on board the ship is excellent for situational awareness but is largely irrelevant by comparison with the information that you'll gain from the ship's FLYCO and that you'll gain from GPS information on approach direction to give you an indication of the magnitude of the tailwind that you're encountering and any crosswind that you might encounter.”

8.51 MAJ 3 took a similar view of the reliability of the weather reported at Orders:

“At the time of orders, at the time of the planning and effectively right up until the time of launch, the ship's head is not necessarily fixed and it was not necessarily going to remain fixed for the duration of the serial. So when it comes to conducting the planning for that, that is one of the factors which is not present, so determining that there was an out-of-wind condition is something that we can't do. For every particular serial, of course there's a potential that you could have a tailwind, a crosswind or a headwind.”

8.52 The evidence of LCDR Collins that the KANIMBLA class of LPA lies beam on to the wind was apparently not known to 171 Avn Sqn personnel in their planning for the serials on 29 November 2006.

8.53 There is general consensus that wind was briefed at Orders but whether or not the likely relative wind was briefed remains inconclusive. In any case, the question remains as to whether it was acceptable to brief wind without an explanation of what the wind will mean for an approach. LTCOL McCall’s opinion was that:

“If a flying sequences calls for an out-of-wind condition, this must be referred to in the brief to aircrew and consequent adjustments required to the flying sequence must, by regulation, be briefed in the Approach Plan. ... To operate out-of-wind without some form of specific risk management plan is contrary to published guidance.”

8.54 The evidence of 171 Avn Sqn aircrew was that wind did not need to be briefed with such specificity because it was a factor accounted for in the flare point formula. As such it is

78 LTCOL 1 T1446-44
79 LTCOL 1 T1446-11
80 MAJ 3 T2111-16
81 LCDR Collins T614-19
82 Exhibit 158 LTCOL McCall Statement at paragraph 13
only raised in crew briefings when airborne when a more precise reading of the wind is taken. The Board does not agree to this approach and the best information available at the time should be always briefed.

8.55 MAJ 3 was examined by the Board in regard to whether or not he understood where the relative wind would be coming from:

Q. ... if you're unaware that an LPA lies beam on to the wind ... if you're making an approach from both port and starboard sides, at least one of those approaches is probably going to have a tailwind component; is that fair?

A. Not necessarily, sir. I see that certainly, under many circumstances, that would be the case.

Q. ... Even taking your viewpoint, if it's unknown that you are going to have a downwind final component for the termination phase, should you not then brief the worst case ... and presume that you may have one and brief for that worst case?

A. Sir, with the benefit of hindsight, I will do from now.

8.56 The Board is of the view that the best weather information available at the time should be briefed. Certainly the true wind speed and direction should always be given along with other standard meteorological information. If in circumstances such as aircraft approaching a ship stopped in the water and the relative wind is likely to be known and unlikely to change, this should also be briefed. This will allow better planning and preparation to occur. In circumstances where the relative wind is not known, and this is accepted as often being the case, and not knowing that information may impact on final approaches in that there could well be a tail wind, that very point needs to be made and mentally prepared for.

8.57 Furthermore, during the planning phase of the sortie, an effective line of communication needs to be established and maintained between the aviation and ship planners. The Board heard evidence that there was a healthy relationship between the aviation and ship planners, however had the information such as likely drift rates and the aspect the ship would likely lie to the wind, be given to or sought from the 171 Avn Sqn Det planners, a better mental model would have been available to the aircrew.

Finding:

83 MAJ 4 T1269-47, T1270
84 MAJ 3 T2132 – 7-23
85 Exhibit 26 - LCDR Stringer statement paragraphs 8-9
8.7 There was evidenced an unacceptable level of complacency with regard to the importance of briefing wind. (NB. This is understandably so given the complacency 171 Avn Sqn personnel have displayed to flying with tail winds.)

Recommendation:

8(c) If the prevailing wind at the target is known, it should be briefed so that better planning and preparation can occur. If the wind is not known, a worst case scenario should always be briefed and planned for.

The Proposed Sortie as “Something Different”

8.58 CAPT 11’s report of BLACK 2’s crew briefing quoted above included the phrase, “We were approaching the ship from the bow, which was different for us as previous approaches had been from the stern”. The bow assault was indeed something new, designed to give “the full length of the ship to assist in the judging of closure rates and speeds”\(^{86}\).

8.59 The evidence from all aircrew supports the view that at Aviation Orders on 29 November 2006, either MAJ 3 as the Authorising Officer or MAJ 4 as the Safety Officer noted that this mission was “different” to what the detachment had been flying to date during Operation QUICKSTEP.

8.60 The characteristic that defined this activity as different or new was that the approach was from the bow. In the words of CAPT 8, “I recall the discussion that the approach coming from the bow was different and to be more conservative. I can’t distinctly remember talking about the ship being static.”\(^{87}\)

“Taking it Easy” in the Proposed Sortie

8.61 As well as highlighting that the serial on 29 November 2006 was going to be something new or different, there is evidence that MAJ 3 or MAJ 4 also told the Aviation Orders group to “take it easy” or words to that effect.

8.62 MAJ 3’s own recollection was that at the end of Orders, he said:

“This is something a little different. Lets make our approaches eighty percenters. Lets

\(^{86}\) MAJ 3 T2073-34
\(^{87}\) CAPT 8 T837-28
"Let's not go like a bull at a gate at this. Do the first few slowly. We'll creep up on this one, 80 percenters. I don't want to see anyone out there trying for the 100 percener first-up."89

8.63 CAPT 8 recalled that:

"I can't remember the exact words, but ... because it was something different, some of us hadn't seen coming from the bow before, that was highlighted, to be flying a more conservative approach. ... 90

I recall a discussion and it being said to take it easy.91

In essence (MAJ 3 said), "We're doing something a bit different today. Fly on the more conservative side."92

8.64 WO2 12 also recalled such a matter being addressed at Aviation Orders, but it was his memory that it was said by MAJ 4 as the Safety Officer:

"It went along the lines of - because this is the first time we've done a bow approach, let's go at 80 per cent for the first one.93

When we were doing new targets or approaching from a different direction, there was always something new to look out for. (The Safety Officer said in Orders on 29 November 2006) just a reminder that this is the first time that you've done something, so instead of going flat out at the target, just back it off and then build yourself up to it"94.

Passenger Issues

8.65 On the basis of the evidence of MAJ 395, MAJ 496, CAPT 697 and WO2 1298, 171 Avn Sqn briefed that there were going to be SASR passengers. MAJ 4 and CAPT 6 recalled
that they were going to fly in both the GOLD and BLACK formations.\(^{99}\)

8.66 However, some of the more junior aircrew gave evidence that the carriage of passengers was not briefed. CAPT 7 recalled that he found out 20 minutes prior to launch\(^{100}\). CAPT 8 recalled that initially there were not going to be any passengers but it was decided that they would come onboard after Orders\(^{101}\). CAPT 11 remembered becoming aware of the passengers during the walk-through\(^{102}\). CPL 13 became aware of passengers just before he walked out onto the deck.\(^{103}\)

8.67 5 Avn Regt SOP 407, *Special Operations Orders* describes orders delivered as a combined activity to ensure a common mental model throughout the force.\(^{104}\) There is no evidence that any member of SASR attended Orders on 29 November 2006.

8.68 The evidence of CPL A, the Aerial Safety Officer in BLACK 1, was that the passengers "really just jumped on the back of some training 171 Avn Sqn was already doing. ... We were on the aircraft because there was room for us in the back"\(^{105}\).

8.69 LTCOL U gave evidence that the passengers were "on the aircraft for a reason, and they were doing operational training for an operational capability"\(^{106}\). The embarked SASR Troop Executive Officer, SGT W, gave evidence that the carriage of passengers had been planned with MAJ 4 forty-eight hours prior to the serials.\(^{107}\)

8.70 Yet there is no evidence of planning to ensure a common mental model between the aircrew and the passengers. There is nothing reflected in the Mission Package which refers to passengers. The evidence relating to whether the carriage of passengers was or was not briefed is unclear. There is also no indication of any passengers on the flight authorisation sheet as there should have been.\(^{108}\) That the passengers would be in a Operational Contingency Loading (OCL) posture should have been acknowledged, highlighted and questioned. This aspect is discussed in greater detail in Section 9.

**Risk Analysis / Assessment**

8.71 While it was valid to mention that the bow approach was new or different, it was

\(^{99}\) Exhibit 124 MAJ 4 Statement paragraph 16; Exhibit 132 CAPT 6 Statement paragraph 8

\(^{100}\) CAPT 7 T907

\(^{101}\) Exhibit 92 CAPT 8 Statement paragraph 11; T834

\(^{102}\) CAPT 11 T1234. Note this conflicts with his Statement at paragraph 6 where he states that he knew that BLACK 2 would be carrying 5 SAS passengers (Exhibit 123)

\(^{103}\) CPL 13 T1093-26

\(^{104}\) Part of Exhibit 205, SOP 407 at paragraph 407.1

\(^{105}\) Exhibit 237 CPL A Statement paragraph 5

\(^{106}\) LTCOL U T1621-40

\(^{107}\) Exhibit 247 SGT W Statement paragraph 3

\(^{108}\) Exhibit 129 – OA 82 Flight Authorisation.
other consequences to this approach which put additional risks into the sortie. These other aspects do not appear to have been specifically highlighted as risks to be aware of. The most highlighting that was done was either MAJ 3 or MAJ 4 directing aircrew to take it easy.

8.72 The AAIT Report lists seven of these matters, which the AAIT believes would have been identified through the thorough application of the aviation risk management process at the tactical level\textsuperscript{109}.

8.73 The Board is of the view that the risks were not briefed in Aviation Orders because they were not appropriately identified. The risks not briefed at orders as determined by the AAIT and agreed to by the Board are\textsuperscript{110}:

a. ship’s drift,

b. termination to the hover with a downwind component,

c. power and control requirements

d. approaches to ‘static’ objective versus a ship underway,

e. currency and recency in the conduct of approaches to a ‘static’ objective,

f. personal mission equipment requirements, and

g. carriage of passengers.

8.74 SQNLDR Morris suggested five elements in his statement which would have been prudent hazards to discuss during Orders.\textsuperscript{111} These were:

a. The lack of visual cues when approaching, departing and operating near ships at sea;

b. The dangers in approaching moving or otherwise targets at sea;

c. The dangers identified in ABR 5419\textsuperscript{112} regarding the variability of relative wind, the likelihood of turbulence and the prudence of extra power margins during shipborne operations;

d. The dangers associated with transient main rotor droop;

\textsuperscript{109} Exhibits 5 and 6 at paragraph 189
\textsuperscript{110} ibid
\textsuperscript{111} SQNLDR Morris Statement at paragraph 27
\textsuperscript{112} Ship’s Helicopter Operating Manual, Exhibit 212
e. The dangers due to misjudged quickstops.

8.75 The Aviation Risk Management (AVRM) process set out in DI(G) OPS 40-2, ADF Aviation Risk Management\textsuperscript{113} has been discussed in detail in Section 6. However, it is noteworthy that in SOP 407 Special Operation Orders\textsuperscript{114} there is scant mention of safety issues and that Risk analysis / Assessment is afforded a single subject heading as the last item in the Special Recovery Operations Air Mobile Orders pro forma at Annex A.

8.76 Suffice to say in the context of Orders for 29 November 2006, 171 Avn Sqn planners failed and inadequately applied the processes of AVRM.

Finding:

8.8 Orders for Black Hawk sortie 29 November 2006 were inadequate to best prepare the aircruce for their mission. The numerous omissions from the Orders Group referred to in this Section which reflect an unhealthy level of complacency. Severally these omissions may not seem important but collectively they had an effect on the manner in which Black Hawk 221 was flown on the day.

Recommendation:

8(d) That the process and procedure for Aviation Orders be comprehensively reviewed and appropriately overhauled to place a greater emphasis on safety and AVRM.

KANIMBIA'S FLYING BRIEF

8.77 Separate to the Aviation Orders process and a standard practice for all ship borne flying evolutions, a ship’s flying brief was conducted at 1500 29 November 2006. The brief was attended by the Commanding Officer, Ship’s Aviation Officer, Operations Officer, Procedural Air Controller, Officer of the Watch\textsuperscript{115} and the two flight lead pilots CAPT Bingley and MAJ 4\textsuperscript{116}. Typically the aim of the ships flying brief is to cover mostly the helicopter / ship interface and in the case of embarked Army aircraft, the mission and certainly the conduct of the mission is of secondary importance. The Ship’s Operations Officer, LCDR Stringer, said:

\textsuperscript{113} Part of Exhibit 205, folder of Defence documents
\textsuperscript{114} Exhibit 205 (part of) SOP 407
\textsuperscript{115} LCDR Stringer T311-3
\textsuperscript{116} LCDR Stringer T312-26
"LCDR Wong would brief the serial conduct from the ship's perspective. So we went through the process that we were going to conduct in this serial from start to finish. The pilots would then brief on any factors that they thought were necessary. Then, on completion of all of the relevant briefings, the weather was also briefed, and there is a briefing pro forma that the procedural air controller also briefs. On completion of that, the captain has the final word, effectively."  

8.78 A component of the information given at the Ship’s Flying Brief it is normal to brief the ship’s calculated risk for the serial. This was briefed by the Ship’s Aviation Officer, LCDR Wong, on the day. CMDR Bannister states:

"Part of the helicopter control officer's duties is to review the risk associated with the evolution, and then he will brief whether that is within the standing risk profile or not. As would normally be the case, this will be done early in the day, so that if it is outside those parameters, a subsequent risk assessment could be done. In this case, the helicopter control officer or ship's aviation officer briefed that it was within his standing risk profile."  

8.79 It is important to note that this risk calculation is primarily for the ship and only includes the aircraft in a generic sense. It does not cover the calculated risk of the actual flight and mission. That risk is calculated and approved by the Aviation Detachment Commander.

8.80 During the Ship’s Flying Brief it is normal for the pilots to have an opportunity to brief any particular aspects of their flight and how it will impact upon the ship. LCDR Wong, the Ships Aviation Officer made the following comment regarding the conduct of the brief:

"I then give the conduct of the serial from the ship's point of view. If the aircraft are embarked, we ask the aircraft captain or the pilot that's attending the brief to discuss it from the aircraft point of view. We then pass to the captain, if he has any points, and then, when the captain is finished, any questions; brief complete."  

8.81 Concerning the pilots’ briefing in particular, he further added:

"I don't recall what they briefed. I am positive that they would have briefed something handed over. They would have discussed what their intentions were, ie, to come in as two pairs, which is why they had the Black and Gold."  

117 LCDR Stringer T311-20  
118 CMDR Bannister T679-45  
119 LCDR Wong T714-17  
120 LCDR Wong T714-36
Finding

8.9 There was no evidence as to whether 171 Avn Sqn personnel briefed KANIMBLA’s Commanding Officer on the calculated risk for their flights. There is no formal requirement to do so.

8.10 There was the opportunity to do so at the ship’s Flying Brief although in the case of embarked Army helicopters, the Ship’s Commanding Officer is not vested with the authority and responsibility for approving such flights. It is therefore unlikely that CMDR Bannister was aware that the Black Hawk sortie flown on the 29 November 2006 was deemed to be HIGH risk.\(^{121}\)

Recommendation:

8(e) That the calculated risk for a flight be briefed at the Ship’s Flying Brief to raise the awareness of any risks that are being taken for any particular flight.

\(^{121}\) Exhibit 127 – 5 Avn Regt Mission Risk Profile Register – No. 13
SECTION 9

HUMAN FACTORS, CULTURE AND SAFETY ISSUES

CREW RESOURCE MANAGEMENT (CRM)

9.1 CRM is described in DI(G) OPS 40-4, *ADF Aviation Crew Resource Management*¹ as "the utilisation of all available resources by an individual or crew towards the goal of safe, effective and efficient operations". At the most basic level, it involves encouraging all members of the crew, regardless of their position or experience, to voice concerns if they perceive something to be wrong with the flying operations.

9.2 The evidence of the willingness of all members of 171 Avn Sqn to speak up at any time was positive. CAPT 8 reported that everyone at 171 Avn Sqn is comfortable in bringing up issues². When questioned on this issue CAPT 8 stated:

   Q. In your experience, especially flying special operations at 171, have you had any problem using what you learned in that course and raising issues with more experienced pilots?

   A. No. I think generally, though, pilots have some sort of confidence level, and I know within our squadron everyone is comfortable bringing up issues, whether with a more experienced pilot or a more junior pilot.

   Q. Does that include making calls, if you like, during a flying manoeuvre against the way in which the more experienced pilot may be flying the aircraft?

   A. The co-pilot will be calling what they see and will let the captain know if they're too fast, too high, too close, and from that point it's the aircraft captain's decision whether he takes on board what the co-pilot is saying and alters in accordance with what he has been given.

9.3 CPL 13 recalled past instances where he has told pilots and CAPT Bingley in particular, to slow their approach, and this input was acted upon in flight³.

   Q. Corporal, even though your flying captain is an experienced person wearing officer's rank as a captain, would you have had any hesitation in calling to that person if you thought there was anything of concern to you?

   A. No hesitation.

¹ Exhibit 205, Folder of Defence Documents
² CAPT 8 T849
³ CPL 13 T1099-3
Q. Have you, on previous occasions, called to pilots that you thought they were travelling too fast, too high, too low or anything out of the ordinary?

A. To pilots - as in calling to the pilots or two, the number.

Q. Calling to pilots.

A. Yes, I have. I've told them to go around or to slow their approach.

Q. Have they responded affirmatively to your call in the past?

A. They have.

Q. And, in particular, to CAPT Bingley, have you ever on occasions in the past called him to tell him that, in your opinion, things were not as they should be?

A. Yes.

Q. And has he reacted and followed your advice, that call having been given to him?

A. He did.

9.4 It is to be noted that CAPT 7 had not completed the three day CRM course at the time of the crash. Nonetheless, he gave evidence that he did not believe that the course added anything to his knowledge of CRM that he had not already learned on the job. Despite his candour, the Board does not support his point of view.

9.5 MAJ 4 spoke of personally encouraging a culture at 171 Avn Sqn that it is everybody's responsibility to speak up because the safety of the aircraft is paramount. Yet he also expressed doubts as to what was actually happening in Black Hawk 221:

"I cannot say if CPL 13 was confident enough at this stage to say these things to a senior pilot ... I would hope that CAPT 7 would have said "You're hot" if the aircraft was travelling too fast but would not be surprised if he had not said this due to the relationship dynamic that existed between CAPT Bingley and the more junior pilots″(emphasis added)

9.6 It is noteworthy that CAPT 7 did not comment on the speed of Black Hawk 221 on approach in the light of the observations concerning him in the previous paragraph. He maintained in evidence that nothing about the approach seemed abnormal when Black Hawk

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⁴ CAPT 7 T941-5
⁵ MAJ 4 T1302-8
⁶ Exhibit 124, Statement of MAJ 4, paragraph 24
221 was clearly too fast.

9.7 An explanation for his failure to comment and appreciate the excessive speed is the “cockpit gradient”. The AAIT also raised the steep Captain / co-pilot authority gradient between CAPT Bingley and CAPT 7. However, the AAIT felt that there was no evidence available to it that CAPT 7, WO2 12 or CPL 13 would not have spoken up had he been unhappy with CAPT Bingley’s approach.\(^7\) This is further exacerbated by the use of SO approach ‘comfort zone’ for each pilot in that what is comfortable for one, may not be comfortable for another. This aspect has been covered in Section 4.

9.8 The AAIT also noted that the absence of any concerns from CAPT 7 on 29 November 2006, but found that it was difficult to determine whether CRM training would have led to a different result. The AAIT drew this conclusion because CAPT 7 did not perceive anything to be wrong with the approach until the final descent, because he had no exposure to approaching a ship from the bow.\(^8\) This conclusion was open to the AAIT at the time. However the Board is of the view that the effectiveness of CRM to harness the combined talents of the crew is undermined by a lack of hazard awareness. MAJ 4 gave an indication of 171 Avn Sqn’s approach to wind in saying that “In my view, the wind would need to be in excess of 30 knots before someone would speak up”.\(^9\) The subjective ‘comfort zone’ approach also undermines the effectiveness of CRM.

9.9 The Board believes that CAPT 7’s lack of appreciation about the circumstances of the approach reflects on 171 Avn Sqn’s culture of poor risk identification at the planning and briefing stage, particularly in relation to wind.

Aircrew Performance Monitoring

9.10 Crew resource management (CRM) aims at improving crew and mission performance by the application of standard CRM principles to minimise errors.

“Crew resource management is something that’s developed over the years as a means of understanding human limitations, human performance, human behaviour to a certain degree and improving communications between teams and crew members, individual crew members, to ensure that you get synergy in a crew, which means that the sum of the crew’s effort is better than their individual efforts. That is probably the best way to sum it up. One plus one equals three or more, or better than two, which means that everybody is working together and communicating together in such a way that you mitigate risks that show up, manage hazards and/or become more efficient and effective.

\(^7\) Exhibit 5, AAIT Report, paragraph 185
\(^8\) Exhibit 5, AAIT Report, paragraph 185
\(^9\) Exhibit 124, Statement of MAJ 4, paragraph 22
9.11 The performance monitoring and risk mitigation aspects peculiar to the pressures being felt by 171 Avn Sqn aircrew of 29 November 2006 will be discussed and analysed in the following paragraphs.

9.12 **CRM Training.** CRM training is mandated for all aircrew in 16 Brigade. An AAIT audit of CAPT 7’s workbook revealed a deficiency in Crew Resource Management (CRM) training. The workbook reflected that a waiver was granted from HQ 16 Bde (Avn) until September 2005. A further waiver was discovered granting him a waiver from September 2005 to November 2005, but as at 29 November 2006 he had not completed CRM training. He stated in evidence that he subsequently completed the training in approximately March 2007. When asked by Counsel Assisting:

> Captain, on completion of the crew resource management qualification, are you able to indicate to the Board what the nature of that training was and how, if at all, it has assisted you?

9.13 He replied:

> The nature of the training involves educating crew members on operating in an environment in the cockpit that's going to be permissive to clear communication regardless of rank and experience. And has it helped me since then, since completing the course? I'd say no.

**Q. Why not?**

**A. Because the previous experience I had had with flying to that point had already taught me those basics.**

9.14 **Performance Monitoring during an SO Approach.** As has been discussed elsewhere in this report (see especially Sections 4 and 5), the SO assault approach lacks definition or parameters in the termination phase. This has been explained to the Board by 171 Avn Sqn personnel by way of a “comfort zone” with the “expectation (is) that a pilot will fly the approach in a manner in which he is consistently reviewing his rate of closure, rate of descent as supported by his crew.” MAJ 2’s expectation as Unit Standards Officer was that he wouldn't expect a co-pilot to fly to the same standard as an experienced aircraft

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10 WGCDDR Blais T97.40
11 WGCDDR Blais T98.28
12 WGCDDR Blais T118.2
13 SQNLDR Pascoe T414-415, Exhibit 40, Medical Report SQNLDR Pascoe 7 June 2007 together with cover letter; Exhibit 5, AAIT Report, paragraph 65
14 CAPT 7 T890.18
15 CAPT 7 T891.41-45
16 CAPT 7 T892.40-893.5
17 LT.COL 1 T1442.39

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captain. Given that each pilot will develop a flare in accordance with their personal comfort zone SQNLDR Morris believes that it would be difficult for the non flying pilot and other crew members to objectively monitor the flying pilot’s performance during the execution of an SO approach:

"The two pilots sitting in the front of the aircraft will have different expectations of how the manoeuvre should be flown and how it's likely to develop. That makes it very difficult for them to cross-check and monitor each other's performance during the approach. It seems to me to be a very subjective approach to the manoeuvre." 19

9.15 **Cockpit Gradient.** The difficulties in monitoring the execution of a poorly defined manoeuvre will be further compounded when a very junior pilot is expected to monitor the performance of a senior pilot and QFI such as in Black One on the 29 November 2006.

"Other crewmembers within that crew know that the person is high standard and has excellent capabilities and they assume that a person can handle a situation that they have got themselves into, so there's a bit of reluctance on their behalf as well speak up, when possibly at other times they should." 20

"The fact that the manoeuvre continued without what appeared to be any interaction from the co-pilot led me to suspect that the cockpit authority gradient affected his ability to communicate his concern."

**Finding:**

9.1 **Inside the cockpit of BLACK 1, the normally available checks and balances at the tactical level were eroded by a lack of definition and clarity in the standards associated with SO flying techniques and approach parameters. This situation was further exacerbated by the absence of formal CRM training on behalf of the co-pilot, an adverse cockpit gradient and a high unit and personal workload.**

**CULTURE AND SAFETY ISSUES**

**Operations versus Risk, Safety versus Cost**

9.16 It is trite to say that, the safest military helicopter in the world would be one that does not fly; the risk of a crash is zero as is its operational capability and utility. The AVRM principle that risks are only accepted when the benefits outweigh the costs has already been

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18 MAJ 2 T1160.18  
19 SQNLDR Morris T1943.6  
20 SQNLDR Morris T1889.39
discussed and this has been a conundrum for designers and military leaders for many years. There is quite often a balance or trade off between operational capability and safety. Examples of this trade off are seats that are fit for purpose verses Operational Contingency Loading (discussed in Section 7) and not fitting the Black Hawk with flotation devices and the DECU. (discussed at Section 14)

9.17 In recent years and certainly since a number of high profile Australian Military tragedies (eg. HMAS WESTRALIA fire and the toxic chemical exposure of F111 technicians working in the fuel tanks), Defence has significantly refocused its outlook on Occupational Health and Safety (OHS). It can be said that there has been an emphasis placed on making Defence activities safer for its personnel. The question remains, has the refocusing been sufficiently acute and balanced?

9.18 RADM Adams, as the Head of Defence Personnel, stated in his keynote address at the Safety in Action Conference held in March 2005, that within Defence the "current strategic approach regards the legislation as a minimum standard against which to measure performance. Defence now accept that a direct consequence of poor OHS management is increased risks of injury and death, a higher turnover of people and higher costs. Therefore Defence now put people first in their management practices, accepting that this approach improves results and is "good for business". He further added: ‘... by focusing on people as the key to military capability and by protecting them from unnecessary risk while they're doing their job, we are enhancing our ability to achieve organisational goals”.

9.19 There is also another important dimension to this balancing of operations and safety and that is financial cost. When there are budgetary constraints, and there always are, arguably it can come down to a choice between a safety upgrade and enhancing an operational capability. Again the difficulty is determining what can be afforded and what Defence cannot afford not to do.

The ‘Can do’ Attitude and Self Belief

9.20 In the paragraphs above, the balance between operations and safety was discussed. Complementary to that notion is the mental aspect, or attitude, and what effect that can have. The Australian Military have historically prided themselves on being resourceful (making do with limited resources) and having a ‘can do’ attitude. For the most part that is a complementary attribute to have. However, that very attribute has also proven to be the downfall of others when the ‘operational outcome’ becomes the sole focus. The example mentioned earlier, where RAAF maintenance personnel working on F111 fuel tanks were

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21 Section 6
22 Section 14
23 Section 14
24 Extract from CCH Occupational Health and Law Service forming part of LEUT Nash’s written submissions and admitted by the Board of Inquiry as Exhibit 280.
exposed to toxic agents is a good one as the operational outcome (having serviceable aircraft) took on a seemingly higher priority than the safety of the maintainers. The common practice and normalisation of Operational Contingency Loading at 171 Avn Sqn and using a helicopter restraint strop rather than a crash worthy seat is another example. The operational outcome has assumed a priority over the safety of the aircraft occupants.

9.21 A ‘can do’ attitude does exist at 171 Avn Sqn. A high level of esprit de corps, self belief and self confidence was evident through the demeanour of many witnesses in this Inquiry. However, that feeling of self belief needs to be tempered against reality so that the belief in yourself does not blind you to your actual level of ability and thus negate it.

Safety Culture of 171 Avn Sqn

9.22 171 Avn Sqn believes it has a highly developed safety culture. Nonetheless, genuine aviation risks have become normalised within the Squadron’s culture which have consequently skewed the reporting of these hazards as they occur. Before considering the evaluation of the culture of 171 Avn Sqn by those external to the unit, it is important to consider the view 171 Avn Sqn itself has of its internal culture.

9.23 MAJ 4 described a noticeable change in culture at 171 Avn Sqn between 2003 and 2005, the period he was not serving in the Squadron. He stated in evidence:

“The overall culture of the squadron had become more conservative. The profiles that were flown were more realistic in that they accounted for the likelihood that the target would be unseen, so the profiles were slightly slower. And the systemic and individual attitude to risk analysis and mitigation was also more mature, in that there was a more active involvement in pre-flight briefings of looking at MRPs, et cetera.”

9.24 MAJ 5, too, described a “dramatic change in the way that the squadron actually operates” since 1996:

“Since 1996, I've viewed a dramatic change in the way -"culture" is not a word I like to use, but the way that the squadron actually operates. I see there's been a greater emphasis on teamwork, there's a greater emphasis on including the entire capability within the squadron to encompass the whole organisation as the team that gets the job done.

In the past, it was very much pilot centric. Guys would present orders, give them and then just go off and do it. Now, the way that the culture has evolved is that everyone

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25 Safety, Culture and Risk: The Organisational Causes of Disasters- Andrew Hopkins CCH, 2005 at page 88
26 Discussed in greater detail at Section 7
27 MAJ 4 T1292-33
from co-pilots to loadmasters gets involved with the planning, so that by the time the orders come around, everybody has a greater understanding of the mission requirements and profiles.

Along with that is because of the understanding of commanders' intent and understanding of what we're trying to achieve, the team, whether it be the squadron, the troop or the individuals in the aircraft, feel that they all have an input into this particular mission and that they can speak up at any time. I've actually seen several examples, even in March, not including SO tasks, of people speaking up about concerns and raising them, because they feel comfortable in the chain of command, and the aircraft captain, to be able to come up and speak up with an issue, and we have to resolve that before we continue."28

9.25 The shift since 1996 was also commented upon by MAJ 2.

"At that time (pre 1996) the work was more closely aligned with a "can do" culture. The tasks were assigned and crews went about trying to achieve them. They had no formal risk management policies in those days. ... The culture at this time was to provide the best level of support – faster, lower, harder.29"

9.26 LTCOL 1 (the Commanding Officer of the Squadron) stated in absolute rather than comparative terms that 171 Avn Sqn has a "strong, positive, operationally focussed, safety based culture ... (with) safety at the forefront of every single task we perform"30.

9.27 The opinion of LTCOL 1 certainly appears to be supported by the most recent Defence Flying Safety Aviation Safety Climate Survey31. Under Chapter 13 of the Defence Aviation Safety Manual, Aviation Safety Climate Surveys are supposed to be conducted biennially. For the December 2005 survey, data was received from 32 aircrew at 171 Avn Sqn. Of note, 93.7% agreed or strongly agreed that 171 Avn Sqn takes time to identify and assess risks associated with flight operations. 96.8% agreed or strongly agreed that 171 Avn Sqn has fully implemented Aviation Risk Management and is genuinely committed to aviation safety.

**Finding**

9.2 *171 Avn Sqn personnel honestly believe that they have a healthy safety culture.*

9.28 The evidence from the senior pilots at 171 Avn Sqn indicates safety is well-entrenched as part of everyday operations. How, then, was the arguably multi-causal accident involving Black Hawk 221 on 29 November 2006, able to occur?

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28 MAJ 5 T970.21-47
29 Exhibit 110, Statement of MAJ 2, paragraphs 7-8
30 Exhibit 137, Statement of LTCOL 1, paragraph 7, dated 13 July 2007
31 Exhibit 169, DSPPR Brief 43/05, Enclosure 1 to DSPPR 2/06 of December 2005
9.29 This question becomes even more acutely relevant in light of the serious incident on 23 June 2007 involving a Black Hawk from 171 Avn Sqn, A25-105. In that significant incident the pilot was unable to arrest the rate of descent during the termination of an assault approach. This resulted in a heavy landing causing major damage (Cat 4) to the aircraft. The similarities of the two incidents are striking.

9.30 The ASOR summarises the contributing factors as “unsafe acts or conditions / errors / skill-based errors / failed to recognise limitations / poor technique”. Like CAPT Bingley, the Flying Pilot in this incident was a Qualified Flying Instructor, an assault approach was being flown, the termination phase had a tail wind component and the aircraft experienced rotor droop. While the command commitment to embedding a genuine safety culture at 171 Avn Sqn is not in question, its effectiveness is.

SUPERVISION

9.31 The Board finds that CAPT Bingley was a very busy man although LTCOL 1 described his workload as being “high but achievable.” However this view may have been influenced by LTCOL 1’s perception, that everyone was “working very hard but we’re not alone in that regard” with CAPT Bingley being no exception.

Q. Operational tempo has been mentioned. I would like you to explain, I guess, the effect that the operational tempo in the past two years or 18 months has had on the squadron, and also the fact that you’ve done a move down from Townsville to Holsworthy and what impact that had on the squadron. I guess what I’m looking for is general comment on workload, on your key personnel and, indeed, on yourself?

A. Sir, we’ve been involved in significant operations, all at short notice, all with no end date. Whilst conducting one of those operations, the one when the accident that the Board is investigating occurred, we were relocating the unit. Clearly, that has an impact on the workload of individuals both deployed and at home. It has an impact on their families - not to be understated, because that affects the capacity of those individuals who are deployed to maintain focus. I’ve been very impressed by the manner in which my subordinate commanders have handled those issues, have maintained open communications with our more junior soldiers and officers, but there is no doubt that the unit has been busy and that it, like many other units, is having to work very hard to keep on top of all of those issues that are required to be maintained by a unit that is on, and continues to be on, operations.

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32 Exhibit 112, ASOR 171AVN-020-2007
33 ibid
34 LTCOL 1 T1517.9
35 LTCOL 1 T1518.1
Q. But has it, in your mind, been sustainable? We can all do [surge] operations where you have high intensity for a short period, but you have had sustained high-tempo operations now for quite some time, and I would suggest to you that when you have that, other things suffer – second and third priority things - and that's often administration and record-keeping and things like that; they tend to get put in the "it can wait until next week" pile. Could you comment on that?

A. I would agree, in general terms, that that's the case. There are some administrative aspects of our unit that have needed, and continue to need, attention, particularly with regards to the relocation. We have individuals who aren't just doing their day-to-day jobs; they're having to re-establish the unit in a new location, re-establish procedures, establish procedures that are separate from a parent organisation, and they all create additional workload and they all take time to become mature. The result is additional friction at the worker level all the way through to the command level in managing that additional workload. I won't suggest that that has been an easy undertaking at all, but I remain very impressed by the manner in which the members of 171 Aviation Squadron have continued to deliver capability in that environment.

Q. I'll put just one final question to you, then. Has the squadron had too much work, given these additional burdens of late, given your limited resources?

A. No, not too much.36

Overall Supervision at 171 Avn Sqn

9.32 In order to mitigate the risks associated with the collective and individual operational and performance pressures, control mechanisms such as supervision and training should normally be put in place.37 For performance monitoring to be effective, suitable repeatable and authorised standards must be available and adhered to. LTCOL U offered the following:

Q. As the leader of an organisation that is subjected to those types of pressure, how do you actually control and rein in enthusiasm, which must happen over the course of these operations?

A. Sir, it's a function of leadership at all levels. I mean leadership, and that's not a throw-away term. It's about knowing your people well, having worked with your people before. It's about having done similar serials in training. It's about building up slowly and then starting to go to job standard. It's about taking a methodical approach to training. It's about planning and working together and spending many

36 LTCOL U T1541.4 – T1542.11
37 SQNLDR Morris T1931.6
9.33 LTCOL 1 delegated much of the oversight for the squadron routine to the OC Aviation and the Unit Standards Officer.\textsuperscript{39} "These two very capable officers police the execution of safe, effective training and operations on my behalf and refer their concerns to me where necessary."\textsuperscript{40} Although he said he sought and welcomed feedback from "authorising officers, air element commanders and flying instructors"\textsuperscript{41} so as to take appropriate action to correct poor performance or inappropriate behaviour, no evidence was otherwise presented of an instance of this feedback occurring. The Board considers it likely that in the face of this workload and in the apparent absence of feedback, that LTCOL 1 was preoccupied in unit administration and not able to provide much in the way of direct supervision of flying activities. In his own words, this was delegated to MAJ 3 as OC Aviation and MAJ 2 as Unit Standards Officer.

Adverse Supervisory Gradient

9.34 MAJ 3 found CAPT Bingley to be "extraordinarily professional"\textsuperscript{42} and a very personable individual with an immensely strong character".\textsuperscript{43} Additionally, CAPT Bingley was one of the instructors when MAJ 3 undertook his most recent SO training course. Although MAJ 3 was the OC Aviation, Detachment Commander and ranking officer on board KANIMBLA for OP QUICKSTEP, there was an adverse knowledge and experience gradient between him and CAPT Bingley that may have prevented him from seeing CAPT Bingley's flying performance as anything other than the Unit standard.

Q. So it remains an area of personal judgment on the execution of the manoeuvre. With respect to the rate at which you may apply pitch, using that term for an aggressive approach, would you be as comfortable, say, as MAJ 2 in flying this type of approach?

A. MAJ 2 has significantly more experience than I do. I am a conservative pilot and, as such, I will build in buffers for myself. Would I conduct something as aggressively as he would? Probably not.

Q. In relation to CAPT Bingley, would the same apply?

A. My relationship with him?

\textsuperscript{38} LTCOL U 1643.45
\textsuperscript{39} LTCOL 1 T1479.41 et al
\textsuperscript{40} Exhibit 137, statement of LTCOL 1, paragraph 11
\textsuperscript{41} LTCOL 1 T1436.5
\textsuperscript{42} MAJ 3 T2093.22
\textsuperscript{43} MAJ 3 T2093.25

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Q. No, would the same apply to CAPT Bingley as you applied to MAJ 2? Would he fly more aggressively than you would?

A. I have not seen CAPT Bingley fly overly aggressively, but as he was a more experienced individual, I expect that he would be far more comfortable in conducting that flight than I would.

Q. Did you ever feel the need to rein in any unit pilots with respect to aggressive flying habits?

A. I have had occasion - and I have normally done it through the individuals' troop commanders and the QFIs - to identify to one or two individuals that perhaps what they were doing is erring on the wrong side of the line and that they needed to have that line readjusted, to be rebase lined.

Q. Would either of those be MAJ 2 or CAPT Bingley?

A. No.

Q. It's a difficult question probably for you to answer, but if you are supervising someone whose skill sets and experience are greater than yours, how do you find that line to define, when you're supervising people who have greater experience?

A. It is a difficult question, sir. I do not profess to have the same skill sets as CAPT Bingley or MAJ 2, but if I am their commander, then I am bearing the command responsibility for whatever they do and it is incumbent upon me, and I assure you I would take steps that if they were doing something that I was not comfortable with, they would be told by myself, regardless of who they are and regardless of the experience that they have over and above mine.

Q. But how would you know if they're flying more aggressively than you and they are more comfortable with it, as you've said?

A. It's very subjective. 44

9.35 Despite MAJ 3’s claims, the Board considers that, due to his perception that CAPT Bingley was one of the senior pilots who set the flying standards, he would not easily be in a position to readily identify overly aggressive flying behaviour. When coupled with the knowledge and experience gradients between MAJ 3 and CAPT Bingley, MAJ 3’s supervision of CAPT Bingley’s flying performance could well have been rendered largely ineffective. MAJ 3 was unaware that CAPT Bingley had had problems in the previous days

44MAJ 3 T2129.1-T2130.4
in relation to his approaches, thereby being deprived of information as CAPT Bingley's personal performance concerns.

9.36 The Board heard that 171 Avn Sqn has been, and is continuing to be under high workload in terms of administration, training and the conduct of operational tasks. For LTCOL 1 the high workload has most likely led to a load shedding requirement whereby the oversight of day-to-day squadron activities was left with MAJ 3 and standards with MAJ 2. LTCOL 1 appeared to rely almost exclusively on feedback to monitor squadron performance. As a relatively inexperienced pilot, MAJ 3 would have undoubtedly felt an adverse knowledge and experience gradient when dealing with CAPT Bingley and MAJ 2. The Board does not know this as a matter of fact.

PERFORMANCE PRESSURES

Introduction

9.37 By their very nature SO missions will carry with them any number of significant pressures due to the importance, urgency and potential use of force and associated violence. The Board heard evidence that there are significant pressures associated with the role. There is an operational pressure to get in there fast on the first approach and out again as fast as you can. It is a high workload environment where pilots aspire to be the best that they can. The pressures on the crews to succeed in this role can be considerable and they will do their very best to achieve the required standards. While this type of pressure is generally good and will push people to strive for and achieve excellence, it may push individuals to exceed their personal performance boundaries particularly if their credibility is at stake.

"[The pressures] can all play a part but some of them are quite positive. It's a matter of how you manage them. I think we talk about the can-do culture, but "can do safely" is the important thing that we should emphasise. But a lot of those attributes, trying to do the best they can - there's nothing wrong with that, provided it's done in a way which is thoroughly understood and the risks are fully appreciated."

9.38 Flying the SO mission is a high-profile activity and SQNLDR Morris offered the following perspective on the associated pressures:

"SO flying is a particularly demanding but extremely satisfying experience. Working with elite professionals, in any environment, makes people try harder to succeed so that they gain the respect of their elite clients, be accepted as part of the team and avoid failure if at all possible. These are all good things and are the foundation of any

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45 MAJ 3 T2118.20
46 SQNLDR Morris T1889.31
47 GPCAPT Lee T1878.23

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successful team activity but, in my experience, the high-profile and high-risk nature of the work can boost confidence and focus to levels that can become dangerous at certain critical times. An example of this task-focus is sadly witnessed regularly at airshows around the world where manoeuvres are sometimes attempted that would not normally be tried or continued if it weren't for the crowd of people watching and the potential loss of personal credibility should the manoeuvre be aborted." 

9.39 CAPT Bingley, as an individual, and by virtue of his role and position within 171 Avn Sqn, trite though it is easy to say, would have been exposed to significant pressures to perform. This section of the Report attempts to analyses the effects that these pressures may have on aircrew performing the SO role generally and those likely to have been felt by CAPT Bingley in particular, as far as they now can objectively be assessed. The effectiveness of traditional controls within 171 Avn Sqn will also be analysed.

**Personal Pressure**

9.40 **CAPT Bingley's Workload.** CAPT Bingley was a qualified flying instructor, a unit maintenance test pilot, a SO to aircraft NVG (Night Vision Goggles) captain, a lead planner, a SO instructor and formation flight lead and assisted the Troop Commander in the administration of his troop. In addition, CAPT Bingley was flying 400 to 500 hours per year for the past couple of years. CAPT Bingley also carried responsibility of being lead planner for the events of 29 November 2006.

9.41 **The desire for Self-Improvement.** In the days prior to 29 November 2006, CAPT Bingley expressed concern to MAJ 4 that he was coming in slightly slow during his previous approaches to the ship despite occurrences of main rotor droop. The Board heard that CAPT Bingley was a person driven to better himself and, indeed that he was in some respects a perfectionist and fairly critical of his own performance. GPCAPT Lee, a human factors expert, gave evidence that a recent study revealed that "pilots were actually more critical of their own performance than were the observers". This observation would obviously apply to CAPT Bingley in that he would have been actively attempting to improve his performance. A possible pressure may well have resulted from his strong professional relationship with MAJ 2. CAPT Bingley aspired to be as good as MAJ 2. This however was not as it could not be the subject of forensic testing and examination to the point that a safe and fair conclusion can be reached.

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\(48\) Exhibit 175, report by SQNLDR Morris, paragraph 7
\(49\) LTCOL 1 T1516.29 to T1517.17
\(50\) MAJ 4 T1258.44
\(51\) MAJ 4 T1289.29-43
\(52\) LTCOL 1 T1528.35
\(53\) GPCAPT Lee T1868.25
\(54\) LTCOL 1 T1529.5
\(55\) LTCOL 1 T1528 passim ("MAJ 2 is the most experienced Black Hawk pilot in the ADF" and "is a very effective Black Hawk pilot" with "superior flying skills")
9.42 SQNLDR Morris gave an opinion as to how CAPT Bingley’s self improvement aspirations may have manifested themselves on 29 November 2006:

“The Aircraft Accident Investigation Team (AAIT) Report (paragraph 132) stated that witnesses reported that CAPT Bingley had been having difficulties in the preceding days terminating the hover close enough to the target and had been tending to terminate too short. This tendency was probably due to the fact that the approaches had been flown to Kanimbila while it was underway, but CAPT Bingley would have been working hard to correct this fault and re-calibrate his approach profile. He would have been trying to delay his deceleration slightly and force a more aggressive and more precise termination.” 56

Role Model and Elitism

9.43 The Board heard evidence that junior pilots in particular looked up to CAPT Bingley as a role model and respected his flying skills57. “He was the person who everyone wanted to fly with, to be in the back of the aircraft, this is testament to what a safe and competent pilot he was.” 58

9.44 SQNLDR Morris made the following comments:

A lot of junior pilots try to imitate their superiors, and CAPT Bingley certainly in this situation was very experienced and capable pilot within 171. A lot of junior pilots would have been looking up to him as an example how to fly on how to operate in a particular role. That in itself brings a lot of scrutiny on him. Everything he does is being observed and analysed and judged from below, and from amongst his peers as well, so there was continuous pressure on him [to perform].” 59

“The pressures on CAPT Bingley to excel should not be underestimated. SO aircrew are considered by their pilot peers to be at the top of their profession. They are highly trained, fly the best equipment and work with elite forces in interesting places doing interesting things. Many junior pilots put SO flying as the ultimate on their wish-lists and look up to SO pilots, of whom CAPT Bingley was one of the most qualified, with admiration and respect. This continuous scrutiny is usually healthy because it drives people to achieve but it also makes it harder for achievers to stop when things start to go wrong because, by stopping, they are admitting fault. This type of pressure also affects high performing crews because individual crewmembers are less likely to voice their concerns about a hazard because they believe the flying pilot is aware of it and

56 Exhibit 175, report by SQNLDR Morris, paragraph 9
57 LTCOL 1 T1528.41, Exhibit 92, Statement of CAPT 8, paragraph 31; etal. This extract from CAPT 8 is offered as an example: “If there was anyone who could have got out of the situation it would be CAPT Bingley”
58 Statement of CAPT 8, paragraph 31
59 SQNLDR Morris T1890.12
can handle the situation."\textsuperscript{60}

9.45 MAJ 4 described the effect of this on the "relationship dynamic that existed between CAPT Bingley and the more junior pilots"\textsuperscript{61}:

"A couple of the junior aircrew who flew with CAPT Bingley regularly almost worshipped him for his abilities in the aircraft and for the speed at which he flew assaults."\textsuperscript{62}

9.46 An implication of this observation in terms of culture at 171 Avn Sqn, is that CAPT Bingley’s example may have perpetuated the normalised extension of acceptable limits in relation to wind and rotor droop and the way he flew in his "comfort zone". TPR E observed: "I always regarded him as the Michael Schumacher of Black Hawks"\textsuperscript{63}

9.47 The evidence of some of the more junior aircrew also supports an hypothesis that his reputation and abilities could have furthered a culture of flying beyond regulated parameters.

"CAPT Bingley ... his comfort level was far beyond that of a less experienced pilot. He would fly the Black Hawk aircraft to its limits within his comfort level"\textsuperscript{64}

"In relation to the main rotor droop occurring the night before 29 Nov 06, I did not feel any danger or apprehension in relation to the aircraft. ... I might have felt in danger with another pilot (than CAPT Bingley)".\textsuperscript{65}

"I flew with CAPT Bingley on ... 28 Nov 06 and recall an instance of main rotor droop on one occasion. ... As a crew we were all aware of CAPT Bingley’s abilities as a pilot and at no stage did I feel that he had endangered the crew, the airframe or myself."\textsuperscript{66}

9.48 LTCOL 1 was not surprised that CAPT Bingley’s flying talents were held in great esteem by the junior pilots who looked up to him as a role model.\textsuperscript{67} Nor was he surprised that he was described by his SAS “customers” as the “Schumacher of special operations flying” and as someone they would like to fly with.\textsuperscript{68}

9.49 CAPT Bingley served with SGT AB as a soldier in 1993\textsuperscript{69}. SGT AB held CAPT Bingley in the highest esteem claiming that he was an “exceptional pilot”\textsuperscript{70}. Being

\textsuperscript{60} Exhibit 175, report by SQNLDR Morris, paragraph 8
\textsuperscript{61} Exhibit 124, Statement of MAJ 4, paragraph 46
\textsuperscript{62} Exhibit 124, Statement of MAJ 4, paragraph 54
\textsuperscript{63} TPR E T139.20
\textsuperscript{64} Exhibit 92, Statement of CAPT 8, paragraph 21
\textsuperscript{65} Exhibit 92, Statement of CAPT 8, paragraph 25
\textsuperscript{66} Exhibit 236, Statement of CPL 19, paragraph 4
\textsuperscript{67} LTCOL 1 T1529.41
\textsuperscript{68} LTCOL 1 T1529.47
\textsuperscript{69} SGT AB T1694.24
\textsuperscript{70} SGT AB T1694.23
knowingly held at in high esteem by former comrades, friends and acquaintances can bring pressure on an individual to perform in order to meet their expectations. SQNLDR Morris explains:

"An additional pressure on CAPT Bingley was that he served as a soldier in the Army prior to being commissioned as a pilot and a number of his friends were soldiers on HMAS Kanimbla watching the flying on the day of the accident. While pilots get used to flying in public view and learn to concentrate on the task without distractions, there is always a temptation to try even harder and make sure the flying is precise and impressive. Whether this pressure was significant on the day is impossible to know but I am sure that the crew of BLACK 1 knew people were watching and wanted to succeed."

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"So I guess as a team, being in the back of his aircraft, we would try and get on his aircraft because we felt that he was a better pilot or would get us on to target quicker or faster or for whatever reason."72

9.50 This evidence, which can, of course, be understood as perceived pilot infallibility in relation to CAPT Bingley can raise concerns as to the efficacy of the aviation safety management system. The Board holds that such views may seriously undermine the primary tools of this system, namely: crew resource management (CRM), debriefs, reporting and command supervision. Accordingly, while the safety processes appears to have been in place, no alerts occurred to suggest that anything was wrong: an example of the triumph of form over substance.

9.51 The examples cited of breakdown of aviation safety management, relevantly to this Board of Inquiry, relate to CAPT Bingley. It is the view of the Board that these problems infect the whole Squadron.

Possible Military Action

9.52 SQNLDR Morris referred the Board to another pressure that may play on the minds of those who are likely to face military action. This may manifest itself as a general stress on everyone with a personal apprehension about their well-being and their likely performance in any potential operation.73 SQNLDR Morris stated:

"The very real threat of being sent into military action was also a pressure that should not be underestimated. All crew would have been concerned, particularly those with Flight Lead and mission planning and coordination responsibilities such as CAPT

71 Exhibit 175, report by SQNLDR Morris, paragraph 10
72 TPR C T169.21
73 SQNLDR Morris T1930.36
Bingley. Crews know that operational missions are painstakingly reviewed and analysed post-flight and every action they make will be evaluated. Again, it is impossible to know the significance of this pressure on CAPT Bingley.  

9.53 The Board heard that there were most likely real and significant operational and personal pressures on CAPT Bingley during his deployment on Operation QUICKSTEP. The Board accepts that CAPT Bingley was likely to have been feeling pressures due to being a very self-critical QFI, aircraft captain and lead planner and the stresses associated with presenting as a role model and example for peers, subordinates and associates alike.

9.54 These pressures, carefully monitored and effectively managed, the Board accepts may cumulatively be capable of modifying an individual's performance and behaviour. While it is impossible for the Board to determine CAPT Bingley's personal ability to monitor and manage stress, it is possible to analyse the apparent effectiveness of any monitors in place at 171 Avn Sqn.

Carriage of SO Troops – Added Pressure

9.55 There was compelling evidence put before the Board that the carriage of SASR troops in A25-221 in the training serial on 29 November 2006 would likely have impacted on the way in which CAPT Bingley approached this training exercise.

9.56 CW5 Charles King of the US Army 160th SO Aviation Regiment (Airborne) (SOAR(A)), a highly experienced and decorated SO pilot stated:

"...in my experience a training flight often becomes a no fail mission when SO troops are added to the equation."  

9.57 CW5 King further said:

"...my experience has been that any time you put highly trained people on board the aircraft, the desires of the pilot become not to fail... it's no longer a training mission at that point".

9.58 CW5 King explained that “professional pride” can influence a pilot:

"...in that as a pilot – and this is my personal experience with this – you never want to accept less than what I call an A-plus standard on your approach ...when you get the operators in the back you tend to push the target a little bit closer... there is an elevated

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74 Exhibit 175, report by SQNLDR Morris, paragraph 11
75 Exhibit 183 CW5 C. King statement paragraph 5(b)
76 CW5 C. King T2025.8
sense of necessity. ...I'm afraid they're going to lose confidence in my ability to put them on target when the time comes." 77

9.59 The evidence of CW5 King is supported by SQNLDR Morris on this aspect. He referred to the continuous scrutiny which has the potential to impact on the most experienced and qualified pilots. 78 During Operation QUICKSTEP it is very likely that CAPT Bingley would have been constantly under such scrutiny making "it harder for achievers to stop when things start to go wrong because by stopping, they are admitting fault." 79

9.60 MAJ 3 disagreed with the opinions of CW5 King and SQNLDR Morris. He believed 171 Avn Sqn pilots were "resilient enough not to fold to the pressure involved when additional personnel are added". 80

9.61 The Board is of the view that by having SF personnel in the aircraft does add another dimension of pressure onto the aircrew. A conscious decision should be made as to the stage and level of training at which passengers should be carried. Certainly the opportunity to maximise training opportunities should be taken whenever possible and this is especially so for a scarce resource. However, that needs to be balanced against an incremental approach to training and safety. The aggressive approach and termination of Black Hawk 221 flown by CAPT Bingley in apparent contravention of the direction from MAJ 3 ("to take things easy and make this an 80 percenter," 81) at Aviation Orders may partially be explained by the carriage of SF passengers. At what point the SF should be included is a matter to be predetermined in a training plan.

Training Build Up

9.62 The training plan for 29 November 2006 did not allow for any formal build up in training for what had been identified as a deficiency in training and a lack of currency.

9.63 MAJ 3 indicated in evidence that he appreciated that it would take "a little while to get back into it". 82 MAJ 3 states at flying orders he said the approach should be flown as an 80 percenter. "Let's creep up on it." 83

9.64 CW5 King referred to a "Crawl, Walk, Run philosophy" utilised by 160th SOAR. In the particular circumstances of the training of 29 November 2006 this would have involved:

77 CW5 King T2025.26-38
78 SQNLDR Morris T1890.12 - .23
79 Exhibit 175SQNLDR Morris statement paragraph 8
80 MAJ 3 T2121.22
81 MAJ 3 T2076
82 MAJ 3 T2117.38
83 MAJ 3 T2115.43 Exhibit 184 MAJ 3 statement paragraph 28

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"The first approach is generally to the deck to get a "feel" for the winds, power requirements etc. Approaches are then conducted culminating in a full mission profile. Passengers are added only after all internal training is complete and aircrew demonstrates proficiency in the manoeuvre." 84

9.65 CW5 King emphasised a progressive approach commencing at a 50% level getting your "eye point" set.

9.66 SQNLDR Morris referred to the prudence of approaching the training with a measure of caution. He noted:

"This incremental approach is often directed by the authorising officer in the mission briefing but will also be discussed by the individual crews in their own aircraft safety briefing". 85

9.67 The approach and termination flown by CAPT Bingley was not consistent with the concept of work up training.

"It was unusual in my opinion that Black 1 was applying such aggression to the first profile flown to a stationery target after nearly four weeks of operating to a moving ship". 86

9.68 It is accepted that MAJ 3 at flying orders exhorted pilots to "creep up" on the training but it is not clear why it appears that CAPT Bingley did not do so. It has to be acknowledged that a possible explanation well may be that he over estimated his ability to cope with lack of currency. 87

9.69 The advice of flying an "80 percent" and "creeping up" on the training carries with it a lack of clarity and certainty for pilots. What is 80% for one pilot may mean something else for another. Judging what is 80% where there is a lack of currency for such training may also create difficulties. MAJ 3 accepted that in hindsight and given what had occurred, the comments of CW5 King and SQNLDR Morris seem to be appropriate. 88

9.70 The Board believes that a more formal incremental approach to training incorporating Crawl, Walk, Run philosophy will create certainty in relation to flying training and promote safety. This incremental approach would include, for example, when it is appropriate to include passengers. It was correct and commendable to identify a training deficiency (lack of recency), however the approach to rectifying that deficiency was ad hoc and without rigour, especially safety rigour.

84 Exhibit 183CW5 King statement paragraph 3
85 Exhibit 175SQNLDR Morris statement paragraph 25
86 ibid
87 SQNLDR Morris (ibid)
88 MAJ 3 T 2122.7

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Finding:

9.3 A more incremental approach to training should have occurred once a training deficiency had been identified. This would include the decision to carry passengers.

CONDITIONS ONBOARD HMAS KANIMBLA

9.71

9.72 The AAIT Report states that the accommodation onboard KANIMBLA was not ideal for the embarked forces. CMDR Bannister reflected that life onboard with so many embarked troops for an extended period was difficult, while LCDR Glynn described the ship as close to maximum capacity.

9.73 As an example of the requirements for feeding 600 personnel efficiently, KANIMBLA’s Daily Orders for 29 November 2006 set out three separate meal times for breakfast: 0550-0630 for embarked forces, 0640-0740 for Ship’s Company, and 0745-0830 for watch keepers, embarked forces from the aviation and recovery force elements.

9.74 Aircrew accommodation was mostly in the Low Dependency Units (a small mess deck with approximately 16 bunks used as a ward for low dependency patients should the PCRF overflow) with some of the more senior officers berthed in three berth cabins. The AAIT noted that conditions were not ideal for aircrew rest requirements, with lights and wake-up calls on the public address system at times when aircrew were resting. MAJ 3 mentioned initial problems with the sleeping arrangements, access to meals and access to recreational and physical training opportunities.

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85 Exhibit 85, Statement of LCDR Oborn, paragraph 3; MAJ 3 T2122-29
86 Exhibit 5, AAIT Report, paragraph 11; Exhibit 124, Statement of MAJ 4, paragraph 3 indicates there were 45 personnel from 171 Avn Sqn embarked
81 Exhibit 21, Statement of LCDR Lassam, paragraph 3
82 Exhibit 35, Statement of LCDR Glynn, paragraph 4
83 Exhibit 246, Statement of CAPT T; Exhibit 227, Statement of MAJ Langford, paragraph 1; Exhibit 228, Statement of WO2 Rule, paragraph 1
84 Exhibit 249, Statement of Elizabeth May Allsopp, paragraph 1
85 Exhibit 74, Statement of CMDR Bannister, paragraph 8
86 Exhibit 35, Statement of LCDR Glynn, paragraph 6
87 Exhibit 86 KANIMBLA Daily Orders 29 November 2006
88 Exhibit 5, AAIT Report, paragraph 172
89 MAJ 3, T2122-33
9.75 WO2 12, too, highlighted the difficulty of coordinating 171 Avn Sqn’s night flying with early morning wake up calls over the ship’s broadcast system in aircrew accommodation. As this system could not be turned off due to its role in an emergency situation, in the end everybody “just got used to it”. While the accommodation for 171 Avn Sqn personnel was not optimal, WO2 12 recognised that aircrew accommodation was vastly superior to the embarked forces mess.

9.76 Despite the modernisation that the LPAs have undergone, they remain old and arguably uncomfortable ships. Accommodation for embarked forces does vary in standard but overall it is considered austere and cramped. The troop messes in particular are very cramped and uncomfortable when fully loaded.

Finding:

9.4 Conditions onboard KANIMBLA were cramped and a significant Command challenge was to keep 600 disparate personnel, motivated, fit, rested, entertained and fed. This required significant compromise and flexibility from all personnel. In the circumstances, the Board is satisfied that this was successful.

Aircrew Fatigue

9.77 The aircrew’s “72 hour history” indicates that each had had plenty of opportunity for rest and sleep. Their flying schedule was usually programmed at the same time each day making fatigue unlikely. CAPT Bingley’s fatigue level (his role included planning and supervisory aspects over and above that of his flying responsibilities) was also assessed as being acceptable for flying. SQNLDR Pascoe, an aviation medical expert and the medical officer on the AAIT, also used the ADF Crew Duty and Rest Planner, a computer based tool, to ascertain the predicted level of fatigue within the crew at the time of the accident using the actual duty times of the previous few weeks. In evidence he concluded that the fatigue level for the crew was at an acceptable level at the time of the accident. When adjusted for the operating environment aboard KANIMBLA, SQNLDR Pascoe concluded: “Given the operational environment, it would be reasonable to adjust the rest planner to include as work time some of what the crew considered to be rest time. This probably gives a more realistic fatigue prediction and thus suggests all crew had a moderate but still acceptable fatigue score at the time of the incident.”

100 Exhibit 106, Statement of WO2 12, paragraph 10
101 SQNLDR Pascoe T413.9
102 SQNLDR Pascoe T416.10
103 Exhibit 36, CV SQNLDR Pascoe
104 SQNLDR Pascoe T416.20
105 SQNLDR Pascoe T416.3
Finding:

9.5 Fatigue, to the limited extent that it may have existed, was not a factor in the circumstances of the accident.

MEDICAL REVIEW

9.78 All aircrew had current aircrew medicals. 106

PLANNING FOR PASSENGERS

9.79 In connection not only with the accident itself but with the planning of the relevant sortie, a great deal of material was received on the subject of how it came about that there were “passengers” on BLACK 1. That material led Counsel Assisting to make a submission to the effect that there was no evidence of planning with the object of ensuring a “common mental model” between the aircrew and passengers. 107 It was further suggested that there was nothing reflected in the mission package which refers to “passengers”. 108 Additionally, it was submitted that the totality of the evidence failed to make it clear whether or not the carriage of passengers was briefed. 109

9.80 There has been a reference to some material relating to this topic above. 110 It is however desirable to rehearse the range of testimony on the subject.

9.81 TPR C said:

Q. When the SAS personnel that were passengers on the aircraft went to the aircraft, are you able to say whether you were expected on the aircraft or what the position was?

A. My memory is that when we turned up for the timings for our flight, a particular loadmaster - I’m not too sure whether it was the two from our aircraft - looked at the manifest and made a suggestion that it was his belief that it was only ASOs going on board.

Q. Only the safety officer?

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106 Exhibit 40, Medical Report SQNLDR Pascoe 7 July 2007 together with cover letter 107 Counsel Assisting written submissions paragraph 5.79 108 ibid 109 ibid 110 See paragraphs 8.65-8.70

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A. Only safety officers. But when CPL A said, "No, we've got a whole team going up", it wasn't a big issue. They just changed the manifest to reflect all the passengers going on board.

Q. Where was it that the manifest was changed and that general discussion took place?

A. In terms of location?

Q. Yes.

A. It was in the aircraft hangar.\textsuperscript{111}

...\textsuperscript{112}

Q. Prior to boarding the aircraft, did you undertake or were you part of a safety briefing?

A. Prior to the aircraft - prior to us getting on the aircraft, we were told about what we were there for, but there was no real need for a safety briefing, because we were basically passengers.

9.82 In his written statement, TPR C said:

I was embarked in HMAS KANIMBLA for Operation Quickstep. During the 6 weeks that we had spent in the AO, there were only limited opportunities to conduct training and keep our skills current. As a result, my patrol commander decided that we should make the most of having access to the helicopters and conduct dry Aerial Fire Support training. This was designed to give us exposure to AFS commands, we could employ these if needed on the current operation, and so that we would already have some of the training objectives signed off when we did the AFS qualification later, as well as relieve boredom. We had done some theory lessons already, and prior to 29 Nov 06, we had done dry training runs on several previous occasions.\textsuperscript{113}

9.83 LCDR Stringer said:

Q. Lieutenant Commander, I was asking you about the ship's flying brief. You mentioned that 171 number 4 and CAPT Bingley were present. Do you recall any discussion taking place at the flying brief concerning the carriage of passengers by either of the pilots that were at the flying brief?

A. Yes, sir, I do.

\textsuperscript{111} TPR C T146.35
\textsuperscript{112} ibid, T160.8
\textsuperscript{113} Exhibit 10, Statement of TPR C paragraph 2
Q. Could you tell the Board what the substance of that conversation is, referring to number or name, as appropriate?

A. The discussion was with number 4 primarily. What that related to was, prior to this sortie, there had been occasions where if space in the aircraft were available, so it wasn’t filled up with soldiers training, it was, say, on an aircraft training mission, if there were spare seats and the opportunity presented, members of the ship’s company and other embarked forces who may not have been directly associated with a direct need did undertake familiarisation flights in the Black Hawks from time to time. However, on this day, the decision was taken by 171 Aviation Squadron to stop that practice. Initially, personnel had been assigned to spare seats in all four of the aircraft for that flying day. However, yes, that process was stopped prior to this serial and they said that that was not going to happen into the future. I’m not sure why that decision was taken.

Q. But it was number 4 that indicated that at the flying brief?

A. Yes.  

9.84 LEUT Jones said:

A. There was a discussion earlier in the day about who was going to be in the aircraft. There had been joy flights that were being organised, if that’s an appropriate term, where photographers and personnel who were interested in aviation careers would be able to go up and fly. It had been organised that there would be, I believe, four or five Navy cooks organised to go on that flight. I understand the night before that, actually all of those types of flights were deemed as not suitable. But that morning, at about 9.30, I was outside the wardroom with the ship’s aviation officer and we were approached by two of the cooks, obviously keen and asking if their flight was on. The SAVO advised at that stage that it was off and that it would only be personnel from the regiment travelling in the aircraft.

Q. So this flight wasn’t a joy flight, for want of a better description?

A. No, sir, no. The joy flight had been switched off for an operational one.  

9.85 CAPT 8 said:

Q. On 29 November, did you seek permission to fly as a passenger in A25-221 during the day training?

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114 LCDR Stringer T313.25-314.5
115 LEUT Jones T300.8
A. Yes, I discussed with CAPT Bingley whether I could come in the back to see the approach by day, since it was a little bit different.

Q. Did in fact your name appear as a passenger in the computer-generated flight data for the planning of the flight?

A. I can’t recall it as a passenger, no.

Q. You didn’t travel as a passenger. Can you indicate to the Board why you didn’t, in the end, travel as a passenger?

A. On completion of orders, at some point it was decided that members of the SASR would come on board to do some further training for themselves, which meant that I wouldn’t be on headset, so I decided that there was no benefit for myself being in the back of the aircraft, not being on headset.

Q. Being on headset, from a training perspective, is it of assistance flying and listening?

A. Yes, it provides you with situational awareness.

Q. Do you know at what stage it was decided that SAS passengers would be taken on Black Hawk 221?

A. It was confirmed sometime after orders. I can’t give you the time frame.\(^{116}\)

9.86 In her written statement, CAPT 8 said:

As I recall it initially there were to be no passengers. Because the training serial was different in the sense the approach was to the bow of the ship, I told CAPT Bingley that I might sit in the back of the aircraft to observe. He gave permission for this. Then I believe the SAS indicated that they wished to participate in the training for their own exposure so I decided not to go as I would not have the headset and therefore not know what was going on.\(^{117}\)

9.87 CAPT 7 said:

Q. On that day, you had some passengers on board. There was a briefing about the passengers going on board, was there?

A. Sorry?

\(^{116}\) CAPT 8 T834.5 -34
\(^{117}\) Exhibit 92, Statement of CAPT 8, paragraph 11
Q. Was there a briefing about passengers being on board?

A. During the orders, I can't recall that. But CAPT Bingley did speak to me about the passengers prior to taking off.

Q. What was it he said about them?

A. What I was told was that the passengers were going to be on the aircraft to conduct some of their ASO drills and dry sniping, the things that they do in the back of the aircraft.\(^\text{118}\)

9.88 CPL 13 said:

Q. In relation to the taking of passengers aboard Black 1, when did you become aware that there would be passengers aboard?

A. I believe it was just before we walked out on to the deck.

Q. Did you know how many passengers you were to be taking on board?

A. Not until they all got in and we asked, "Is that all?" And they said yes, and there were then six.\(^\text{119}\)

9.89 CAPT 11 said:

Q. You had passengers as well as your full flight crew in Black 2 on that day?

A. Yes.

Q. Do you recall when you first became aware that you were to have passengers?

A. Basically, during the walk-through I became aware.

Q. Did you know at that stage how many passengers you were to have?

A. No, I didn't, sir.\(^\text{120}\)

9.90 MAJ 4 said:

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\(^{118}\) CAPT 7 T943.8-22
\(^{119}\) CPL 13 T1093.23-32
\(^{120}\) CAPT 11 T1234.23-33
Q. Major, can I briefly go back to the serial of 29 November. You refer in your statement at paragraph 27 to your anticipation that you would launch with passengers and that you launched without passengers because of delays and your being the first aircraft into the air on this day. Was there planning in relation to passengers or was it a late-stage development in relation to the overall planning of the serial from the squadron's perspective?

A. At the end of orders, all crews knew that we would be carrying passengers. It was mentioned at the end of orders. All the appropriate approvals and checks for IUET currency had been conducted, as far as I'm aware, and I expected to receive passengers from the moment I stepped into the aircraft. There were delays that occurred for reasons unbeknownst to myself, and I expressed to the helicopter control officer that I was not waiting any longer and that I would not be taking any passengers, and departed. So my formation, Gold 1 and Gold 2, departed the deck with no passengers.\(^\text{121}\)

9.91 LT COL U, in his written statement, deposed:

I would not give approval for an activity if the activity was not operationally required or the risk was too high. For example, earlier in the day before the accident, it was proposed that six Navy members go up as passengers for exposure training. I denied this proposal because it was not directly related to the operation and therefore carried unacceptable risk levels.\(^\text{122}\)

9.92 In relation to this the following exchange took place:

Q. You mentioned in your statement that there was a suggestion at one stage that six members of the ship's company were going to go up as a part of the passengers, if you like, on board one of the Black Hawks, and you vetoed that. Can you just take us through that process?

A. Yes, the process is, as part of those conferences, we raise what the load lists are, is there anything unusual that I should know about, and I'm briefed by the operations officer on that. On that particular day, the question was raised that there were six Navy personnel that wanted to get familiarisation, and I suppose my response was, "Is it in line with - do they need that operationally?" And the answer was no. Therefore, I said that they weren't authorised to go on the aircraft. So people on the aircraft were there for a reason, and they were doing operational training for an operational capability.\(^\text{123}\)

9.93 LT COL U further said:

\(^{121}\) MAJ 4 T1293.14-32
\(^{122}\) Exhibit 153, Statement of LT COL U, paragraph 5
\(^{123}\) LT COL U T1621.26-41
Q. Immediately prior to 29 November, you had vetoed, for want of a better word, a flight involving Navy cooks because there was no training purpose served?

A. There was no reason for them to be on that aircraft.

Q. There was a reason for your troopers to be on the aircraft on 29 November?

A. There was a clear requirement.

Q. That was a training requirement?

A. It was an operational training requirement.

Q. My understanding is that the particular serial flown on 29 November hadn't been practised to a stationary target for some time; is that right?

A. To the best of my knowledge, that's right. Yes, that's as much as I can say. Those serials and practising putting people in to do that sniper training was an important aspect of the capability we needed.  

9.94 SGT AB said:

Q. In relation to the task that was being performed on that day, it was your understanding that there was a familiarisation or visualisation for the passengers in the back?

A. Yes, sir, we'd just covered the theory component, I think either the night before or that morning, and all the members of that team that were in that aircraft on the day had passed a formal theory written test to ensure that they knew all the safety aspects of the activity, and then they were going up to do some dry rehearsals. All training we do is graduated, so it starts from the theory, then you will do dry practices and then live practices, both by day and night, and you'll always go dry before doing it live.

Q. And these particular soldiers that were doing this particular serial, were they being advanced by support soldiers qualified through to sniper qualified?

A. No, sir, some of them were about to undertake the sniper course. Some of them had been pulled off the sniper course to go on the task. The thing is that - I can't explain it here, sir, but there are certain nuances between the two different types of activity.

124 ibid, T1631.41-1632.13
125 SGT AB T1693.27 -1694.1
MAJ 3 said:

Q. Major, in paragraph 22 of your statement, you say that there was no confusion as to the role of troops being taken as passengers. I want to put to you that there was in fact some confusion. Those passengers were due to go on a Gold flight, were they not?

A. Yes, they were due to be distributed across all the aircraft.

Q. And they were due to fly with MAJ 4, but MAJ 4 took off or launched prior to those troops presenting to go in his aircraft?

A. That's correct.

Q. The next aircraft to launch was 221; is that correct?

A. No, 221 was the third aircraft to launch.

Q. Why didn't they go with Gold 2?

A. Because the time differential between Gold 1 and Gold 2 launching - I'm not certain which launched first, Gold 1 or Gold 2, but we're not talking about a 30-minute difference; it's a couple of minutes.

Q. CAPT Bingley was made aware of the training that they wished to conduct?

A. Yes.

Q. And was made aware of that training in your presence?

A. As the lead planner, he is effectively the individual that they go to initiate that training.

Q. They were, at least in part, involved in a sniper serial for their own purposes?

A. Yes.\(^{126}\)

MAJ 3 had said in his statement:

\(^{126}\) MAJ 3 T2119.35-2120.20

I have listened to the vast bulk of the evidence before this Board of Inquiry and it has been suggested on occasions that there was some confusion as to what the troops role
might have been. I do not believe that this was the case. It was known to the aircrew that we would be taking the troops, and I was then and still am confident that we had sufficient power to conduct the manoeuvre.\textsuperscript{127}

It was briefed at the 171 brief that we would be carrying SAS passengers.\textsuperscript{128}

I cannot recall why but there was some delay in the troops arriving. By the time the troops had arrived one of the Gold aircraft was launching. Given the small number of troops I decided that the troops would be accommodated on Black 1 and 2.\textsuperscript{129}

My understanding is that the troops had already been briefed by their Patrol Sergeant as to the role that they would be performing. They were then briefed by the Aircraft Captain of the aircraft on which they would be seated prior to take off. I briefed the troops loaded onto my aircraft with the details of the two serials that were to be conducted. The ropes were already on the aircraft as the aircraft were continually maintained in an operational configuration.\textsuperscript{130}

9.97 \hspace{.5cm} WO2 12, in his written statement, said:

On 29 Nov 06 we arranged to do our first training to the ship not making way. The ship was moving in the water due to slight breeze (5 knots) and a bit of current. We were doing the training to keep our skill set up in flying to a static target, and for the SASR to train their Aerial Safety Officers. We were also going to train putting our gas masks on while airborne. This makes it very difficult to keep getting the visual information that you need – we needed practice.\textsuperscript{131}

9.98 \hspace{.5cm} MAJ 4, in his written statement, said:

On the morning of 29 Nov 06, there was some discussion about us taking passengers for the activity. I was not directly involved in the planning or authorizing process for flying with passengers on this day. It may have been mentioned, and my reaction would have been that it was fine as long as the passengers were approved to fly by their chain of command. We had been taking personnel on familiarisation flights for morale purposes when we were doing other tasking. My only two concerns were that they were properly briefed about the timing for the commencement of the serial, and ensuring that they are HUET qualified in accordance with the Army Training Instruction on HUET qualification standards.\textsuperscript{132}

\textsuperscript{127} Exhibit 184, Statement of MAJ 3, paragraph 22
\textsuperscript{128} ibid, paragraph 30
\textsuperscript{129} ibid, paragraph 32
\textsuperscript{130} ibid, paragraph 33
\textsuperscript{131} Exhibit 106, Statement of WO2 12, paragraph 13
\textsuperscript{132} Exhibit 124, Statement of MAJ 4, paragraphs 11
At the end of Orders on 29 Nov 06, we knew that we were going to be carrying passengers who were to be distributed between both the GOLD and BLACK formations.\textsuperscript{133}

9.99 TPR B, in his written statement, said:

I embarked in HMAS KANIMBLA for Operation QUICKSTEP in late 2006. On 29 Nov 06, I was scheduled to do Aerial Fire Support (AFS) training in one of the Black Hawks. We were so bored onboard and there was so much sitting around doing nothing; we were trying to do as many courses and get as many competencies ticked off as we could.\textsuperscript{134}

Generally, we were briefed every night about the training missions for the next day. If the weather had not changed and the activities were going to proceed as planned, we would all meet on the tank deck where our equipment was stowed. We would then talk about the training and go up to the flight deck.\textsuperscript{135}

On the evening of 28 Nov 06, our troop sergeant told us that we would have the opportunity to do some AFS training the next day. He informed us that the training was primarily for the aircrew, but we would fill the spots in the back and go through the training was primarily for the aircrew, but we would fill the spots in the back and go through the motions of pretending to shoot and fire to practise the AFS calls. This was a good way of getting our people qualified doing AFS so our time was not wasted not doing anything. This was the fourth AFS serial we had done during the operation.\textsuperscript{136}

At around 1600 on 29 Nov 06, we walked out onto the flight deck and sat down in the aircraft wherever we wanted. There was a bit of shuffling around while we decided who was going to sit where. I happened to sit on the floor in the front position of the right hand side door. TPR D was behind me in the aircraft on my right. On my left was one of the loadmasters. CPL A was sitting in the middle of the aircraft on top of the coiled fast ropes, wearing a communications headset.\textsuperscript{137}

9.100 CPL A, in his written statement, said:

We really jumped on the back of some training 171 Avn Sqn was already doing. They were practising going through the motions of a helo assault fast roping serial. This involves the pilots talking to the loadmasters, the loadmasters talking to the ASO, with all the correct hand signals and actions. We were on the aircraft because there was room for us in the back. If there was time and space, we intended to conduct a dry Aerial Fire Support (AFS) serial. The AFS serial was not specifically planned, but the

\textsuperscript{133} ibid, paragraphs 16
\textsuperscript{134} Exhibit 154, Statement of TPR B, paragraph 2
\textsuperscript{135} ibid, paragraph 3
\textsuperscript{136} ibid, paragraph 4
\textsuperscript{137} ibid, paragraph 5

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aviation guys had said they would fit our activity in if they could. The troops on the aircraft were not specifically selected, it was just who was available.  

Initially there was some confusion because the aviators were not expecting two patrols to get on the helicopters, but this was sorted out between my patrol commander and MAJ 3. We knew the drills because we had been briefed on the aircraft and the seating positions during our first week on the ship. This brief was fairly extensive, to the extent of identifying electronic devices which needed to be raised or switched off etc in the event of an accident.

9.101 CAPT T, in his written statement, said:

Each training exercise we planned had specific mission orientated objectives. The training planned for the 29 Nov 06 had 2 objectives. Firstly, maintain our diving currency using one of KANIMBLA’s boats as the safety craft. It was a really calm day which meant that it was extremely favourable weather for diving. Secondly, we knew that the aviation guys from 171 Avn Sqn were going to be flying so we decided to use this as an opportunity to do support drills.

The flying exercise on 29 Nov 06 was a dry run incorporating procedural calls, in plain camouflage gear. The aim was to cover off on their procedures in the air, and practise using the intercom and radio systems on board the aircraft. Even during dry runs, the aircraft captain makes live calls as if he is doing it for real, which provides good practice for the troops in the back.

I have since been told that two of the SASR soldiers took video cameras with them for the exercise on 29 Nov 06. We regularly use video cameras to capture techniques and as a training aid. We watch the video as a team afterwards to work out how we can do the serial better. While I cannot say for certain why the soldiers had video cameras with them because I did not know they had them at the time, it is also possible that the troops may have been using their video cameras to simulate Night Vision Goggles. The lenses of NVG and video cameras are similar, and may be able to simulate look for areas of fire below the helicopter.

The objectives of the specific training we were doing governed the configuration of the aircraft and who went in each aircraft. This would have been the decision of troop XO (SGT W) or the troop commander (CAPT Y) in consultation with the aircrew, the 171 Avn Sqn XO or OPSO. The seating and configuration would then have been manifested

138 Exhibit 237 Statement of CPL A, paragraph 5
139 Ibid, paragraph 6
140 Exhibit 246, Statement of CAPT T paragraph6
141 Ibid, paragraph 7
142 Ibid, paragraph 8
by one of the SASR clerks, who would then have given it to the ship's Flight Commander, LCDR Todd Glynn.\footnote{Ibid, paragraph 9}

Typically, before we did any serials onboard KANIMBLA, our guys would have a brief by the Troop Commander to cover safety issues, what we are trying to achieve, what order we will do things in, and who is doing what. Often these occurred in the Joint Operations Room (JOR) or in the hangar. I would sometimes stick my head into these briefings, but not often because I had faith in the people giving the briefings. I did not drop in on the briefing on 29 Nov 06 because it was only dry runs using communications. After the brief everyone normally goes to the aircraft.\footnote{Ibid, paragraph 10}

9.102 SGT W, in his written statement, said:

During the days prior to 29 Nov 06, I spoke to the SAS team commanders about the planned activity and which Troop members would be available to participate in the various training activities planned for 29 Nov 06. Approximately 48 hours out, I got work from 171 Avn Sqn's training officer, then-CAPT 4, that our flying exercises were going ahead on 29 Nov 06.\footnote{Exhibit 247, Statement of SGT W, paragraph 3}

Around 24 hours out, I spoke to CPL Z and delegated the finalising of the organisation of the flying exercise to him, as I was going to be involved in the diving exercise. We decided that CPL Z's patrol would fly on one aircraft, and SGT AB's patrol would fly on another aircraft. Some of the troops who were going to be involved were those identified for the next snipers' course, in order to give them exposure to ship assaults. SGT AB himself was not going to fly because he was busy with planning duties, so we decided that CPL A would go in his place. I did not specifically discuss the need to de-conflict the diving and flying exercise because the divers were going to be back onboard KANIMBLA by the time the aircraft activity commenced.\footnote{Ibid, paragraph 4}

Finding

9.6 In the Board's candid view, the array of evidence points to an unacceptable state of uncertainty vis a vis passengers.

9.7 The presence or absence of particular passengers appears not to have been planned, but rather fortuitous.

9.8 That no clear evidence could be given as to whether or not the carriage of passengers
was briefed at any point, reflects an unsatisfactory state of affairs.

Recommendation

9(a) The carriage of passengers must be the subject of a timely and firm decision, thorough planning, clear orders and necessary approvals.
9(b) The Board repeats its observations in paragraphs 8.66-8.70 of Section 8.
SECTION 10

INCIDENT MANAGEMENT AND REPORTING WITHIN 171 AVN SQN

INTRODUCTION

10.1 GPCAPT Lee explained to the Board the importance of feedback within a safety management system:

"It's just not possible that these accidents occur without any precursors. With almost every accident you can think of in aviation or any other industry, the precursors were always there; the warning signs were always there beforehand. But often they had either been identified and not acted upon, or people simply hadn't appreciated them. Suddenly we have a big accident and everyone goes back and says, "Well, with the benefit of hindsight we should have done this", when in fact all of the information they needed to do it was there at the time. That is part of our problem. We have to make this process a continuous ongoing information loop that is going on all the time, because no accident should really be something which happens completely out of left field. You always find precursors to it."¹

10.2 During the hearing the Board heard of the formal and informal feedback mechanisms available to and used by 171Avn Sqn. LTCOL I described ways that he might learn of incidents in the Squadron. He listed crew and mission debriefs, ASORs, and individuals mentioning it directly to him, particularly senior pilots in the unit². Additionally the Unit is subjected to external safety and standards auditing process³. This Section of the report will introduce the reporting framework, and then discuss and analyse the reporting culture within 171 Avn Sqn using occurrences of main rotor droop an example. As this Section deals with incident reporting holistically, the findings and recommendations are enumerated after the analysis.

Background

10.3 MAJGEN Fraser outlined the ADF safety processes that should be followed after an incident has occurred.

"First of all, they would debrief on return from the sortie and raise it through the chain of command. Then a safety occurrence report would be raised, an aviation safety occurrence report would be raised. There's a new system in the Australian Defence

¹ GPCAPT Lee T1882.16
² LTCOL I T1433-29 and LTCOL I T1435.10
³ Exhibit 137, Statement of LTCOL I, paragraph 16
Force raised I think in 2002/2003, the defence hazard and reporting tracking system. So it would be raised electronically and as a report of the incident, depending on whether it was a material incident, so if it was an aircraft, something broke on the aircraft, for example, it would require a technical investigation and technical information to be provided. If it was a human factors issue, then an investigation by someone appropriate within the unit, or referred outside if they needed external support to be able to comment on, and then it would be closed out as that report within the unit and submitted. Now, that's the raising of the report. Army Aviation, under a safety and risk management system that we introduced in 2001, is a closed-loop reporting system."

Debriefs

10.4 The term ‘debrief’ was used in two ways by 171 Avn Sqn personnel. Temporally, the first debrief was the in-flight crew debriefing immediately after a flying incident:

"The crew would normally debrief immediately following the sortie, assuming that there hadn't been crew changes, et cetera, et cetera. But on completion of the sortie, the crew would get together, they would conduct a crew debrief and they would have the opportunity to raise any significant issues they had from a crew perspective. There might be crew management, crew interaction issues that they want to raise in that forum that they don't think are necessary to be raised in a central forum, so minor issues, and they would also have the opportunity to raise those major issues there. And then, again, that crew would go to a central debriefing at which all crews involved in the activity would be present."  

10.5 WO2 12 described what appears to be an optimal crew debrief in relation to main rotor droop:

"... there would be a brief that would normally happen in the air. The pilot or whoever drooped the aircraft would be spoken to by normally the other person. If it was the senior person who did it, then they would explain as to how they got themselves into that situation to the younger member and the rest of the crew, so that the crew knew that whilst he shouldn't have done it, on this case something had caught him out."  

10.6 The second type of debrief raised in evidence was the formal post-flight overview envisaged by Annex E to 5 Avn Regt SOP 303, Orders and Briefings. This is a SMEAC-style format (Situation, Mission, Execution, Administration and Logistics, Command and Communications) covering aspects of the flight, from enemy forces to fuel use to the Risk Management Plan. This SOP requires that all flights be debriefed within 30 minutes of

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1 LTCOL 1 T1437.10
2 WO2 12 T1049-40
3 Part of Exhibit 205, Folder of Defence Documents
completion, in the Annex E format. WO2 12 described this as a productive activity:

"The authorising officer would always be there and so would the safety officer and the people who had flown the sortie ... we would go through and talk about any issues, both good and bad, that had come out of that sortie for any learning."

Aviation Safety Occurrence Reporting

10.7 The next safety mechanism designed to pick up flying problems is the Aviation Safety Occurrence Report (ASOR). The ADF policy on ASORs states that an aviation safety occurrence is any occurrence which impacts adversely, or could potentially impact adversely, the safety of flight of Defence aviation assets. Annex A to this policy lists over fifty occurrences when an ASOR should be submitted. Of note in this context are the following reportable occurrences:

(a) spatial disorientation and resultant loss of aircraft control that was subsequently recovered by the crew without the loss of the aircraft or significant damage;

(b) human error or violations;

(c) unsafe acts;

(d) violations of regulations and/or procedures;

(e) loss of aircraft control while the aircraft is in the air or on the ground;

10.8 The Aviation Safety Occurrence Review Board (ASORB) meets quarterly to review ASORS, look at developing trends, and evaluate the health of Army Aviation generally. It is ordinarily attended by Army Aviation commanders, airworthiness and safety staff, COMCARE, and BRIG Bartels, COMD 16 Bde (Avn).

Audits by 16 Brigade (Aviation)

10.9 LTCOL McCall conducted an audit of 171 Avn Sqn during the period 13-16 November 2006. His report noted a significant failure of supervision and non-compliance at 171 Avn Sqn in relation to the requirements in SI(AVN) OPS 1-104 and 1-105. These

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7 Part of Exhibit 205, Folder of Defence Documents, paragraph 303.4
8 WO2 12 T1050-11
9 Exhibit 159, SAFETYMAN, Volume 3, Part 1, Chapter 9
10 Exhibit 196, Audit Report
documents relate to aircrew workbooks, the Army Aviation Information Management System and the administration of aircrew qualifications. These issues were common to other units audited by 16 Bde (Avn) at this time.

Other Reporting Mechanisms

10.10 LTCOL 1 noted that he “might” learn of incidents of main rotor droop by individuals reporting to him separately of incidences aircraft mishandling but more importantly from his senior aircrew particularly his Standardisation Officer, QFIs and the OC Aviation. He also suggested that in multi-aircraft missions, experienced aircrew might notice if another aircraft suffers main rotor droop.

10.11 The Defence Aviation Safety Manual allows personnel to lodge de-identified safety reports about aviation incidents with the Director of Defence Aviation and Air Force Safety (DDAAFS). This is known as a Confidential Incident Report (CONFIR) system.

ANALYSIS

Debriefing

10.12 Evidence of in-flight crew debriefings was neither definitive nor comprehensive. CAPT 9 stated that rotor droop he had experienced was only debriefed after the flight at the crew level. CAPT 8 too noted that if episodes of transient rotor droop were debriefed at all, this would involve just the individual crew, “if it’s deemed that it can be resolved within the crew”. CPL 19 recalls a short debrief during an incident of main rotor droop when flying with CAPT Bingley also on 28 November 2006, but on this occasion in the night serials:

“I do recall an instance of main rotor droop on one occasion during the serials. ... I recall vaguely discussing the incident amongst the crew as we moved away from the ship before cutting a circuit and landing on deck. As discussions go it was very brief because as a crew we were all aware of CAPT Bingley’s abilities as a pilot, and at no stage did I feel that he’d endangered the crew, the airframe or myself.”

10.13 In relation to an incident of main rotor droop involving CAPT Bingley on the afternoon of 28 November 2006, CAPT 8’s recalled a cursory airborne debrief:

11 LTCOL McCall T1713
12 LTCOL 1 T1433,30
13 LTCOL 1 T1436-10
14 CAPT 8 T829-46
15 Exhibit 236, Statement of CPL 19, paragraph 5
"We debrief it immediately after the approach. CAPT Bingley asked me how much it drooped, and I said that it was in the amber and recovered quickly, so we didn't feel that there was any need to debrief it."\(^{16}\)

10.14 These comments are revealing in respect of 171 Avn Sqn’s normalised deviance in relation to rotor droop. However, they also demonstrate a deficiency in relation to the debriefing process and a consequential lack of value and result. The limitations of the debriefing system resulting from an adverse professional gradient were encapsulated by MAJ 4’s comments on the monitoring of CAPT Bingley’s performance prior to the accident:

"In the normal course of events the only people are directly saw his performance were all junior to him - the co-pilot and the loadmasters. It is a crew management issue, one that is only able to be monitored indirectly by the chain of command."\(^{17}\)

Aviation Safety Occurrence Reports

10.15 LTCOL 1 acknowledged that there is no main rotor droop limit at which time it is mandatory to report the droop by ASOR. The only requirement to report occurs where the safety of the aircraft or its occupants may have been compromised\(^{18}\). He stated that an ASOR would only be submitted if it were “sufficiently significant to justify producing an ASOR\(^{19}\)”, and acknowledged that the submission of an ASOR is “very much up to the aircraft captain’s discretion\(^{20}\).”

10.16 The normalisation of deviance with respect to the acceptance of main rotor droop may well have had its origin in the late 1990’s. According to MAJ 2, “we set about reporting it consistently a number of years ago, in the order of six to ten years ago, because we wanted to encourage command to provide us with a better engine.”\(^{21}\) He went on to say that “we had to discontinue [reporting main rotor droop] because it was considered an aircraft handling characteristic and not necessarily an ongoing problem.”\(^{22}\)

Q. So what was happening, then, was that a safety system was being manipulated to get a result?

A. It was certainly to raise its profile with command, to show that this was a problem, or had the potential. It is a characteristic, but it’s an undesirable one.

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\(^{16}\) CAPT 8 T833-10
\(^{17}\) Exhibit 124, Statement of MAJ 4, paragraph 54
\(^{18}\) LTCOL 1 T1433-43
\(^{19}\) LTCOL 1 T1433-36
\(^{20}\) LTCOL 1 T1482-32
\(^{21}\) MAJ 2 T1123.11
\(^{22}\) MAJ 2 T1181.12
Q. But it was possibly a misuse of the safety system?

A. Sorry?

Q. A misuse of the safety system?

A. It was.  

10.17 Two issues immediately spring from this evidence. Firstly, it possibly identifies the genesis of acceptance of main rotor droop as an unfortunate characteristic of the Black Hawk. The second issue is that a blatant misuse of the safety and reporting system for a particular end occurred to which MAJ 2 candidly agreed.  

10.18 From the perspective of reviewing ASORs through the ASORB, BRIG Bartels stated that:

“I'd like to be in that position (to know of instances of rotor droop below 95%), just like any other ASOR-reportable incident... The rotor horn is there to tell you that you need to do something different, you need to recover your rotor RPM. That's the intent of the horn.”  

10.19 Nonetheless, BRIG Bartels was not surprised at the under-representation of pilot-handling airborne incidents reported by ASOR, as the pilots at 171 Avn Sqn are all fully qualified and trained pilots:

Q. ...What I want to put to you is that there is nothing in those ASORs that demonstrates any problem - no ASOR relating to such an incident. Do you have any view as to whether in 18 months you would expect such an ASOR?

A. It's no surprise to me that there aren't any, put it that way.

Q. Why is that?

A. Well, they're all fully qualified pilots; I wouldn't be expecting, as a matter of course, badly mishandling the aircraft. I would be expecting the exact opposite.  

10.20 The 16 Bde (Avn) Standards Officer, LTCOL McCall, took a different view. He recognised that while 171 Avn Sqn operates high-end, demanding skills, the pilots have

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23 MAJ 2 T1123.11
24 MAJ 2 T1181.22
25 BRIG Bartels T1795-9
26 BRIG Bartels T1795-21
27 BRIG Bartels T1812-27
28 LTCOL McCall T1720-30; Exhibit 158, Statement of LTCOL McCall, paragraph 10
varying degrees of expertise. It is therefore unlikely that very few errors are made.

"171 operates fairly high-end skills. All aircraft have some form of work-around procedures that crews have to deal with during operation of an aircraft. From discussions that I've had here, indications of rotor droop or getting - the reason I have said, "This could show very high-end or excellent skills", none of ADF aviation operations have consistent high-end skills. We have a range of people who operate, and there are a range of errors that are made in flying operations, and that's consistent, I think, across Army Aviation.

So I would expect that there are errors being made. Those errors are usually managed through the process of crew resource management and generally the aircraft is operating within the range allowed by the original equipment manufacturer. But indications of rotor droop below certain limits - I would expect the unit to report those incidents as either events or hazards, or if the unit considered that they were hazards, that they would consistently reinforce that by reporting those problems. If they haven't, then I would consider that the unit has identified that this is something that they're just living with and now have accepted as a risk or a hazard that is going to be there all the time, and now they've moved past that problem, and that problem is now something that they just deal with as a routine incident."  

(emphasis added)

10.21 The evidence in relation to main rotor droop, particularly the evidence of junior pilots, generally supported LTCOL McCall's view. Many said categorically that there was no formal reporting or recording of rotor droop. For example CAPT 8 was asked specifically about the reporting of main rotor droop:

Q. Are you aware of any mechanism in the squadron which enables those who have ultimate charge of the squadron, in the higher ranks of the squadron, to determine the rate of occurrence of transient main rotor droop in flying?

A. Unless it has been reported every time it happens, no.

Q. So feasibly, on your evidence, there could be occurrences of transient main rotor droop occurring frequently but no reporting mechanism by which that goes outside the aircraft?

A. There's no formal reporting.

10.22 CAPT 9 had experienced rotor droop on three occasions:

29 LTCOL McCall T1720.30-1721.08; Exhibit 158, Statement of LTCOL McCall, paragraph 10
30 CAPT 7 T897-9; CAPT 8 T830-27; Exhibit 92, Statement of CAPT 8, paragraph 23; MAJ 4 T1291-10; CAPT 6 T1376-11; CAPT 9 T1078-20
31 CAPT 8 T830-27
Q. You are familiar with the facility to raise an Aviation Safety Occurrence Report, an ASOR, in the event that you are involved in an incident which may bring danger to an aircraft or its occupants?

A. I am.

Q. Have you ever felt the need to raise an ASOR after any of these three rotor droop incidents?

A. No.

10.23 CAPT 9 experienced main rotor droop to 92% in a SO approach, after which it took the rotor four seconds to recover. While this was described as “uncomfortable”, CAPT 9 did not feel that the aircraft was in any sense of danger because they had enough room underneath. He did not report this incident by ASOR. Even in retrospect, his assessment was that conservatively, “perhaps” he should have submitted an ASOR. CAPT 9’s explanation for not submitting an ASOR was that he spoke to the crew and others (presumably at 171 Avn Sqn) and the view was that ASORs were not submitted for such an occurrence. The evidence did not make clear whether the advice from other people not to put in an ASOR for such an incident was because the incident was only rotor droop, or because CAPT 9 had not felt that the aircraft was at risk.

10.24 Either interpretation indicates to the Board a serious problem with and an unacceptable attitude to droop and ASORs.

10.25 CAPT 6 explained that he would submit an ASOR if an incident of main rotor droop caused the aircraft to encounter another hazard, such as a near-miss with an obstacle. He concluded that “[f]or normal transient droops, major or minor, if the aircraft isn’t put into an unsafe situation, no I wouldn’t (put in an ASOR).”

10.26 This explanation exposes three misunderstandings about the ASOR process: the perception that rotor droop can always be considered “normal”, the comment that “major droop” might not be intrinsically unsafe, and the idea that only the secondary hazard is ASOR-able.

External Audits

10.27 For various reasons, the November 2006 audit was not as thorough as possible. The airworthiness issue of lack of compliance with workbooks and logbooks had been raised in the context of a different Army Aviation unit, which is why a similar focus was taken with

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32 CAPT 9 T1078-20
33 CAPT 9 T1077-3, T1078-25
34 CAPT 6 T1376-7
171 Avn Sqn. There was also limited documentation for review due to 171 Avn Sqn being in the middle of moving from Townsville to Sydney. The audit report planned a follow-up audit in early 2007 to chase up those matters not covered in the November audit.

10.28 When asked by Counsel Assisting in relation to adverse cultural issues in 171 Avn Sqn found in audits LTCOL McCall stated:

"Culture is a difficult word to identify. What we’re looking for as auditors is behaviour, and that is, are they complying with the published orders, instructions and publications? And, in most cases, for the flying skills and knowledge, we found that their standard was reasonably good; attitudes - we’re a bit like speed camera cops, when we’re around, everyone behaves."

10.29 Despite the limitations of the audit, LTCOL McCall noted that there were no significant embedded cultural issues suggesting elitism or systemic problems in relation to wilful non-compliance with the required protocols of the operational airworthiness system. The Board accepts LTCOL’s finding in this regard.

Other Reporting Mechanisms

10.30 As the Standards Officer at 171 Avn Sqn, MAJ 2 is, responsible for, inter alia providing advice to CO, OC Avn and OC TAS on flying standards issues, tactics, techniques and procedures and for the conduct of internal standards and safety audits. Despite his active professional interest in knowing about the state of the Squadron’s flying standards, MAJ 2 gave evidence that he would only find out about “lesser” instances of rotor droop by “observations or anecdotal reports through the crew”.

10.31 In relation to other methods of reporting apart from ASOR, MAJ 4 stated that

"I think command should be in a position to know if an individual aircraft captain is habitually inducing transient rotor droop, and that will come through debriefings, et cetera, of crew members.”

10.32 This statement reveals the fundamental problem with the ad hoc nature of 171 Avn Sqn’s incident reporting and management arrangements. MAJ 4’s own instance of rotor

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35 Exhibit 158, Statement of LTCOL McCall, paragraph 8
36 Exhibit 196, HQ 16 BDE (Avn) minute 841-11-8 Audit Report 171 Avn Sqn 13-16 November 2006 of 29 November 2006
37 LTCOL McCall T1719.20-36; Exhibit 158, Statement of LTCOL McCall, paragraph 10
38 Exhibit 158, Statement of LTCOL McCall, paragraph 10
39 Exhibit 111, Duty Statement for 171 Avn Sqn Standards Officer
40 MAJ 2 T1122-45
41 MAJ 4 T1291-15
droop during Operation QUICKSTEP was not reported to MAJ 3, the 171 Avn Sqn Detachment Commander.\textsuperscript{42} Similarly, he did not recall informing MAJ 3 of the several incidents of rotor droop by CAPT Bingley in the days leading up to 29 November 2006. In relation to these incidents, MAJ 4 said that:

"He (MAJ 3) should have been made aware of it. There was never a problem with bringing anything like this to MAJ 3, but I got caught up in my duties and do not think that I got around to it."\textsuperscript{43}

10.33 There have been no CONFIRs for Black Hawk operations in the ADF since 2004.\textsuperscript{44} There are a number of explanations as to why this could be so:

a. There is no need – all safety issues are reported openly and there is no need for identity to remain discreet.

b. There is nothing to report – a faultless safe environment exists.

c. Personnel do not trust the system and feel that their identity may not be kept discreet and fear repercussions.

d. A belief that 'nothing will come from it'.

e. Everybody is too busy, and they haven’t the time.

f. Personnel are not aware of the CONFIR system and are not encouraged by Command to use it.

10.34 Obviously no conclusive finding can be made from such a list; however the example of sub paragraph b is a highly unlikely state of affairs. What can be concluded is that nobody has made a CONFIR report since 2004, and that this particular safety system is not working as it should. A lack of safety reports is often indicative of a poor safety system and culture.

CONCLUSIONS

10.35 While Command may seek to become aware of issues such as rotor droop through informal chats and observations, it is clear to the Board that the informal reporting mechanisms in place at 171 Avn Sqn were not effective. It is unlikely that incidents will be reported by junior members of the crew to the chain of command if they feel that the debriefing process is the effective and accepted manner of dealing with such things. Given

\textsuperscript{42} Exhibit 124, Statement of MAJ 4, paragraph 50
\textsuperscript{43} Exhibit 124, Statement of MAJ 4, paragraph 53
\textsuperscript{44} Exhibit 195, email from DDAAFS following search of CONFIR database
what constituted an in-flight debrief after an incident of rotor droop for many aircrew members at 171 Avn Sqn, the Board questions what manner of incident would not be able to be resolved within the crew. While SOP 303 is comprehensive, this evidence induces in the Board a real concern as to what in reality is raised at official post-flight debriefs and whether this debriefing process is properly performed.

10.36 The Board is persuaded that 171 Avn Sqn has two cultural problems with respect to ASORs which extend throughout the hierarchy. First, there exists a complete misunderstanding of the SAFETYMAN requirements. There are four levels of ASOR-able occurrence, event, incident, serious incident and accident. Occurrences range from an ‘event’ such as bird strike, to an ‘accident’ which includes death or loss of an aircraft. In the middle is an ‘incident’, which includes “[a]n occurrence which did not adversely affect safety at the time of the occurrence, but which, in other circumstances, could have adversely affected the safety of any aircraft or its occupants, or of any other person.” The second cultural problem is one of normalised deviance. Despite 171 Avn Sqn’s discouragement of main rotor droop, the condition is not regarded as inherently unsafe regardless of the pilot’s ability to recover, If the SAFETYMAN guidelines were to be followed, the illumination of a cockpit warning and the sounding of the low rotor RPM alarm must unquestionably give rise to an ASOR. These two issues are largely responsible for preventing the extent of rotor droop at 171 Avn Sqn from being internally, externally and objectively assessed.

10.37 The Board also notes the difficulty for an audit team to “get a feeling” for a Unit’s culture during a three day visit with sub-maximal documentation. The Board questions how the auditors could realistically inform themselves of the serious safety and standards issues raised in this Board of Inquiry, with such scarce internal reporting and communication of potential matters of interest to the auditors.

10.38 The Board considers that the lack of formality and the absence of any records associated with the debriefing processes have resulted in the lack of an audit trail. Without an audit trail, the trends that should have been immediately obvious were not evident. It is also very likely that the debriefing process itself may well have acted as a filter that prevented reportable incidents from being reported since they were apparently being dealt with by the debriefing process. As a result they went undetected by the chain of command. It is the Board’s view that none of the means and methods of monitoring in Safety Management at 171 Avn Sqn was sufficient to grasp the significance of normalised deviance occurring. If flying incidents are not reported ASORB does not consider them. If there is a lack of reporting within the Squadron by debrief or otherwise, command will proceed in ignorance. At each stage; debriefs, ASORs and external audits, the cultural drift away from safety was not identified and curbed.

Findings:

45 Exhibit 159, SAFETYMAN, paragraph 9.7
10.1 The incident reporting and management system at 171 Avn Sqn failed to detect the normalisation of deviance with respect to the Squadron's flying techniques. The informal debriefing process acted as a filter that prevented oversight of flying standards by the chain of command.

10.2 The SAFETYMAN guidelines were not followed with respect to the reporting of main rotor droop at 171 Avn Sqn. Had the guidelines been appropriately applied, many instances of main rotor droop would have been reported which in turn may have allowed the external audit system to identify trends and react accordingly.

10.3 The external auditing process by 16 Avn Bde, being limited to a documentation audit and in the absence of a fully documented reporting regime, failed to identify any major issues at 171 Avn Sqn.

10.4 The CONFIR system has been an ineffective tool at 171 Avn Sqn.

Recommendations:

10(a) The SAFETYMAN requirements for incident reporting must be consistently, uniformly and rigorously observed by 171 Avn Sqn.

10(b) For a Squadron with a unique role, the audit of 171 Avn Sqn should include a regular validation of the associated flying tactics, techniques and procedures against authorised doctrine and accepted and approved flying standards by suitably qualified individual who is external to the Unit.

10(c) A review be conducted to improve the effectiveness of the CONFIR system greatly and to include a 'trip wire' so that unusual reporting patterns are exposed and investigated.
SECTION 11

ANALYSIS OF THE FINAL APPROACH OF BLACK HAWK 221

INTRODUCTION

11.1 The evidence shows that CAPT Bingley was flying an SO assault approach that involved a “flaring turn” in order to achieve a hover over KANIMBLA’s flight deck. As Black Hawk 221 approached the ship from ahead, it commenced a decelerative flare, passing down the port side of the ship before turning left towards flight deck.1 The flare was terminated with an attitude of 20° nose up and a bank angle of 43°; an extreme attitude that effectively placed the helicopter into an out of ground effect hover with no power applied. After the flaring turn, the pilot attempted simultaneously to roll wings level, adjust the pitch attitude to the horizon and introduce power by raising the collective. At this point, Black Hawk 221 began a descent toward KANIMBLA’s deck in the presence of a tail wind of 10-15 knots.2 Despite an immediate response by both engines, the rotor RPM further decayed and the helicopter continued its rapid descent.3 The FDR data showed that significant main rotor droop was experienced during the final termination. Although operating normally, the engines could not keep up with the power demand as the collective pitch was increased and the RPMR reduced linearly from 100% from the peak of the flare to about 75% at impact.4 It is also most likely that Black Hawk 221 entered a vortex ring state during this stage.5

11.2 The SO assault approach profile has already been discussed and analysed,6 as has the final flight path of Black Hawk 221 as reconstructed from the evidence.7 The purpose of this

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2 Exhibit 28, Flying Brief Proforma states the wind as 115° at 15 knots. The wind was “predominately .trending the same, towards a wind direction 115 at about 12 knots” (LCDR Collins 1610.31). With a ship’s head of 23° (Exhibit 5: paragraph 77 AAIT Report), the wind relative to the ship is RED 118° at 15 knots. The wind was “RED 115° to 135° at 10 knots” (LT Jones, T300.43). The video of the post accident recovery clearly shows the wind as being from just aft of abeam on the port side at 10-15 knots as evidenced by the smoke marker in the water (Exhibit 1 Video of incident and Exhibit 5 AAIT Report, Paragraph 69). From this evidence, the relative wind was most likely from RED 120° at 10-15 knots.

3 Exhibit 8, Flight Data Recorder Comparative Analysis; Exhibit 152, DSTO Wreckage Assessment and Flight Data Recorder Analysis; Mr T Truong T1602.34 to T1617.30

4 Exhibit 175, Statement of SQNLDR Morris, paragraph 32

5 SQNLDR Morris T1920.3. Having viewed the video footage of the incident and examined the flight data recorder and other information, SQNLDR Morris was “puzzled as to why the aircraft descended so rapidly, given the high power setting and the control inputs that the pilot had made. The only two likely situations that I could see leading to that were either vortex ring or the fact that the main rotor had stalled. The aperiodic and significant blade flapping and flexing (a symptom of vortex ring) becomes more likely given that one of the witnesses I believe saw the rotor tip at an unusually low position during its arc.”

6 See section 4

7 See section 2
Section is to review critically the final approach of Black Hawk 221 in the light of the body of evidence available to the Board. This Section should therefore be read in conjunction those already referred and with other relevant Sections; in particular, those dealing with normalised deviance, culture and reporting.

11.3 A critical review of the circumstances surrounding events leading up to 29 November 2006 will demonstrate that this accident, like many others, was avoidable. Moreover the evidence points toward the inevitability of an accident. This Section of the report explores and develops this notion using a systems approach to aviation safety management.

BACKGROUND

11.4 GPCAPT Lee regarded Black Hawk 221’s accident as a failure of the Army aviation system. He further elaborated by explaining the systems approach to aviation safety management:

"The systemic approach to air safety investigation, which has driven the adoption of safety management systems in aviation, has shown that the same underlying organisational factors, such as inadequate training, equipment deficiencies, ineffective risk management policies and procedures, absence of effective integrated safety management systems, and so on, can all combine with a set of specific circumstances and events on the day, to contribute to a multiplicity of possible accident scenarios. Each of these scenarios might appear to be quite different on the surface, but all emanate from the same underlying contributory systemic factors. In the present accident, a number of systemic deficiencies in the Army Aviation System have been identified, and the tragic accident to Black Hawk 221 was but one of many potential accident scenarios which could have resulted from the same underlying systemic factors."

11.5 It is in this context that the final approach of Black Hawk 221 as flown by CAPT Bingley will be compared to the standard SO assault approach and the unique circumstances and culture present at 171 Avn Sqn leading up to the accident.

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8 Exhibit 170 statement of GPCAPT Lee page 1
9 Exhibit 170 Statement of GPCAPT Lee page 12
ENERGY MANAGEMENT

11.6 As discussed in Section 4, energy management during the conduct of the SO assault approach is critical. There were two control mechanisms in place that were intended to aid with energy management throughout the SO assault approach. The first was a speed limitation, adjusted for wind, at the entry gate designed to limit the total energy of the approach. The second was the concept of employing a “comfort zone” during the flare to wash off the residual speed and energy prior to establishing a hover. The SO assault approach had no go-around criteria and instead the comfort zone concept was completely reliant on pilot judgement for successful completion. Of importance when analysing this approach is that speed that is carried from the entry gate, and the associated energy, must be dissipated within the space available to do so.

11.7 The space available to dissipate the residual energy of the approach may be thought of as an imaginary box with the outer dimensions constrained by the distance of the flare entry point from abeam the flight deck, the lateral separation with the ship and the aircraft’s height above the flight deck. Given a constant initial approach speed, any additional height, or increased lateral separation, or a flare initiation point that is further from the ship will give more space for the dissipation of energy. Conversely any reduction in the dimensions of the box will limit the space available for the flare and will require the energy to be dissipated in a shorter period of time.

11.8 The following paragraphs discuss the factors with direct influence over energy management during the final approach. Topics include the “space” that CAPT Bingley gave himself, his “comfort zone”, the flying techniques used and relevant environmental aspects.

11.9 **Height.** Analysis of the FDR revealed that Black Hawk 221 was at a constant height of 100 feet throughout the run-in up until the flare initiation point after which the aircraft was allowed to descend to 70 feet according to the radar altimeter. According to the Black Hawk Standardisation Manual, the aircraft should not be allowed to descend during the flare unless a conscious decision is made by the flying pilot. Although it cannot be determined whether CAPT Bingley was aware of the descent, he did not call the descent, nor was it acknowledged or recalled by his co-pilot. In any case, the descent reduced the height dimension of the ‘space’ available to dissipate the residual energy.

11.10 **Lateral Separation.** With respect to lateral separation from the ship, the analysis of video footage further indicated the flight path offset of the aircraft was 20 metres +/- 3 metres to the portside of the ship. As referred to above the last reliable frame of the video indicated the aircraft was 104 metres +/- 18 metres from the bridge structure of the ship. The rotor width of the Black Hawk helicopter is 53 feet 8 inches. Converting this figure to metres equals

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10 Exhibit 214 Black Hawk STANMAN page 15-4
11 Simulator and video analysis Ex 151 2.A 2.5 p.6
12 Black Hawk Flight Manual 1-1-4 Ex 213

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approximately 16.5 metres; on this basis allowing for tolerances of the video analysis, Black Hawk 221’s approach was approximately 1½ to 2 rotor lengths from the portside of the ship. This was confirmed by the co-pilot of BLACK 2, following 30 seconds behind, recalling that Black Hawk 221 appeared to be relatively close to the ship on the run-in, observing that “BLACK I was 1½-2 rotors out from the ship”.13

11.11 Flare Initiation Point. The observations of several witnesses confirmed the Flight Data Recorder (FDR) analysis that Black Hawk 221 was too fast throughout the final approach segment. CAPT 8 was in FLYCO office at the time of the approach to the aft deck of the ship. From this vantage point she observed the aircraft from the initial point as it came alongside the ship to the aft deck.14 She believed it to be travelling “quite quickly” and made the comment in the FLYCO office “Bingers was hot” meaning “too quick”.15 MAJ 3 was of the opinion that Black Hawk 221 carried far too much speed into the final portion of the termination and that amount of energy should not have been taken into the last critical phase.16 However the FDR confirmed the co-pilot’s observation that the run-in from the IP was 100-105 KIAS which is standard for the SO assault approach’s 100 knot ground speed when adjusted for wind. For the witness observations to be correct and with the run-in at the standard speed, the flare initiation point must have been closer to the ship than that specified for a standard approach. SQNLDR Morris explained that, as a consequence of flying the aircraft 10 knots too fast at the 100 metre mark, “CAPT Bingley had to work harder to get rid of the extra speed and that was to be achieved by a more aggressive deceleration”.17

11.12 Comfort Zone. The aggressive nature of the flare as described by SQNLDR Morris agreed with witness observations. CPL 18, the loadmaster in BLACK 2 was watching Black Hawk 221’s approach to KANIMBLA and “noticed [that] BLACK 1 appeared to be in an aggressive flare.” From his vantage point in FLYCO, LCDR Wong observed that “it flared, a big flare, banked left to come over the deck and, as it sort of banked, the nose came down and it headed towards the deck”.18 As discussed previously, the excessive speed of Black Hawk 221 in the final stages of the serial meant a more aggressive deceleration or flare was required to counter the speed and make the left turn.

11.13 Apart from the use of sideslip to wash off speed it is clear that the application of the comfort zone as an energy management concept, with its emphasis on dissipating the majority of the energy in the final stages of the flare, compounded CAPT Bingley’s excess speed problem and exacerbated Black Hawk 221’s entry into the main rotor droop regime.

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13 Exhibit I23 Statement of CAPT II paragraph 11 and CAPT II T1240.9
14 CAPT 8 T853.34
15 CAPT 8 T854.5 - .16
16 MAJ 3 T2122.20
17 SQNLDR Morris T1914.12 - .17
18 LCDR Wong T721.43
Wind

11.14 The evidence of LCDR Collins as to wind direction and strength is generally consistent with that given by witnesses from 171 Avn Sqn and with the document prepared by LS Kuen, procedural aircraft controller, for the ship’s flying brief. She recorded the wind 115 at 15 knots. LCDR Wong was responsible for briefing the wind to A25-221 at launch; he stated that it was to his best recollection "...a red wind within the range 90-140, ie. blowing from port quarter of the ship". The totality of the evidence is clear; aircraft approaching the ship along portside terminating with a left turn to the hover over the aft deck would experience a 10-15 knot tail wind.

11.15 Thus in addition to the height, speed, and lateral distance from the side of the ship, the wind became a significant contributory factor of this crash. CW 5 King stated that he believed CAPT Bingley failed to properly anticipate the effect of the tail wind. Under such conditions, SQNLDR Morris noted the power may have been adequate for nil wind conditions, but, like CW5 King believed the tail wind placed Black Hawk 221 in a position where the aircraft could not produce enough power to complete the manoeuvre in the manner it was flown. He explained the reasons why the aircraft needed more power as follows:

"The aircraft needed to be flared at a higher pitch attitude in the final termination to counter the wind... More power was required to hold the aircraft level as the nose was lowered to the hover attitude... torque will rise rapidly as the rotor is forced forward to pitch the aircraft rapidly nose down from the flare to the hover...hovering in a stable ground position with a tail wind requires more torque than hovering in a nil wind or a head wind."  

11.16 SQNLDR Morris concluded the combination of these factors "...can contribute to 15-20% more torque being needed to terminate a quick stop down wind than into the wind". He referred to these matters in evidence as follows:

"...say your torque, your power required, to stabilise at the hover is higher for the fact that you have a tailwind; you also have increased tail rotor requirement; the aircraft naturally wants to try to point into the wind, like a weather vane. To hold the tail into the wind, you..."
need to use tail rotor to hold the aircraft heading. Every time you use tail rotor, particularly left pedal, it uses torque, so it actually increases the amount of torque that you are demanding.\textsuperscript{26}

### Turning and Sideslip

11.17 The evidence establishes that in addition to flare, CAPT Bingley incorporated a sliding turn to arrest the speed of the aircraft. While reconstructing the flight path of A25-221 from the analysis of the FDR, Mr Truong identified significant sideslip.\textsuperscript{27} Viewing Black Hawk 221’s final approach from the FLYCO office, CAPT 8 described that “[h]e commenced a left pedal turn and it seemed that the momentum of the aircraft – the aircraft was sliding or slipping and had a rate of descent that wasn’t arrested or stopped”.\textsuperscript{28} It can only be assumed that speed coupled with the reduced lateral distance from the ship on approach caused CAPT Bingley to adopt the “unusual” technique of slipping the aircraft in an effort to reduce that speed. SQNLDR Morris stated –

“The lateral spacing flown by A25-221 was quite close and means that the final turn radius would have been very tight, requiring low speeds and high angles of bank.”\textsuperscript{29}

11.18 The evidence of SQNLDR Morris casts doubt on the appropriateness and viability of the slip or sliding turn.

“A sliding turn is used to wash off even more airspeed. If you recognise that you’re faster, you can wash off excess speed by slipping the aircraft. I must admit, I don’t use that technique... In the Black Hawk, one of the problems with the sliding technique is that there are no side slip limits specified for the aircraft. The lateral limit I believe for the Black Hawk is 35 knots, so you would have to then look at, if you are slipping the aircraft, how much slip you can apply before you exceed the lateral velocity limits of the aircraft. If you are at 100 knots, 20 degrees would be your maximum slip; something like 24 degrees at 80 knots. Sikorsky don’t specify a side slip limit because they don’t necessarily expect you to side slip the aircraft, so it’s an unusual thing to do I believe.”\textsuperscript{30}

\textsuperscript{26} SQNLDR Morris T1903.32
\textsuperscript{27} Truong T1605.36 - .44
\textsuperscript{28} CAPT 8 T854.21
\textsuperscript{29} SQNLDR Morris statement paragraph 28, Ex 175
\textsuperscript{30} SQNLDR Morris T1912.30 - .46
ANALYSIS OF THE FINAL APPROACH

11.19 After viewing footage of the accident sequence, MAJ 4 was of the opinion "that on this occasion CAPT Bingley came into fast, too close to the ship and too low." It is also clear from the evidence that CAPT Bingley flew Black Hawk 221 in a very aggressive manner. In addition to a harsh flare he used the non standard technique of sideslipping or sliding to aid in energy management. He also used a turning approach contrary to SO doctrine and accepted a downwind termination contrary to the embedded requirements of the Black Hawk Standardisation Manual. In conducting the approach in this manner he managed to place the aircraft outside of its performance envelope. As a result he failed to carry sufficient collective that would otherwise enable the engines to cope with the required power changes in a timely fashion. Consequently the aircraft entered irrecoverable main rotor droop and likely entered into a vortex ring state. Throughout the approach the co-pilot maintained that "nothing felt out of the ordinary; it felt very normal and very standard."  

11.20 How is it possible for this accident to be apparently so "normal" and to occur without forewarning? GPCAPT Lee gives us some insight from the human factors perspective:

"CAPT Bingley's excellent flying record, his professionalism, and the high regard within which he was held in the squadron, do not indicate that he would have intentionally, and knowingly, accepted the extremely high level of risk inherent in flying the training mission in the way that he did under the prevailing conditions, and in a manner which would unnecessarily endanger his crew and passengers. In my view, the most opposite explanation is that CAPT Bingley, and his crew, simply did not fully understand, appreciate, or perceive the extremely high level of risk involved in flying the mission in the way that he did under the particular circumstances and environmental conditions pertaining at the time. If he had been aware of the potential outcome it is most unlikely that he would have operated in the manner that he chose to do."  

11.21 As GPCAPT Lee explains, it is most unlikely that CAPT Bingley deliberately exposed the aircraft to the conditions that brought on the inevitable accident.

11.22 The Board considers it likely that many different cultural, operational and personal pressures conspired to lull CAPT Bingley and his crew into a false sense of security. Many of these aspects have been previously discussed in the report. Cumulatively, they have manifested themselves as a normalisation of deviance, within a "can-do" culture that has then failed to observe the subtle changes and aberrations in techniques as they have occurred. As a result

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31 Exhibit 124 Statement of MAJ 4 paragraph 41. The reservation previously concerning MAJ 4 do not affect the Board's position on this Analysis.
32 CAPT 7 T922.19
33 Exhibit 170 Statement of GPCAPT Lee, page 3
safety incidents were neither recognized nor reported, thereby rendering aspects of 171 Avn Sqn’s safety system largely nugatory. These issues will be discussed in turn.

Normalisation of Deviance

11.23 Arising from this Inquiry the Board has formed the opinion that many instances of ‘normalisation of deviance’ have occurred at 171 Avn Sqn. This is because the boundaries defining normal safe activity have widened to encompass conduct and conditions which should not be so classified. This phenomenon is also known as normalised deviance, risk shift or practical drift. As an example, several witnesses indicated some self-awareness that they sometimes fly on the brink of acceptability, summed up by CAPT 6: “On Special Operations approaches, we are often on the edge of the performance envelope”34. Yet when questioned, CAPT 6 was unwilling to admit that he meant that 171 Avn Sqn flies beyond the capabilities of the aircraft. “You’re still operating within the operating limits of the aircraft, but inherently trying to get the maximum out of the aircraft”35. He stated that he considered himself a conservative pilot.36 Specific examples of normalised deviance at 171 Avn Sqn can be found in Section 7.

Normalisation of Deviance - The SO Assault Approach

11.24 As discussed in Section 4, the extensive use of exceptions to the Black Hawk Standardisation Manual requirements has caused significant deviation from the quickstop manoeuvre from which it was derived. The major differences between the current practice and that defined in the SOPs and the Standardisation Manual are; the acceptance of tailwind as an operational norm, the use of turning and sliding approaches and the lack of emphasis placed on ETL in the termination phase of the approach. Instead the emphasis had shifted to achieving surprise, shock action and saturation of an objective. When coupled with a flying technique that relies almost exclusively on pilot judgement and the comfort zone for energy management, the operational imperatives have manifested themselves in striving for faster approaches. CAPT Bingley was not immune to this pressure.

“A couple of the junior aircrew who flew with CAPT Bingley regularly almost worshipped him for his abilities in the aircraft and for the speed at which he flew assaults. It appeared that he was very comfortable in his Special Operations Aircraft Captainsy...CAPT

34 CAPT 6 Statement paragraph 36, raised at T1376-18
35 CAPT 6, T1376-26
36 CAPT 6, T1380-6
Bingley's obvious ability and his comfort in his role was perhaps leading him to try that little bit harder all the time. 37

"CAPT Bingley -we'd watched a number of these assault profiles while the ship was underway previously, and the aircraft which CAPT Bingley was in when he was flying - and you could tell from listening to the voice - was normally a little bit lower, a little bit harder; the flares were sometimes more spectacular." 38

Normalisation of Deviance – Other Examples

11.25 Two other examples of normalised deviance within 171 Avn Sqn’s operations are particularly significant and appropriate to Black Hawk 221’s final approach. Firstly, 171 Avn Sqn’s attitude to wind, and secondly their attitude to rotor droop. These aspects of normalised deviance are discussed in detail in Section 7. The former has revealed itself as an unshakable belief in the Black Hawk’s ability to perform an approach and hover under tailwind conditions. The latter is the acceptance of main rotor droop as an unfortunate characteristic of the Black Hawk. This attitude is of particular significance to any discussion of final approach. There were several incidents of main rotor droop that occurred in the days leading up to the accident. Through an analysis of these incidents, the squadron’s attitude toward rotor droop and the reporting culture can be directly related to CAPT Bingley’s perception of his own performance and his behaviour. The following paragraphs use Operation QUICKSTEP’s main rotor droop incidents as the centre of the discussion.

Episodes of Main Rotor Droop during Operation QUICKSTEP

11.26 There were at least three episodes of main rotor droop prior to 29 November 2006. At least two involved CAPT Bingley; one with CAPT 7 as the co-pilot and one with CAPT 8 on 28 November 200639. Another incident involved MAJ 440. None of the incidents were reported to MAJ 341. CPL 19 in his statement referred to an episode of droop when flying with CAPT Bingley on 28 November 2006. This was an additional episode of droop on that day and different to what was referred to by CAPT 8.42

37 Exhibit 124 Statement of MAJ 4 paragraph 54
38 LCDR Wong T722.12
39 Exhibit 92 paragraph 22 CAPT 8 statement; Exhibit 98 paragraph 26 CAPT 7 statement
40 Exhibit 124 paragraph 50 MAJ 4 statement
41 Exhibit 124 paragraphs 50 and 51 MAJ 4 statement, MAJ 4 T1292.25; Exhibit 184 paragraph 50 MAJ 3 statement
42 Exhibit 236 paragraph 5 CPL 19 statement

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11.27 MAJ 4's incident occurred after he "misjudged the rate-of-closure" when approaching the aft deck from astern while the ship was steaming at approximately 10 knots. He had to "flare more aggressively at the end of the approach" thus causing the droop. The low rotor warning horn sounded for approximately two seconds.43

CAPT Bingley's Main Rotor Droop Episodes

11.28 CAPT 7 recalled an incident of rotor droop when flying with CAPT Bingley in the immediate days prior to 29 Nov. The transient rotor droop occurred during the termination phase of the approach whilst the ship that was making way.44 The droop occurred because "the rate of increase on drag in the main rotor wasn't commensurate with increase of power of the engines".45 It was during daylight and the droop was minimal; "...say approximately one second", "somewhere below 95 per cent for a short period to time".46 At the time a quick-stop as part of special operations assault technique was being undertaken.47 WO2 12 was apparently one of the loadmasters on that flight. He was vague about the details of the episode but recalls it because he heard CAPT 7 say something along the lines of "Oh, nice droop, Bingers. You're supposed to be number 1".48 The droop on that occasion was not of a magnitude to be felt by WO2 12 "through the aircraft".49

11.29 CAPT 8 experienced droop whilst co-pilot to CAPT Bingley in the week prior to 29 Nov. She stated the episode was on 28 Nov whilst undertaking assault approaches to the stern of the ship for the purpose of hovering for a simulated roping.50 The rotor horn came on. The aircraft recovered almost instantaneously.51 CAPT 8 believes that the approach "did not seem fast" but there was "a flicker of amber before it went back to green"52. CAPT 8 stated that CAPT Bingley had the aircraft under control at all times and the matter was debriefed with the crew after the flight. CAPT 8 observed that "[i]t may have been faster than what I would fly – but it didn't feel too fast for CAPT Bingley".53

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43 Exhibit 124 paragraph 51 MAJ 4 statement; T1290.15 (the horn came on for about one second)
44 CAPT 7 T894.21
45 CAPT 7 T894.44
46 CAPT 7 T895.13
47 CAPT 7 T896.32
48 T1051.18
49 Ibid
50 CAPT 8 T832.5
51 CAPT 8 T832.25
52 T832.14
53 CAPT 8 T833.3

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11.30 In his statement MAJ 4 referred to CAPT Bingley drooping the rotor "...in several approaches to the aft flight deck". This, in the opinion of MAJ 4, was evidence of a "severely mishandled approach".  

11.31 MAJ 4 understood that in "the days preceding 29 Nov 06 CAPT Bingley had drooped the rotor in several approaches to the aft flight deck" and that once this had occurred with a "20-30 knot headwind". After learning of one incident MAJ 4 approached CAPT Bingley to discuss the issue. MAJ 4 was a Captain at the time. He told him that he should not be drooping the aircraft approaching the back of the ship "...given the wind conditions". Under these conditions, it was the opinion of MAJ 4 that to induce rotor droop the approach "...would have to be relatively aggressive". MAJ 4 stated:

"In the days leading up to 29 Nov 06 CAPT Bingley had expressed to me that he was not happy with his approaches because he thought they were too slow. He had a reputation amongst some of our supported units for being a great pilot, particularly because of his aircraft handling abilities that allowed him to come in fast..... I told him that when you approach the rear of the ship with a 30 knot head wind and the ship moving away from you that it will always look like you are coming in slowly to those watching from the ship".

11.32 MAJ 4 when asked about this paragraph in evidence he confirmed the concern of CAPT Bingley and added that he (CAPT Bingley) "...had expressed concerns that he was coming in slightly slow". (emphasis added) CAPT Bingley is reported to have responded "something along the lines of 'Yeah, I really stuffed that one up'". Each of CAPT Bingley's two confirmed episodes of main rotor droop involved approaches to the aft deck, from the stern, to a ship making way and with a significant head wind component. MAJ 4 stated "I thought to myself that this kind of stuff should not happen, as it is evidence of a severely mishandled approach".

11.33 The evidence strongly points to CAPT Bingley having difficulty with his approaches involving the assault technique. These instances of droop particularly related to rate of closure. The evidence discloses that CAPT Bingley was approaching too fast, too aggressively. On one occasion he sustained droop when approaching the aft deck with a 20-30 knots headwind; to sustain droop in such circumstances meant the approach must have been fast yet CAPT Bingley felt pressured because he believed he was too slow. In an apparent contradiction to his previous statements and despite the problem CAPT Bingley was having with main rotor droop in the days

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54 Exhibit 124 paragraph 51 MAJ 4 statement
55 ibid
56 MAJ 4 T1289.43
57 MAJ 4 T1290.7
58 Exhibit 124 Statement of MAJ 4 paragraph 47
59 MAJ 4 T1289.33
60 ibid
61 Ibid

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prior to the accident, MAJ 4 observed that CAPT Bingley "was not doing anything obviously unsafe."\textsuperscript{62}

11.34 In any safety system, the importance of feedback is paramount. As discussed in Section 10, incidents of main rotor droop were not being formally reported; instead they were the subject of an informal debriefing. In the lead up to the accident CAPT Bingley's episodes of main rotor droop were not formally reported but were discussed amongst CAPT Bingley's peers and the incident crews. Because of CAPT Bingley's reputation as a pilot, and standing within 171 Avn Sqn, it is unlikely that CAPT Bingley's performance would be challenged within that select group. "In the normal course of events the only people who directly saw his performance were all junior to him – the co-pilot and the loadmasters. It is a crew management issue, one that is only able to be monitored indirectly by the chain of command."\textsuperscript{63}

11.35 Notwithstanding the lack of formality in addressing these flying performance issues, the underlying acceptance of main rotor droop would have prevented any proper action being taken. MAJ 4 further justified this by stating:

"It would have been extremely impractical to stand CAPT Bingley down from being Flight Lead as a result of his incidents of rotor droop, and at no stage was such action warranted. This would have hamstrung the Squadron's capabilities as we have a problem with experience levels in our aircrew."	extsuperscript{64}

11.36 The Board notes that the Black Hawk aircraft "...is perfectly capable of approaching a 15 knot downwind out of ground effect hover" however it needs to be approached "...in a planned, less aggressive fashion... the Black Hawk can do it".\textsuperscript{65} And so it was a combination of factors; height, speed, lateral distance from the ship and tail wind that contributed to the crash of Black Hawk 221. Moreover, the energy that the aircraft carried into the approach could not be successfully dissipated in the available space while keeping the aircraft within the Flight Manual engine management and performance limitations. The resultant flare terminated in an extreme attitude and in the presence of a tail wind. Under these circumstances, the engines were unable to respond to the power demands in a timely fashion and the Black Hawk responded as should have been expected. MAJ 4 succinctly concluded that CAPT Bingley was travelling faster than what he and thought and misjudged the rate of closure.\textsuperscript{66}

11.37 The impact of normalised deviance within 171 Avn Sqn, and the associated practical drift of the SO assault approach, can be summed up by a comment made by CAPT 10:

\textsuperscript{62} Exhibit 124 Statement of MAJ 4 paragraph 54
\textsuperscript{63} Exhibit 124 Statement of MAJ 4 paragraph 54
\textsuperscript{64} Exhibit 124 Statement of MAJ 4 paragraph 55
\textsuperscript{65} SQNLDR Morris T1899.444 - 2000.1 -.5
\textsuperscript{66} MAJ 4 T1288.46 - 1289.7
"If we were to conduct the same serial tomorrow, with the information that we had at that
time, I don’t believe we would have done it any differently."67

Findings:

11.1 The energy that Black Hawk 221 carried into the approach could not be successfully
dissipated in the available space while keeping the aircraft within the Flight Manual engine
management and performance limitations. It was a combination of factors; height, speed,
lateral distance from the ship that resulted in a flare that terminated in an extreme attitude and
in the presence of a tail wind. Under these circumstances, the engines were unable to respond
to the power demands in a timely fashion and Black Hawk 221 responded as should have been
expected. Consequently the aircraft entered irrecoverable main rotor droop and likely entered
into a vortex ring state.

11.2 CAPT Bingley flew Black Hawk 221 in a very aggressive manner. In addition to a harsh
flare, he used the non standard technique of sideslapping or sliding to aid in energy
management. He also used a turning approach contrary to SO doctrine and accepted a
downwind termination contrary to the embedded requirements of the Black Hawk
Standardisation Manual.

11.3 In relation to 171 Avn Sqn, in the light of the number of areas flawed by normalised
deviance, the Board holds the problem to be systemic to that Squadron.
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SECTION 12

POST ACCIDENT CHANGES TO THE SPECIAL OPERATIONS ASSAULT

12.1 Since 29 November 2006 a number of changes have occurred to the flying of the SO assault approach because of two significant incidents involving the flying of the assault.\textsuperscript{1} The changes were made in the absence of knowledge of the recommendations of the AAIT report relating to the crash of A25-221\textsuperscript{2}.

INITIAL ACTION BY 171 AVN SQN

12.2 LTCOL 1 stipulated that additional controls be put in place to limit total energy of the approach by lowering of speed \textsuperscript{3} According to LTCOL 1, this change was not to be a hard and fast rule that one had to enter below this speed. Rather, it was seen as an aid to the management of the comfort zone.\textsuperscript{4}

"The instructions that I gave in February are not the same as the instructions in the [subsequent] SFI. The instruction that I gave in February was that they were to adjust the final gate for a tailwind component and that was a not greater than limit, and that was to be incorporated into the subsequent special ops qualification course documentation."\textsuperscript{5}

"Allowance for wind is to be made at the final gate; reduce ground speed target at the final gate for the approach by the tailwind component; at the final gate of tailwind. That was the control that was in place in February. It is not the control that's in place in the SFI.\textsuperscript{6}

12.3 The evidence discloses some confusion in the Squadron after the release of this directive. The ASOR relating to the crash of a Black Hawk in East Timor in June 2007, of which MAJ 4 was the flying pilot,\textsuperscript{7} reported that the flying pilot used the previous parameters, not the revised parameters, due to a misunderstanding of the restrictions put in place by the CO.\textsuperscript{8} LTCOL 1 took responsibility for the pilot being unaware of this direction.\textsuperscript{9}

\textsuperscript{1} LTCOL 1 T1457.16
\textsuperscript{2} LTCOL 1 T1457.18: BRIG Bartels T1790.45
\textsuperscript{3} LTCOL 1 T1460.26
\textsuperscript{4} T1462.16 - .21
\textsuperscript{5} LTCOL 1 T1461.38
\textsuperscript{6} LTCOL 1 T1462.2
\textsuperscript{7} Exhibit 143 ASOR 171-002-2007
\textsuperscript{8} Ibid Exhibit 143
\textsuperscript{9} LTCOL 1 T1461.10

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12.4 The crash in East Timor was the catalyst for further changes to the SO assault approach profile culminating in issue of a Special Flying Instruction (SFI) and a subsequent amendment by BRIG Bartels. He also initiated a task request to the Aerospace Operational Support Group's Aircraft Research and Development Unit (ARDU) to investigate the "science" of the SO assault approach.

"Probably where it is right now with the action that I've taken, bearing in mind that I didn't have this [AAIT Report] document. But the day before I struck the SFI, I did receive the draft report from the specialist team members who were in Timor investigating that incident. That was my trigger to say, "I need science." I therefore did a number of things. I placed some restrictions on the pilots in the way they conduct the SO approach, and I have tasked ARDU, which is the test and developmental organisation which Army uses for its helicopters, to go away and, among other things, report back to me on the appropriateness or otherwise of the approaches being flown and to give me a series of parameters for employment of the Black Hawk in terms of things like weight of the aircraft and power margins as related to various degrees of tailwind to see whether these approaches can be improved."

12.5 So as to be in a position to know of all incidents of rotor droop, BRIG Bartels also undertook "to strike an SFI to say that if the horn sounds, you report it via ASOR". There is no evidence before the Board to support whether this action has been taken or not.

SPECIAL FLYING INSTRUCTION 18/2007

12.6 The SFI as originally issued modified the existing SO approach profile by clarifying the 300 m point and added go-around criteria to the approach. In particular, it reinforces the 300 m point conditions put in place by LTCOL 1's earlier directive and further mandates a go around procedure if, from the 300 metre point, if either pitch attitude or angle of bank exceeds 30° degrees. This instruction was subsequently amended and issued as SFI 18/2007 AL1 such that it now included a complete prohibition on downwind approaches. Reporting is required if pitch attitude or angle of bank restrictions are breached. In essence, the three constituent parts of the SFI as amended are:

a. gate speed limitations aimed at energy control

b. Attitude limitations aimed at providing go-around criteria

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10 BRIG Bartels T1795.14
11 Exhibit 139 and Exhibit 163. Exhibit 139 is unsigned and undated but is a copy of the original SFI. Exhibit 163 is the amended version (AL1) signed and dated 20 Jul 07.
12 Exhibit 139
13 Exhibit 163
c. A prohibition until more is known about applicable aircraft performance and safety margins.

TASKING ARDU

12.7 BRIG Bartels advised that ARDU had been consulted and tasked to look at downwind and weight issues associated with the approach and the mission task elements so as to determine if what is being done is appropriate and whether it can be improved. The Board understands that this task has been initiated by 16 Bde (Avn) and has been conducted and completed by ARDU. The Board is not in receipt of the completed formal report.

THE APPROPRIATENESS OF THE CHANGES

12.8 As discussed elsewhere in the report, the Board considers that effective energy management throughout the flare and appropriate approach abort criteria are essential elements in flying safe andrepeatable SO assault approach profiles.

12.9 The first constituent of the SFI is an attempt to control energy by limiting the total energy at the start of the approach and through to the 300 m gate. On this change SQNLDR Morris said “that it was sensible to moderate approach for the wind on the day but the success of this direction was dependent upon the accuracy of the 300 metre point which is difficult to determine at sea – nevertheless the direction was appropriate”.  

12.10 On the second factor, both CW5 King and SQNLDR Morris commented favourably on the provision of pitch limits:

“I think they’re completely adequate at this point. They stay within the limitations spelled out for the aircraft. They allow the pilot to be fairly aggressive on the controls, however not so much so that they put the aircraft in an attitude that could be dangerous.”

“I think both of those are good, reasonable limits to apply. Certainly if you are anywhere near those limits, the crew should be aware that you have been compressed. Yes, I think they’re appropriate”.

12.11 On the third factor, the Board believes the involvement of ARDU to review

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14 T1799.21 -31  
15 SQNLDR Morris T1897.43  
16 CW5 King T2024.7 -11  
17 SQNLDR Morris T1899.22
downwind approaches is sensible. SQNLDR Morris anticipated that ARDU would develop recommendations as to torque margins and a final gate “...where if it hasn’t worked the crew can give it away.”

12.12 The Board considers that none of the elements as specified within the SFI will be effective at limiting how aggressively the approach can be flown. Although the application of pitch limits to approach may be construed as limiting the extremes of attitude that can be achieved, the helicopter can still be exposed to conditions conducive to main rotor droop:

Q. With respect to the recently drafted and approved special flying instruction, I note that there's a control placed on entry speed to the special operations tactical approach and that there are limits to the angle of bank and pitch angle that are used as criteria for a go-around. What is to prevent me, being a junior pilot in your squadron, from observing the entry gate requirements and delaying my flare and then rapidly applying controls to achieve 30 degrees up and 30 degrees angle of bank? Have I exceeded any of the controls in place?

A. No.

Q. Would this be a desirable outcome in your attempt to control the instances of main rotor droop?

A. We don't teach our pilots to fly a particular way, because it doesn't say we can't, and a suggestion that they would see the rules and find a loophole to fly as hard and as fast as they could would be inappropriate.

Q. But we've already heard that a lot of your junior pilots aspire to be as good as your senior pilots, who seem to be able to fly fairly hard and fast. Isn't this the very thing that this SFI is trying to control?

A. This SFI is attempting to support the maintenance of the crew within the comfort zone, and where they misjudge the rate of closure or misjudge their energy management, this provides them with direction regarding what they need to do if they're unable to complete the termination within these boundaries. So if they are required to exceed 30 degrees nose up or 30 degrees angle of bank, then they are required to go around. So if you're too fast and you have to exceed that attitude to be able to terminate to your point, then you have to go around.

Q. So if you arrive at a point at 30 degrees nose up and 30 degrees angle of bank with the lever on the floor, the NP and NR not matched, in a tailwind, is that an undesirable position?

18 SQNLDR Morris T1899.44 - T1900.23
A. You mean terminate in that condition?

Q. Terminate.

A. You haven't yet terminated if you're at those limits, sir.

Q. I would suggest you have, if you have no air speed.

A. By "terminate", I mean you're in a condition where you're able to insert a supported unit in the hover attitude.

Q. Would you be able successfully to terminate from that position?

A. From a stationary position with 30 degrees nose up and 30 degrees angle of bank?

Q. And the lever on the floor.

A. And lever on the floor.

Q. Or in fact you could carry collective - we'll give you 20 per cent collective, no torque. Do you think you could successfully terminate?

A. I don't think it would be very pretty, sir.

Q. And I don't think that SFI actually stops you from doing that.

A. Sir, it doesn't stop you from doing a lot of things.¹⁹

12.13 SQNLDR Morris agreed that the SFI fails to put in place a mechanism to prevent the SO assault approach being flown overly aggressively and that a change to the flying technique used may be a more appropriate measure:

Q. With respect to the special flying instruction, I note that the gates and controls are specifically on entry parameters and exit attitudes. In the light of that, can you see any controls that would control the rate of aggression of that manoeuvre?

A. No, you could still hit the entry gate and initiate the manoeuvre too aggressively. You could overflare the aircraft initially, which would set you up at a slower speed earlier than you should be in that particular profile; and vice versa, you could develop it too slowly and hence have to compress more of the deceleration at the end. The only system that I saw that could possibly work would be to have, as I've tried to suggest, some sort of minimum final leg length where the aircraft was

¹⁹ LTCOL 1 T1535.8 – T1536.25
wings level looking at the objective, where the crew could assess the closure rate, the energy, the height, and determine whether it’s suitable to continue or not.

Q. I guess another way of achieving aggression control in the sense that we’re using the word may well be to change the way it is approached with respect to one-quarter and three-quarters, et cetera, so a very conservative approach would be to lose half the energy in the first half and the other half in the second half, but you would want something between that and what it currently is, presumably, to achieve the outcomes?

A. Yes, obviously a half-and-half approach would be a linear deceleration from your start point to your end point.\(^\text{20}\)

12.14 The Board concludes that, as interim steps, the initial Unit recommendations followed by the formal limitations introduced by the SFI were reasonable in the circumstances. In particular, the Board considers that the temporary prohibition on downwind terminations will limit exposure to the risk of main rotor droop as a result of the unknowns associated with conducting a dynamic approach in the presence of a tail wind.

12.15 However, upon analysis, the other mandated changes clearly still fall short of introducing measures that will prevent the likelihood of a similar accident occurring in the future. The amendments required to the SO assault approach must include changes to the way the approach is flown; bearing in mind the proximity of aircraft performance boundaries, the fallibility of human judgement under high pressure circumstances and the need for third party monitoring of the approach. The approach must therefore be well defined, safely within performance margins and be readily repeatable. It must therefore be developed such as to be considerate of sound airmanship attributes.

12.16 The Board endorses the decision to derive empirically the safety margins and to redefine the SO assault approach by the way of a formal task against ARDU. The Board is confident that the ARDU report will address the issues and concerns expressed herein.

Findings

12.1 The actions by CO 171 Avn Sqn and COMD 16 Bde (Avn) after the accident were reasonable and consistent with the level of knowledge at the time. The decision to get the “science” is endorsed.

12.2 The current SFI still falls short of the Board’s expectations in that it fails to define adequately a repeatable and safe SO assault approach technique cognizant of safety

\(^{20}\) SQNLDR Morris T1943.28 - T1944.9

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margins and consistent with sound airmanship considerations.

Recommendation

12(a) The SO assault approach must be redesigned to ensure adequate safety margins and sound airmanship considerations are preserved.
SECTION 13

SHIP MATTERS

FLYING STATIONS

13.1 At 1430 29 November 2006, 30 minutes prior to the launch time of the first two (of the four) aircraft, KANIMBLA crew closed up at flying stations. Flying stations is intended to ensure that specialised personnel are appropriately stationed for the conduct of the flying evolution and also should an emergency develop, the ship will be best postured to respond through both materiel and personnel measures. The detailed requirements for flying stations are contained within ABR 5419, Ship’s Helicopter Operating Manual.¹

13.2 The Commanding Officer of KANIMBLA, CMDR Bannister, in his oral evidence stated that at the time of the incident KANIMBLA was relaxed at flying stations.² As he said, relaxed at flying stations allows closed up personnel the opportunity to relax at their station, remove fire fighting clothing and helmets, trickle away to grab a drink or go to the toilet. All materiel measures remain in force. Personnel are to be able to close up to flying stations at short notice.

13.3 CMDR Bannister stated that because the aircraft had launched and would not be recovered until the end of the sortie, being relaxed at flying stations was appropriate.

13.4 ABR 5419 Vol 1 Annex D to Chap 6 discusses operational utility evolutions. It states:

“Operational Utility, ..., refers to a range of helicopter evolutions conducted to a ship that are not otherwise mentioned in this chapter. This may include, but is not limited to:

a. fast roping
b. rappelling
c. caving ladder extraction, and
d. suspended recovery operations.”

13.5 It further states:

¹ Exhibit 212
² CMDR Bannister, T681.37
"Flying Stations. The ship shall remain closed up at Flying Stations throughout the conduct of the operational utility evolutions."

13.6 CMDR Bannister stated that because there were no ropes deployed or support with the ship required, that being relaxed at flying station was still appropriate.\(^4\) He also stated that the ship was at ‘flying stations’ throughout, but were ‘relaxed’\(^5\). It can be argued that the flying being conducted on the day of the incident by 171 Avn Sqn would qualify as an ‘Operational Utility Evolution’ in that the fast roping assault profiles being practised terminated in the hover over the aft flight deck in a profile that fast ropes would normally be deployed. The Board considers the wording of ABR 5419 is ambiguous in this regard.

13.7 CMDR Bannister also stated that the initial request for the serial was to conduct the training to ‘one spot’ in the forward deck of the ship. He had a risk assessment conducted by the Ship’s Aviation Officer (SAVO), LCDR Wong. CMDR Bannister correctly rejected this proposal as being too risky because of the stowage of bulk unleaded petrol and because the fixed fire fighting system would be blocked.\(^6\) A risk of a crash on deck was obviously considered to exist.

13.8 The Board considers, having noted the high energy and high risk manoeuvres that were to be conducted on the day with the aircraft terminating in the hover over the flight deck, that for those periods when the aircraft was within the ships control zone and preparing to manoeuvre over the deck, full flying stations would have been appropriate.

13.9 Further, applying the principles of operational risk management, the additional factors would have supported being closed up at full flying stations for the critical periods when the aircraft were over the deck and not to be in a relaxed state. They are:

a. The sortie on 29 November 2006 was the first occasion during the voyage that all four Black Hawks were airborne.\(^7\)

b. The sortie was the first occasion that aircraft had flown to a ‘static’ target and that aircrew had been advised to “take it easy” and “fly a “eighty percenter” by the 171 Avn Sqn Detachment Commander, MAJ 3.\(^8\)

c. The sortie was determined to be ‘HIGH’ risk according to 5 Avn Regt MRP No. 13\(^9\)

13.10 Had Black Hawk 221 remained on the deck after it crashed rather than going into the

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\(^1\) Exhibit 77
\(^2\) CMDR Bannister T698
\(^3\) ibid
\(^4\) CMDR Bannister T678
\(^5\) Exhibit 131, Statement of LS Kuen, paragraph 13
\(^6\) Major 3 T2104.43
\(^7\) Exhibit 127, 5 Aviation Regiment MRP Register

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water, having all personnel fully closed up and ready to react, could well have saved lives in many scenarios including if the aircraft had caught fire.

13.11 Evidence was taken from two personnel who were on the flight deck or the sponsons at the time of the accident. ABATA Healey was seated on a bollard adjacent to the starboard exhaust funnel and ABBM Chun was at his place of duty (closed up) as the Lifebuoy Sentry on the starboard sponson. Regardless of whether the ship was relaxed at flying stations or fully closed up, neither of these personnel should have been there.

13.12 ABBM Chun believed that at relaxed flying stations he had to close up on the sponson. However, this was incorrect as upper deck restrictions remain in force even when 'relaxed at flying stations'. ABBM Chun, as the Lifebuoy Sentry, should have closed up elsewhere, normally in Flight Control Office (FLYCO), when the ship is at flying stations. The OOW is responsible for the positioning of the Lifebuoy Sentry and should have ensured this occurred.

13.13 Similarly, ABATA Healey, should not have been on the flight deck during flying stations and indeed to be where he was when the Black Hawk was conducting the fast roping profile and hovering over the deck, was unfortunate and risky. He had the good sense to seek cover when he realised things were amiss. The control of personnel onto the flight deck during flying stations is the responsibility of the Helicopter Control Officer (HCO) and should have been enforced.

Finding:

13.1 On the 29 November 2006, KANIMBLA being relaxed at flying stations had no impact or effect on the crash or the recovery operation of the Black Hawk 221 survivors.

13.2 For Special Operations approaches that terminate over the ship, regardless of whether ropes, rappelling gear or the like are deployed, ships should be fully closed up at flying stations at a minimum for the periods that the aircraft are manoeuvring close to or over the ship.

13.3 There was no compliance with ABR 5419 Vol 1 Ch 5 Table 5.1 in relation to ABATA Healey and ABBM Chun.

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10 Exhibit 220, Statement of ABATA Healey, paragraph 3-4
11 Exhibit 217, Statement of ABBM Chun, paragraph 4
12 Exhibit 212, ABR 5419 Vol 1 Ch 5 Table 5.1
13 Exhibit 217, Statement of ABBM Chun, paragraph 4
14 ABR 5419 Vol 1 Ch 5 Table 5.1
15 Exhibit 220, Statement of ABATA Healey, paragraph 6
Recommendation:

13(a) ABR 5419 be amended to reflect the above and that any ambiguity as to when and when it is not appropriate to ‘relax at flying stations’ should be eliminated.

13(b) Even when ‘relaxed at flying stations’ upper deck restrictions must be positively controlled by the Officer of the Watch. Control of the flight deck, in turn is delegated to the HCO.

13(c) No administrative or disciplinary action however is warranted against any officer.

BRIDGE RECORDS

13.14 To determine rate of drift and assist in the reconstruction of a reliable timeline of events, significant reliance was placed on KANIMBLA’s Rough Weather Log\(^1\) for weather data, and the Officer of the Watch Note Book\(^2\) for navigational data and key timings. The standard of record keeping in both of these bridge documents was poor with numerous obvious errors and anomalies. The importance of maintaining accurate records is often not appreciated until they are needed for an inquiry such as this one. As it transpired the inaccuracies did not have a significant impact on the investigation.

Finding:

13.4 Bridge records, particularly the Rough Weather Log and Officer of the Watch Notebook were inadequately maintained and contained too many inaccurate entries.

Recommendation:

13(d) Greater care, accuracy, attention to detail and supervision needs to be applied to record keeping. The importance of good record keeping is to be emphasised during appropriate training.

13(e) No administrative or disciplinary action however is warranted against any officer.

\(^1\) Exhibit 59, November Routing Chart
\(^2\) Exhibit 82, OOW Notebook
STOKES LITTER

13.15 CAPT Bingley was recovered to KANIMBLA on a mesh stretcher known as a “Stokes litter”. (Figure 13.1) It has karabiners in each corner onto which a harness is attached to winch the litter upwards. CPL G, the SASR medic who performed CPR on CAPT Bingley in the RHIB, tried to loosen some of the karabiners in order to put CAPT Bingley onto the litter. He gave the following evidence:

"The stokes litter had four karabiners, one on each corner, which attached to a harness used to winch the litter upwards. Some of the karabiners were salted shut and could not be loosened, so we had to weave CAPT Bingley's head and legs into the litter. This added approximately 20-30 seconds to the process. TPR B and one of the loadmasters helped me get him into the litter."  

![Figure 13.1: Stokes Litter](image)

13.16 CMDR Bannister’s evidence when asked about the serviceability of the stokes litter said:

"The Stokes litter, like a lot of the safety equipment on board, is maintained by appropriately qualified safety equipment sailors. The requirement for a Stokes litter is for it to be serviced every six months and recorded in the relevant document... The Stokes litter is kept on the forward part of the ship, internal, near the swimmer recovery point where, if we need to recover a man overboard, typically we do that via the starboard station just forward of the bridge."

13.17 Chapter 40 of ABR 1977, the RAN Manual of Shipborne Lifesaving and Survial Equipment\(^{20}\), states the Stokes Litter is to be inspected weekly and six monthly and recorded in Form OS-17, the Shipborne Lifesaving Equipment Log\(^{21}\). Given the unserviceable state of

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\(^{18}\) Exhibit 13, paragraph 19, CPL G T204.11-16  
\(^{19}\) CMDR Bannister, T689.11-22  
\(^{21}\) Ibid Chapter 40 paragraph 40.5, 40.7, 40.13
the karabiners, it seems highly unlikely that the inspections occurred or were effective. The KANIMBLA Shipborne Lifesaving Equipment Log was not tendered in evidence by Counsel Assisting.

13.18 CMDR Bannister also stated that a number of KANIMBLA’s ship’s company should have known the location of the litter:

There are some people within the ship that should be aware of where that litter is kept, Sir. Certainly, the ICs, the people that are in charge of the swimmer recovery party, are aware of where it is stowed, as would be many of the personnel that are involved in swimmer recovery and, of course, the safety equipment sailors.22

13.19 The Board feels that because the Stokes Litter is a critical item of life saving equipment and that any of the ships crew can be called upon to assist in a man overboard recovery (where the Stokes Litter is likely to be used), the location of that equipment should be well known to nearly all of the crew rather than just some.23

13.20 TPR P gave evidence that a second stokes litter was required after CAPT Bingley was taken into the resuscitation bay to deal with some of the other injured, particularly TPR E who had spinal injuries. He located a second stokes litter in the back of the embarked Sea King, which was of assistance to the recovery of survivors.24 In cross-examination, CMDR Bannister agreed that it would be useful for KANIMBLA to have a second litter in the event of a multiple casualty incident.25

13.21 The ship’s allowance for the Stokes Litter is one only26 and the Board can see the benefit of having a second one available for use in multi casualty situations. This is especially so in aircraft capable ships.

Findings:

13.5 The Stokes litter was not in a serviceable state on 29 November 2007. The maintenance procedures had not been followed in accordance with current regulations (ABR 1977). Neither factor contributed, however, to the death of CAPT Bingley.

Recommendations:

13(f) Review current mechanisms that should ensure that correct Safety Equipment

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22 CMDR Bannister, T689.7
23 ibid
24 Exhibit 242, paragraph 9
25 CMDR Bannister, T690-35
26 Exhibit 286 ABR 1977 Chapter 3 paragraph 3.55
maintenance procedures are carried out.

13(g) A review of the adequacy of the Stokes Litter shipboard allowance should be conducted.

13(h) No administrative or disciplinary action however is warranted against any person.

CRASH ON DECK v HELO DITCHING

13.22 The Board heard evidence that there was some confusion as to the state of the aircraft immediately after the crash. On impact to the flight deck by Black Hawk 221, the HCO, LCDR Wong, activated the ‘crash on deck alarm’. The aircraft then went over the side becoming a ‘ditched helo’. This change in circumstances did cause some confusion as to the status of Black Hawk 221 and particularly to those in the hanger who had no visual cues as to what was happening on the flight deck. Without better knowledge, it was assumed that the crashed aircraft remained on the deck and their response was appropriate in that they donned their fire fighting equipment and prepared to conduct a door entry onto the flight deck (a fire fighting procedure).27 It was not until the ships Executive Officer walked into the hanger from the Flight Deck, was the status of the aircraft known to the emergency personnel stood to in the hanger. LS Emery, a member of the flight deck team, stated:

“I ran back into the hanger and started getting the flight deck team together. We rolled out our hoses and got our fearnoughtsuit-men dressed to be ready to make a door entry onto the flight deck. The flight deck team were about to make an entry onto the flightdeck via the starboard door. Just as we were about to go out, the Executive Officer, LCDR Oborn, came inside the hanger by the very same door we were going to go out of. He told us that there were ten people in the aircraft and that it had ditched into the water.”28

13.23 The Board considers that in hindsight, an informative ‘sitrep’ (situation report) by the HCO to the personnel in the hanger to describe the situation may well have cleared up any confusion.

13.24 It needs to be reiterated however, that despite this short term confusion, the rescue efforts were not hampered in any way.

13.25 During the preparation phase of this BOI, the Board had the opportunity to visit MANOORA. In that ship a flat screen TV had been positioned in the hanger for the purpose of displaying the flight deck CCTV.

27 Exhibit 218, Statement of LS Emery, paragraphs 3-4
28 Ibid
Recommendation:

13(i) To improve situational awareness of emergency crews closed up in the hanger, a CCTV feed to the hanger should be provided.

PREPARING THE FLIGHT DECK FOR FLIGHT OPERATIONS

13.26 The first priority for the KANIMBLA crew and embarked forces was the recovery of and first aid to the survivors from Black Hawk 221. Following thereafter was the safe recovery of the three remaining aircraft. To achieve this, the flight deck crew had to rapidly secure the area as an accident site and record as much photographic evidence as time allowed and then clean up the area to ensure that there was no debris that could cause foreign object damage (FOD) which could endanger the aircraft on landing. Both tasks were expeditiously conducted and the flight deck was prepared to recover the remaining Black Hawks with the first one recovering approximately one hour after the crash.29

13.27 LCDR Glynn, the Sea King Detachment Commander and Flight Commander, stated:

"...my areas of concern were the condition of personnel, the state of the deck, the recovery of any remaining Black Hawks that were airborne and the preservation of evidence.‘ He further added: ‘I also immediately set about ensuring that the evidence relating to the crash was being properly preserved. I returned to FLYCO and obtained the manifests relating to the sortie and also spoke to the 171 SQN maintenance personnel in order to quarantine the maintenance documentation."30

13.28 KANIMBLA’s Executive Officer, LCDR Oborn stated:

“There was shrapnel debris on the flight deck. The Ship’s Aviation Officer, LCDR Wong wanted the deck back in shape for the landing of the remaining aircraft. He also indicated there was time for us, as best we could, to preserve debris and the like. I informed the CO and we got to work on deck. Photographs were taken and a walk was conducted for picking up debris."31

29 Exhibit 131, Statement of LS Kuen
30 Exhibit 35, Statement of LCDR Glynn paragraph 17
31 Exhibit 85, Statement of LCDR Oborn paragraph 18
Findings:

13.6 The collection and preservation of evidence was completed expeditiously and efficiently.

13.7 The preparation of the KANIMBLA flight deck to enable helicopter operations to resume was well executed.
SECTION 14
SURVIVAL TRAINING AND EQUIPMENT

HELIkoPTER UNDERWaTER ESCAPE TRAINING

14.1 Helicopter Underwater Escape Training (HUET) is conducted by the ADF for aircrew and frequent over-water fliers (FOF) to better prepare them for survival should they be involved in a helicopter incident at sea. Army Training Instruction 7-3\(^1\) states *HUET improves the chance of survival through the application of thorough pre-flight preparation, the correct use of safety equipment, and the appropriate helicopter evacuation safety techniques.*

14.2 There are numerous levels of HUET\(^2\) dependant on the role the member has. They are:

a. **Pre-flight training** – is conducted for all passengers flying over water in helicopters at the beginning of each serial, regardless of whether they have completed and are qualified in formal HUET. This training is essentially a briefing detailing what to do in an emergency, the use of safety equipment and where the exits are.

b. **Basic HUET** – is conducted for all personnel including aircrew who are required to frequently travel by helicopter over water to become competent at exiting a helicopter in an emergency situation. This is formal training and involves a practical element of a helicopter ditching simulator.

c. **Advanced HUET**

i. **Aircrew** – this training includes the conduct of pre-flight briefings for passengers, deploying helicopter escape devices and use of escape devices such as Helicopter Emergency Escape Equipment (HEED)/Helicopter Aircrew Breathing Device (HABD)/Emergency Breathing Air (EBA).

ii. **Specific SOCOMD Personnel** – this training is designed to develop the competence required to exit a helicopter under abnormal circumstances while restrained by or carrying a range of SO mission specific equipment. Importantly, SOCOMD HUET may or may not include the use of escape devices such as HEED\(^3\).

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\(^1\) Army Training Instruction 7-3
\(^2\) Army Training Instruction 7-3 paragraph 16
\(^3\) Army Training Instruction 7-3 paragraph 16 b (2)(b)
14.3 All personnel, whether aircrew or SAS passengers, in Black Hawk 221 on 29 November 2006 were appropriately HUET trained and in date for currency with the exception of TPR D who had never conducted the mandatory training. His non qualification was explained by LTCOL U:

"the only explanation I can offer for that (non HUET qualification for TPR D) it was an oversight. We the system did not pick that up. And I say "we" - ultimately I'm responsible for that".

14.4 Some of the survivors indicated that HUET had been of significant benefit in their escape from the sinking aircraft. CAPT 7, the Co-pilot of Black Hawk 221, in his written statement said:

I believe the HUET and HABD training that I had received significantly contributed to my safe exit of the helicopter.

14.5 CPL 13 in his written statement said:

I went through my goggles - toggles - beads - bubbles HUET drill and it all worked perfectly.

14.6 TPC in his written statement said:

Personally I think the HUET at Campbell Barracks is entirely adequate .......I would hate to see a knee jerk reaction to make HUET harder or more complicated - all but one of us got out.

14.7 Whilst most of the survivors were grateful for their HUET experience, some of them were critical of the training in that they felt ill prepared to deal with a rapidly sinking aircraft. WO 12 in his written statement said:

......(I) could not see anything because I had both my helmet visors down. I did not know which way was up even though it felt like we were sinking. It was totally different to anything I have done in HUET and I felt extremely uncomfortable.

14.8 TPR B in his written statement said:

......the water ran across me much faster than we do during HUET .......just before we entered the water, I felt comforted by the fact that I had done HUET which should

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4 Exhibit 5, AAIT Report, paragraph 37; Exhibit 238, Statement of TPR D
5 LTCOL U T1623-24
6 Exhibit 98, Statement of CAPT 7, paragraph 25
7 Exhibit 10, Statement of TPR C, paragraph 41
8 Exhibit 106, Statement of WO2 12, paragraphs 33, 34, T1045.31-1046.2

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prepare you for an accident like this. But looking back, it was not the same at all and may have hindered me. HUET trains you for a helicopter that is floating in the water and then tips upside down very lazily. The reality was nothing like this because Black Hawk 221 crashed sideways and went down extremely quickly.⁹

14.9 Further, MAJ 4 said:

...... I believe that some of what is taught in HUET is wrong. A Black Hawk helicopter will not float for a few seconds – it sinks extremely quickly, like a stone. HUET is a civilian run program based on lessons from small helicopters which fly with all their doors closed in coastal waters, and which typically have 5-15 seconds flotation time to escape. When an Army helicopter ditches it is highly likely that it will do so at a high energy state resulting in, or from, catastrophic disintegration. HUET is not designed to cope with aircraft which have suffered catastrophic disintegration. The time required to take all the gear off means you are already 10 metres deep if you egress immediately, yet HUET trains you to wait until the aircraft has stopped moving before commencing egress and escape.¹⁰

14.10 The HUET simulators all have their limitations and it would be difficult to fully simulate a rapidly sinking helicopter. A number of witnesses including MAJ 4; CAPT 6; LTCOL 1; WO12; CPL 13; TPR B; and SGT AB indicated that the training premise of ‘remaining in the brace position until all movement has ceased’ is flawed and adopting that procedure in a rapidly sinking aircraft could be fatal.¹¹

14.11 The Board agrees that the scenario of a rapidly sinking aircraft should be incorporated as best it can into the HUET curriculum. However, it also needs to be said that for the most part HUET worked, was relevant and remains an essential element of mitigating risk for helicopter flight operations over water. The Board feels that the training received during HUET, may well have given the survivors the particular skills necessary to escape.

Finding:

14.1 HUET is relevant and a necessary risk mitigator for ADF helicopter flights over water.

14.2 HUET does not adequately prepare trainees for the scenario of escaping from a rapidly sinking helicopter.

⁹ Exhibit 154, Statement of TPR B, paragraphs 12-14
¹⁰ Exhibit 124, Statement of MAJ 4 paragraph 59; T1294.14-37
¹¹ Exhibit 124, Statement of MAJ 4 paragraph 59; MAJ 4 T1294; CAPT 6 T1367; LTCOL 1 T1502; WO12 T1082; CPL 13 T1110; TPR B T1664; SGT AB T1698
Recommendation:

14(a) HUET should be reviewed to include the scenario of a rapidly sinking helicopter.

Underwater Breathing Apparatus Training

14.12 During advanced HUET training, the use of underwater breathing apparatus such as Helicopter Emergency Escape Equipment (HEED) / Helicopter Aircrew Breathing Device (HABD) / Emergency Breathing Air (EBA), is taught. Evidence was heard that air crew are not only instructed on the use of underwater breathing apparatus but during instruction they have the requirement to actually use the equipment underwater in a training environment. Conversely, the Board heard that the SO forces, that are equipped with the EBA, are instructed in its use but they do not necessarily receive the practical training and actually get to practice using the equipment underwater. The reason given for this is that to be able to operate any of the underwater breathing apparatus, that a full dive medical must be completed prior to the training as a safety precaution.

14.13 LEUT Squires, an underwater medical specialist stated that he “would be an advocate that everybody gets a full dive medical” to mitigate against the risk of injury during training.

14.14 It was not evident why current Army policy differentiates between personnel (that frequently fly over water) and the requirement to train on safety equipment that they operate. LTCOL U offered this point of view when questioned over the adequacy of extant policy regarding training with HEED.

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Q. LEUT Nash was asking you some questions about HUET and HEED. You spoke of the Army policy at the moment. Do you agree with that policy?

A. Yes, I do, but I'd like to put a little caveat in there. I'm not sure of the latest one, because I know it's been revised.

Q. So the policy at the moment is that the troops do not do the HEED training unless they have done a full medical. You would prefer to keep it that way, rather than change it so that all personnel who carry HEED are actually trained in its use?

A. I think if we have the right equipment, then we should do the HEED training.

Q. So you don't agree with the policy?

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12 LTCOL U T1639.10
13 LTCOL U T1645-21
A. No, I'm saying that if the right equipment fits and all comes into policy, then we should do it, if we can afford to do it, within the dynamics of resources –

Q. I don't think you can afford not to do it.

A. Okay.

14.15 The AAIT noted that the SO personnel, who survived the accident, did not use their EBA with the exception of TPR E who happens to be a qualified diver.\textsuperscript{14} Although the evidence is inconclusive, it seems likely that TRP Porter did activate his EBA.\textsuperscript{15}

Finding:

14.3 Army training requirements are inconsistent with respect to the use of emergency underwater breathing apparatus. Both air crew and SO personnel who frequently fly over water and are provided with a HABD / EBA, have different training requirements. Air crew receive practical instruction on the equipment in an underwater training environment, whereas the SO personnel do not.

Recommendations:

14(b) All personnel equipped with emergency underwater breathing apparatus (HABD / EBA) be trained in its use including practising using the equipment in an underwater training environment.

14(c) Under current policy, for personnel to train on the HABD/EBA in an underwater training environment, a full dive medical is required. It is recommended that this ruling be reviewed with the possibility that given the shallow water such training is undertaken, a full dive medical may not be necessary.

LIFE SUPPORT EQUIPMENT

14.16 The Board heard considerable evidence regarding survival and safety equipment, known generically as Life Support Equipment (LSE), which was utilised by the aircrew and SASR passengers in Black Hawk 221 on 29 November 2006. The Board benefited immensely from the detailed and thorough investigation that was conducted by the Aerospace Equipment Systems Support Office - Aeronautical Life Support Equipment (AESSO-ALSE).

\textsuperscript{14} Exhibit 5, AAIT Report, paragraph 28  
\textsuperscript{15} SQNLDR Pascoe T419-420.13
Their report “Investigation into Recovered Aircrew and SASR Life Support Equipment Black Hawk (A25-221) Accident – 29 Nov 06”\(^{16}\) is considered a true and fair account and is not disputed. The findings and recommendations made in that report are agreed to. Rather than repeating all of those findings and recommendations, the most pertinent aspects will be discussed further, where doing so will assist in understanding the events and aftermath of 29 November 2006.

14.17 Similarly, the two enclosures to the AESSO-ALSE report provided by DSTO Air Vehicles Division\(^{17,18}\) are also very detailed and the findings contained within accepted.

**Aircrew LSE**

14.18 The Aircrew Safety Survival Equipment Ensemble (ASSEE) worn by 171 Avn Sqn personnel comprised the following equipment\(^{19}\):

- a. Gentex HGU-56P aircrew helmet and CEP
- b. Ephese Aircrew Breathing System (ABS)
- c. Simula Low Profile Survival Vest (LPSV) with LPU-34/P flotation collar for pilots
- d. SALA International SO28 Loadmaster Harness with Secumar flotation collar for loadmasters
- e. Combat Clothing Australia (CCA) Ballistic Vest
- f. Helicopter Aircrew Breathing Device (HABD)

14.19 The ASSEE was acquired under a rapid acquisition program, Project Bluefin, so that the equipment was available for Operation Gold in 2000.\(^{20}\) Operation Gold was the name given to the ADF operation in support of the Sydney Olympic Games. Equipment that is purchased in such a way should either be approved for a one off occasion and then withdrawn from service after its short term needed has completed, or should a long term need be identified, that equipment should be formally accepted into service. In this particular case,

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\(^{16}\) Exhibit 46, *Investigation into Recovered Aircrew and SASR Life Support Equipment Black Hawk (A25-221) Accident – 29 November 2006*

\(^{17}\) Exhibit 46 Enclosure 3 Air Vehicles Division Aircraft Forensic Engineering Investigation Report – *Black Hawk A25-221 Accident – Assessment of Helmet Damage*

\(^{18}\) Exhibit 46 Enclosure 4 Air Vehicles Division – *Thermographic Evaluation of Gentex HGU-56/P Helmets*

\(^{19}\) Exhibit 6 – Aircraft Accident Investigation Report – Black Hawk 221, p18

\(^{20}\) Exhibit 282 Special Flying Instruction 28/2007 dated 18 September 2007
the ASSEE was to be withdrawn from use after Operation Gold\textsuperscript{21} however this did not occur and the items remain in use. With the exception of two items, the Gentex helmet and communication ear piece (CEP), the equipment has not undergone the service release process. They are currently being used under the auspice of a clearance from the Army Operational Airworthiness Authority\textsuperscript{22}.

14.20 Not being released for service does and has caused some concerns for the equipments ongoing support and maintenance. In their report, the AESO-ALSE made the point:

"The LSE is yet to achieve Service Release for all LSE ensemble components and therefore is operating under the approval by the Operational Airworthiness Authority without appropriate logistic support, which included the lack of CAMM2\textsuperscript{23} tracking, the use of temporary publications, and without complete ADAASS authority to fit documentation. ALSE personnel at 171 SQN have been asked to undertake daily maintenance in an environment without the logistic support arrangements required to adequately maintain the equipment in an operational environment."\textsuperscript{24}

14.21 The AESO-ALSE also suggests that:

"Inadequate pre-deployment planning and supervision or increased operational tempo within the unit and Life Support maintenance facility, may have contributed to the large number of discrepancies identified with the LSE."\textsuperscript{25}

14.22 The Board is of the view that to have equipment not formally entered and accepted ‘into service’ after seven years is too long.

Recommendation:

14(d) For rapid acquisition of aviation equipment where a continued need is identified a mechanism should be in place to ensure that equipment undergo the full process of being accepted into service expeditiously.

\textsuperscript{21} Exhibit 6 – Aircraft Accident Investigation Report – Black Hawk 221, p18
\textsuperscript{22} Exhibit 6 – Aircraft Accident Investigation Report – Black Hawk 221, p18
\textsuperscript{23} CAMM2 is a software based maintenance management application which is used to administer ADF aircraft maintenance and manage its associated data in an integrated logistics environment.
\textsuperscript{24} Exhibit 46, Investigation into Recovered Aircrew and SASR Life Support Equipment Black Hawk (A25-221) Accident – 29 November 2006
\textsuperscript{25} ibid
LSE Failures and Identified Deficiencies

14.23 For the most part, the LSE as supplied to both Air crew and the SASR worked as expected and indeed significantly contributed to the safety of the personnel involved. There were, however, a number of identified problems and the most significant of those will be elaborated on. Full details are contained within the AESSO-ALSE report as previously mentioned.26

14.24 The AESSO-ALSE report states:

"The Physical Configuration Audit concluded that the majority of 'aircrew' LSE recovered was correctly configured at the time of the accident, ..." it further added "Observations on the 'SASR' LSE concluded that some of the equipment was not configured IAW the requirements of the applicable Electrical and Mechanical Engineering Instructions, and contained modifications that were not authorised in the applicable manuals. The deficiencies identified were minor to moderate in nature and may have degraded the overall performance of that equipment."27

"The maintenance Certification Review concluded that there was a significant amount of Life Support Equipment not correctly 'certified' as serviceable and was overdue for scheduled maintenance, or the maintenance activity was conducted and the recording of such maintenance was not completed. Additionally, it was identified maintenance certification had not occurred for 'Before Flight' maintenance activities performed on all LSE on the day of the accident."28

14.25 Mr Vitasz, an expert in LSE and a co author of the AESSO-ALSE report, was asked in hearing (concerning the number of discrepancies between the equipment configuration and the component logs and other maintenance documents) the following question:

"In your experience, would this be a normal occurrence you would expect during a routine configuration audit of a unit?"

14.26 He answered: "No, Sir, No"29

Finding:

14.4 The maintenance, record keeping and configuration control of LSE by both 171 Avn

26 ibid
27 ibid
28 ibid
29 Mr Vitasz T542.10
Sqn Detachment and SASR (embarked) was not conducted in accordance within current guidelines.

Recommendation:

14(e) The strict adherence to current guidelines be followed and that mechanisms be put into place to ensure standards do not drop when deployed away from a unit’s home base.

14.27 Three significant faults were identified by the AESSO-ALSE on the SASR and Aircrew LSE that had the potential to effect safety of the individual user. These faults were immediately acted upon. The faults related to:

(a) the mouthpiece of the HABD
(b) HABD cylinder adapter security i.e. a loose retaining nut
(c) Loose retaining nut on SASR LPV Type 60 B and C

Mouthpiece of HABD

14.28 The OIC AAIT contacted AESSO Deputy Director and indicated:-

"...as a result of the incident on the 29th, that when one of the aircrew members were recovered, the mouthpiece was still attached to his mouth and there may be some potential safety concerns that we need to look at regarding the security of the mouthpiece." 31

14.29 The aircrew member was the pilot CAPT Bingley. When he was reached in the water, CAPT Bingley had the mouthpiece of the emergency breathing device ("EBA") in his mouth. This mouthpiece was not connected to the regulator. 32

14.30 An immediate examination was undertaken by AESSO of the mouthpiece to the pilot’s and co-pilot’s life preserving equipment. This examination investigated the ability of the mouthpiece to become detached from the regulator.

30 Ibid page 6
31 Mr Vitasz T472.40-46
32 Exhibit 9 paragraph 15, Statement LCPL M
33 Exhibit 10 paragraph 7 Statement CPL I
34 Mr Vitasz T473.7-10
14.31 As part of the conduct of this element of the AESSO investigation an approach was made to the original equipment manufacturer Aqualung (a world wide and well known supplier to military and commercial organisations of scuba-diving equipment) to ascertain whether there were any standards or specifications for the security of the mouthpiece.\(^{35}\) It was confirmed that there are no standards for the removal of the mouthpiece.\(^{36}\)

14.32 As at 29 November 2006 the method for securely fixing the mouthpiece to the second stage regulator was via one Panduit brand cable tie or equivalent.\(^{37}\) Investigations were undertaken to determine the security of the mouthpiece to the second stage regulator:

"...we put the Panduit strap on the device, on the mouthpiece, how the publication stated it should be, and then we conducted some pull-off tests of the mouthpiece and second-stage regulator to determine how much force was required to remove the mouthpiece from the second stage. Then we looked at alternative options by using larger Panduit straps and larger pressures and also putting two Panduit straps on it to maximise the effectiveness of the retention of the mouthpiece to the second-stage regulator. As a result of our investigations - and I conducted something like 130 pull-off tests - we found that the "two Panduit strap" configuration provided the best method, or an increased amount of force required to take the mouthpiece off."\(^{38}\)

14.33 In conjunction with this, questions were asked in relation to the type of strap used.

14.34 When asked by Counsel Assisting whether there was an incorrect type of Panduit strap Mr Vitasz replied that there were effectively 2 types of straps in use in Defence both complying with military specifications; the Panduit brand strap and those straps made by other manufacturers.\(^{39}\) It was found that the military specification strap was ‘not as good as’ the Panduit brand strap. It broke more easily under pressure at the locking tab than the Panduit brand when the same pressure was applied.\(^{40}\) It was effectively an inferior product.\(^{41}\) As a consequence a recommendation was made that only Panduit brand straps should be used.\(^{42}\)

14.35 The recommendation to use two Panduit brand straps to secure the mouthpiece to the second stage regulator was the subject of an AESSO technical airworthiness alert information to AASPO. In turn AASPO released Special Technical Instructions ("STI") initiating immediate changes to all HABDs to have the dual Panduit strap configuration.\(^{43}\) These STI’s are STI Black Hawk 379 dated 12 December 2006, STI Black Hawk 380 dated 19 December 2006. The effect of these STIs was that no personnel were able to fly without the HABDs

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\(^{35}\) Mr Vitasz T473.7-34
\(^{36}\) Mr Vitasz T474.43
\(^{37}\) Mr Vitasz T474.7
\(^{38}\) Mr Vitasz T475.13-26
\(^{39}\) Mr Vitasz T476-477
\(^{40}\) ibid
\(^{41}\) Mr Vitasz T478.16-17
\(^{42}\) Mr Vitasz T478.9
\(^{43}\) Exhibit 72 STI Black Hawk 379 dated 12 December 2006, STI Black Hawk 380 dated 19 December 2006
being modified to the dual Panduit strap configuration.\(^{44}\)

\[\text{Figure 14.1: Dislodged Mouthpiece on 2nd Stage Regulator}\]

**HABD Cylinder Adapter Security - Loose Retaining nut on one of SASR LPV’s operating heads**

14.36 During the preparation for the despatch of the HABD to DSTO for further analysis the HABD assembly was turned from the OFF position to ON. During this process the HABD cylinder began to unscrew from the 1st Stage Regulator assembly, causing the remaining air in the HABD cylinder to release to the atmosphere.\(^ {45}\) The HABD which was specifically examined was Corporal Loadmaster CPL 13’s. (Exhibit 42)

14.37 Mr Vitasz examined the unit and found:

"As part of our investigation, we were going to send the HABD bottle down to DSTO to get some further analysis done, and prior to packaging it off, I unscrewed the cylinder - actually, this particular cylinder - from the "off" to the "on" position, and what ended up happening is that the actual cylinder began to unscrew from the first-stage regulator, and the residual air that was left in the cylinder escaped as the cylinder

\(^{44}\) Mr Vitasz T478.26-42, Exhibit 46 p5 AESO-ALSE Report

\(^{45}\) Exhibit 46 page 81, AESO-ALSE Report
began to unscrew, and then once that happened, you could unscrew the complete cylinder off the first-stage regulator."  

14.38 Investigation of the original equipment manufacturer ("OEM") servicing and maintenance documentation required the cylinder adapter to be torqued to the cylinder at a force of 25 ± 2 ft lbs. This maintenance function is not conducted by operational unit personnel but by authorised contractors during HABD Overhaul maintenance activity.  

14.39 AESSO-ALSE initiated a Technical Airworthiness Alert Information ("TAAI") on 5 April 2007 and a Report on Defective or Unsatisfactory Materiel (RODUM) on 10 April 2007 to all users in particular AASPO and Amphibious and Afloat Support System Program Office ("AASSPO") recommending "all HABD's in service including serviceable stock be inspected to determine the security of cylinder adapters. A check test action was recommended to confirm security of cylinder adapter through utilising the minimum torque value for the attachment of the cylinder adapter to confirm security." AASPO then released an aircraft STI on 24 April 2007 to ensure all Army HABDs were checked and any failures remedied. 

![Figure 14.2: Exhibit 42 CPL 13 Loadmaster's HABD](image)

SASR LPV Type 60 B and C

14.40 The LPV pictured below was worn by one of the SASR members on Black Hawk 221.  

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46 Mr Vitasz T 521.31  
47 Exhibit 46 page 81, AESSO-ALSE Report  
48 Ibid; Telecon Secretary BH221 BOI and Mr Rudi Vitasz on 13 November 2007  
49 Telecon Secretary BH221 BOI and Mr Simon Dakin on 13 November 2007  
50 Ibid page 82, Mr Vitasz T 522.9  
51 Exhibit 46 page 109, Exhibit 43
14.41 Examination of the LPV pictured above revealed no obvious damage. Mr Vitasz stated in evidence:

"One of the vests I examined had a loose retaining nut, which retains the operating head onto the valve that lets the CO2 gas into the chamber. Once we inflated that particular jacket, some CO2 escaped from the operating head, so not all the contents went into the actual jacket."\textsuperscript{52}

14.42 This LPV became Exhibit 43. Illustrated at Figure 14.3 is a close up of the operating head.

14.43 Mr Vitasz explained the problem:

"This is the operating head here, and this is the particular nut that we found loose. You undo the nut and the operating head slides off a schrader valve, similar to what's on a bicycle tube. Then the operating head slides over the top of that schrader valve. There are two rubber O-rings, one on the underside and one on the top side, and then the nut screws down on top. The maintenance instructions for this particular vest don't identify that the nut has to be torqued, and we found one that was loose."\textsuperscript{53}

14.44 As a consequence of the loose nut the vest did not fully inflate.\textsuperscript{54} Investigation of the Low Profile Survival Vest Ensemble ("LPSVE") documentation highlighted the requirement to torque the operating head onto the Schrader valve at a value of +/- 1 in-lbs. Further discussions with the OEM for the LPV also confirmed the requirement to torque the operating

\textsuperscript{52} Mr Vitasz T483.34
\textsuperscript{53} Mr Vitasz T485.36-44
\textsuperscript{54} Mr Vitasz T486.2
head to the Schrader valve system. The AESSO-ALSE report at page 110 states:

"Previous discussions with AAIT member SQNLDR G. Pascoe (AVMED) advised that one SASR member commented on the inadequacy of buoyancy from his LPV. Based on the examination of this LPV it is likely that the partial inflation of the chamber was attributed to the loose operating head retaining nut not securely attaching the operating head to the Schrader valve. The loose (un-torqued) operating head may have contributed to the escape of the CO2 as it flowed under pressure from the cylinder to the inflation chamber. The inflation chamber was deflated and the operating head re-examined."

**Figure 14.4:** Exhibit 43 Close up of Operating Head and Nut

14.45 Unfortunately, no evidence other than this statement was provided to the Board of the SASR member’s observation.

14.46 The potential leak was fully investigated by checking all components of the schrader valve, operating cylinders and gaskets for security and serviceability. The conclusion reached was that the potential leak of CO2 gas during inflation was the likely result of a loosely fitted operating head.

14.47 Immediately on reaching this conclusion AESSO-ALSE initiated two SAFETY RODUMs to highlight this deficiency to AASSPO, the managers of Type 60B and 60C LPVs. These RODUMs were issued on 10 April 2007. AESSO-ALSE advised that AASSPO has

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53 Exhibit 46 page 109
56 Ibid page 110
57 Telecon Secretary BH221 BOI and Mr Rudi Vitasz on 13 November 2007
actioned this accordingly in April 2007.\textsuperscript{58}

FURTHER LIFE SUPPORT EQUIPMENT ISSUES

EBA in ‘OFF’ Position.

14.48 During the investigation by the AAIT, it was found that all of the SASR survivors with the exception of Trooper E (a qualified SCUBA diver), had not used their HABD and on inspection the regulators were in the ‘off’ position. The AAIT heard that because of excessive air turbulence in the rear of the Black Hawk when the side doors are open, that the compressed air in the HABD was being inadvertently released. To mitigate against this, the Troopers had been instructed to leave their EBAs in the ‘off’ position and should they be needed in an emergency they were to be turned ‘on’.\textsuperscript{59}

14.49 The problem of inadvertent purging of the SASR HABD had been identified and corrective action had been taken by the fitting of a purge button cover. This was outlined in Modification Instruction Marine D37-1 Issue 1.\textsuperscript{60} Coincidently this instruction had been issued in October 2006 and had not been received by the SASR prior to deployment for Operation QUICKSTEP.\textsuperscript{61}

Adequacy of Life Preserver Vests (LPV)

14.50 During the hearing phase the Board heard evidence that some of the Life Preserver Vests worn by the Loadmasters and the SASR Troopers did not provided adequate buoyancy and especially so at depth as the personnel attempted to egress from the rapidly sinking helicopter. The AESO-ALSE report covers the buoyancy aspects in great detail and their findings are summarised below.

14.51 The Loadmaster SO28 harness fitted with the Secumar Flotation device was deemed to be undesirable based on the buoyancy force calculations made by AESO-ALSE. It was determined that at depths greater than approximately one metre, the user would find themselves to be negatively buoyant whereas an example of comparison, the pilots life preserver provides positive buoyancy to depths of approximately 12 m. It was recommended by AESO-ALSE that the AASPO review the current flotation device fitted to the SO28 Loadmaster Harness with a view to increasing its flotation capability.\textsuperscript{62} Of note, as an interim

\textsuperscript{58} Exhibit 46 page 110; Telecom Secretary BH221 BOI and Mr Rudi Vitasz on 13 November 2007
\textsuperscript{59} Exhibit 5 – AAIT Report
\textsuperscript{60} Exhibit 46 page 23
\textsuperscript{61} Telecom Secretary BH221 BOI and Mr Mark Winter on 22 November 2007
\textsuperscript{62} Exhibit 46 pages 130,131
measure, Commander 16 Brigade issued SFI 28/2007 in September 2007\(^63\) providing additional risk mitigators for the use of the SO28 harness until a more permanent solution is developed. This should in no way take any priority away from providing equipment that is fit for purpose and has undergone the rigorous process of being accepted into service.

14.52 The buoyancy calculations for the SASR Life Preserver Vest (LPV) for the Troopers as they were dressed wearing ‘basic uniform’ came out very positively with the neutrally buoyant point determined to be greater than 30 metres. However, if those troops had been fully prepared for battle, their all up weight can range to a maximum of 150 kg. In such a condition it was considered that it may be unlikely that the current flotation device used by the SASR would provide the requisite buoyancy capability. It was recommended that AASSPO determine the flotation adequacy for the floatation devices used by the SASR.\(^64\)

**Finding:**

14.5 **AESO-ALSE report “Investigation into Recovered Aircrew and SASR Life Support Equipment Black Hawk (A25-221) Accident – 29 November 2006”\(^65\) is accepted by the Board.**

**Recommendation:**

14(f) **All recommendations within AESO-ALSE report “Investigation into Recovered Aircrew and SASR Life Support Equipment Black Hawk (A25-221) Accident – 29 November 2006” be acted upon.**

**Body Armour Quick Release**

14.53 Further to the issue of the SASR LPV, and outside the scope of the AESO-ALSE report, the Board heard evidence and was given a demonstration of the current SASR body armour ensemble known as ‘Eagle Marine’. The great advantage of this system that was graphically demonstrated to the Board, was its ‘rip chord’ quick release that allows the member to quickly shed the weighty body armour. Given the marginal buoyancy capability of the current LPV system, being able to shed weight rapidly and simply, thus increasing ones buoyancy is considered an essential safety feature. Accordingly, it is recommended that Army conduct a study with the view of issuing other operational units (other than the SASR) that operationally fly over water with a system that allows the simple quick release of ballistic

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\(^{63}\) Exhibit 282 HQ 16th Brigade (Aviation) - SFI 28/2007

\(^{64}\) Exhibit 46 pages 130,131

\(^{65}\) Exhibit 46, Investigation into Recovered Aircrew and SASR Life Support Equipment Black Hawk (A25-221) Accident – 29 November 2006
armour such as the ‘Eagle Marine’ currently used by the SASR.

**Recommendation:**

14(g) That a review considered for the introduction of a quick release body armour system for combatants use in helicopters when they fly over water. This review should not be done in isolation of other LSE reviews.

**Corporal A – No Helmet**

14.54 On the 29 November 2006, CPL A was performing the role of Sniper Safety Supervisor in Black Hawk 221. His role required him to communicate with the pilots. To perform this task he was required to wear a communications headset that was incompatible to be used when wearing his normal SASR helmet. CPL A states:

> "I had communications with the pilots and I was testing out a set of Peltor head phone communications system that I had borrowed. This system is a lot more streamline than the head phone system that comes with the Blackhawk, and allows you to simply unplug one connection so you can fast rope from the aircraft" 66

14.55 A waiver had been sought and ultimately granted by Commander 16 Brigade (Aviation) for SASR personnel deployed on Operation QUICKSTEP under a number of circumstances. 67 When SO personnel are required to wear communications headset and the "supplied helmet is unsuitable or incompatible was one of the approved circumstances." 68

14.56 Notwithstanding that the waiver had been granted, this failed to protect Corporal A in the accident. Amongst all of the survivors, he was the only one to have suffered a head injury and he temporarily lost consciousness. He was one of the last to egress the aircraft and breach the surface. The Board considers that he is very fortunate to be alive. Chief Warrant Officer Class 5 of the US Army 160th Special operations Aviation Regiment made the following comment to the Board:

> "My experience is that if he was taking his helmet off to gain communication with the pilots or his personnel, the same can be accomplished fairly simply by making a connection, an electronic connection, that adapts to that particular type of headset that they’re already wearing that is fitted underneath their helmet. This would have helped

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65 Exhibit 237 CPL A Statement paragraph 9
66 SOHQ C918423 Operation QUICKSTEP – Request For Waiver – Minimum Requirements For Passenger Helmets dated 09 November 2006
67 ibid
him to avoid contacting one of the many hard things on the roof of a Black Hawk or some other place and, as it says in the report, knocking him unconscious and coming to underwater and then aspirating some water on the way up as he was trying to egress. Had he had his helmet on, I believe he would probably have bumped his head and moved on, but he would not have lost consciousness. That could have been another fatality that was avoided very narrowly because of the helmet.”

14.57 In his written statement, CW5 King stated that “...equipment is available that will allow communication without loosing the protection a helmet provides”.

14.58 LTCOL U when asked if such equipment was being sought or looked into at the Squadron level of within Army generally, he replied:

“My understanding is that these issues are being looked at Army level. For that particular waiver, I asked approval, because I wrote back when we first got on the ship and said, “Look, the current set of equipment we have doesn’t work for this type of serial. Given the risks, are people happy with it?” I went up to a fairly high level in the system and (it) came back down and said, “Yes, for these types of operation, we’re comfortable.””

14.59 This section concerning CPL A’s lack of helmet is equally at home under the Sub Heading of Safety Culture and Safety Issues as it is in Life Support Equipment. It would also qualify to be included as an example of Normalised Deviance. That an operational waiver had been sought and granted does not abrogate the responsibility of the employer to provide equipment that is fit for purpose and to provide as safe a working environment as practicable. As the Occupational Health and Safety Act of 1991 states: The employer is to “…take all reasonably practical steps to protect the health and safety at work of its employees”. This was certainly not the case for CPL A. It is not understood why he could not have worn an air crew helmet for the task, a simple solution that would have provided him with good communications and appropriate cranial protection.

14.60 In addition, it should be noted with concern that LTCOL U had interpreted the initial waiver approved by COMD 16 Bde (Avn) in a manner that prompted him to further extend the waiver to not wear a helmet to all SO personnel providing AFS (sniping) in Army RW aircraft during Operation QUICKSTEP. The original approval given by COMD 16 Bde (Avn) stated inter alia that a waiver be granted in circumstances when:

Any activity that is deemed to impinge on delivering an operational capability or affects the safety of a specific task. To be assessed and approved by COMD TG

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69 CW5 King T2037.31
70 Exhibit 183 CW5 King Report dated 12 July 2007
71 LTCOL U T1645.8
72 Occupational Health and Safety Act, 1991 – Section 16(1)
73 CTU 636.2.1 minute REQUEST FOR WAIVER NOT TO WEAR HELMETS WHILE PROVIDING AERIAL SNIPPING SUPPORT – Operation QUICKSTEP dated 10 November 2006
636.2.1 (currently CO SASR) on a case by case basis.

14.61 Rather than providing a case by case basis, LTCOL U’s interpretation would be better described as a ‘blanket’ waiver. Given that the waiver was ‘in force’, perhaps it is fortunate that the other troopers embarked in Black Hawk 221 were wearing their helmets on the AFS training sortie 29 November 2006. Why a sniper wearing a helmet was deemed to impinge on delivering an operational capability is not understood, nor was it explored during the hearing. However, it certainly does suggest a significant and dangerous inadequacy in current equipment. Furthermore, the granting of waivers should be the last resort and the least desirable method to achieve an outcome and certainly should not be a short cut to circumvent a safety system. It is an indication that the ‘system’ is failing and when safety is involved a full risk assessment should always be conducted. This does not appear to have been the case.

Finding:

14.6 There is an identified need for a helmet with a communication system to allow the Sniper Safety Supervisor to have two way communications with the air crew whilst maintaining appropriate and approved cranial protection.

Recommendation:

14(h) A ‘fit for purpose’ communications capable helmet should be acquired given the identified operational need.

HELIICOPTER RERAINT STROP

Description

14.62 A Helicopter Restraint Strop (HRS) was used by the SASR passengers in Black Hawk A25-221 on 29 November 2006. It is designed to provide passengers with some form of security (from inadvertently falling from the aircraft) when Operational Contingency Loading (OCL) is approved and seats are not being used.

14.63 The HRS used is comprised of a short tether which is clipped to the utility belt of the soldier and the other end clips to a ring bolt in the floor of the helicopter. Its length is designed to enable the soldier to kneel while attached at both ends. It is made of two quick release devices, nylon webbing, nylon tape, polyester rope and shock cord.74 The quick

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release fittings, which are also known as spinnaker clips or snap shackles enable the strop to be released under load. The other designs of the HRS currently in ADF use, instead of using the quick release fittings, use a C-type karabiner, which are not releasable under load.\footnote{Email CAPT George / LCDR Probert, WO2 Easton, LTCOL Cullinan, LTCOL Barnes of 24 September 2007, 1135}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{image}
\caption{Exhibit 209 Helicopter Restraint Strop}
\end{figure}

14.64 In the documentation reviewed by the BOI in relation to this issue the HRS was variously known as an Operational Contingency Loading (OCL) Strop, an Assaulter’s Strop, Personal Passenger Securing Device, Fall Arrest Device, Strop Restraining Line and Operational Control loading Strop. That the HRS has so many names and/or variants would suggest that it is in need of rationalisation.

\section*{Introduction into Service}

14.65 Some close wandering restraint system akin to the HRS has been in service for some time without any certification or formal acceptance into service.\footnote{Exhibit 211, documents relating to HRS; BOI submission by CAPT George of 28 September 2007, paragraph 13;}

14.66 In November 2001, SASR requested that a method of restraining troops inside helicopters for OCL tasks be developed by the DMO’s Land Engineering Agency (LEA).\footnote{Exhibit 211, SASR minute 990-1-2- R2867/01 of 15 November 2001} In late 2001, when there was an urgent operational requirement for HRS, CO SASR authorised the purchase and informal introduction into service of 60 off-the-shelf ‘Antec’ inertia reel strops. While the Antec strop was considered by the SASR to be appropriate for the role, it was not fitted with a quick release device.\footnote{Exhibit 290 SASR minute 990-1-2 of 5 March 2002}
14.67 In March 2002, SASR raised a User Requirement for a certified HRS in order to facilitate the certification and acquisition process. The capability requirements outlined included: use of a quick release device, connection to both the roof rings and the FRRD to avoid trip hazards, and able to be connected to the Fallright full-body harness. SASR noted their preference for an inertial retractable reel device rather than an elastic/bungee type device. The User Requirement noted that The strop is to provide an enhancement in safety ... obviously the HRS will not provide 100% protection from all hazards, for example, it would not provide the same level of protection as a seat/harness would during a significant accident.\textsuperscript{79}

14.68 By 2004, LEA had advised SASR that the Antec strop could not be certified. SASR obtained 12 HRS with different configurations for trial.\textsuperscript{80} The process appears to have stalled after this point. However, the most current information available to the BOI is that a HRS is in the process of being brought into service by the General Support Systems Program Office (GSSPO) within Land Systems Division of the Defence Materiel Organisation. Meanwhile, in June 2006, DCOMD 16 Bde (Avn) provided operational airworthiness clearance for the HRS.\textsuperscript{81}

Assessment of the HRS

14.69 To bring the HRS into service, GSSPO developed a Risk Management Log. The Log was raised to Issue 1 of 5 July 2007.

14.70 The Log focuses on the risk of the strop failing to hold a user in the aircraft in various circumstances, after which he or she falls from the aircraft. It also describes the risk of the quick release device failing and the user being unable to detach in the event of a ditching. Of the eight risks listed, four were assessed as having a medium level of residual risk after mitigation strategies were implemented. The other four were all assessed as having a high level of residual risk. Of these, three were unable to be mitigated, and one was reduced from an extreme level of risk to a high level of residual risk with mitigation strategies. For the four high level risks, the recommendation was for Army Headquarters (AHQ) to accept the risk as the operational risk of not having the HRS was greater.

14.71 Director Technical Regulation–Army (COL Phasey) considered the risks associated with both the failure of the HRS and use of the HRS. He stated that he would not recommend that AHQ accept the risks. His view was that AHQ only provide interim acceptance of the HRS, and instead procure a safe, fit for service and environmentally compliant strop.\textsuperscript{82}

\textsuperscript{79} ibid
\textsuperscript{80} Exhibit 291 SASR minute, Trial Directive – HRS of 26 February 2004
\textsuperscript{81} Exhibit 289, 292 and 293.
\textsuperscript{82} Exhibit 294-Email COL Phasey / COL Rudzki, CAPT George, MAJ Martin, LTCOL Harris, Mr Bettiol, COL Mulhall, LTCOL Walk, Mr Atkins, Mr Graham Smith of 13 July 2007, 1746
14.72 Provisional Design Acceptance paperwork, including the Design Acceptance Certificate, Concession form and minute for staffing to AHQ have been raised. Provisional Design Acceptance cannot be granted without an operational imperative because of the numerous high risks which are unacceptable under “normal” circumstances.

Conclusion

14.73 While the HRS has not been properly certified and accepted into service, there is no doubt that the quick release clip aided in the ease of egress of the five surviving SASR passengers. The Board notes the evidence of WO2 Dean Rule of 4 RAR (Cdo) regarding his unit’s strops which do not contain a quick release mechanism to enable the soldiers to rapidly free themselves from the aircraft. Given the success and ease of the quick release mechanism, the Board is of the opinion any HRS designs which are not releasable under load should not be used.

14.74 As recommended elsewhere in this report, the Board believes that the ADF should review the Black Hawk passenger arrangements with the intent of acquiring a seating system that is able to be used for a wider variety of tasks than current Black Hawk passenger arrangements safely permit. However, the Board also recognises that there will always be rare times of operational in extremis circumstances in which OCL will be acceptable. Also, until such time that ‘fit for purpose’ seating is identified, or for the roles that just cannot be done with seating, and there is an operational necessity, the need for a HRS is accepted. The history of this matter, involving extensive work by a number of agencies, over a lengthy period of time is extraordinary for its inconclusivity.

14.75 The Board has received correspondence from Army Headquarters containing the most recent status of the HRS. Interim approval will be provided for Special Operations Command to continue using the HRS pending formal approval. SOCOMD will review the User Requirement to enable the DMO to conduct testing to ensure that the HRS is fit for service, safe, environmentally compliant, and minimises injuries due to being arrested. The DMO will then test the current HRS and conduct market research to determine whether there are any better products available. Given its limited but vital and valid need, the Board is of the strong view that the approval process for a restraining system be expedited and given a high priority.

83 Ibid - Email Mr Atkins / CAPT George, Mr Bettiol, CAPT Dowsett, Mr Griffin, CAPT Johnson, Mr Buck, WO1 Caldera, WO1 Stephen Jones of 9 July 2007, 1441
84 Ibid - Email Mr Bettio / COL Phasey of 12 July 2007, 1644
85 Exhibit 228, Statement of WO2 Dean Rule, paragraph 15
Findings:

14.7 The quick release clip on the HRS used on 29 November 2006 enabled the survivors to rapidly release and egress the sinking aircraft. Conversely, had the aircraft been carrying members of 4 RAR using the other type of strop (without a quick release mechanism), it is likely that they would have struggled to release their strops under load and they may well have been trapped inside the aircraft as it sank.

14.8 That the approval process, or lack thereof, of the HRS into ADF inventory when there is a valid case for its need has been slow and cumbersome without result.

Recommendations:

14(i) That any HRS without a quick release mechanism that can be released under load not be given approval for use.

14(j) That the approval process for a restraining system for use in legitimate Operational Contingent Circumstances be expedited and given a high priority.
SECTION 15

OTHER BLACK HAWK MATTERS

FLOTATION DEVICES

15.1 The issue of whether Black Hawk should have been fitted with flotation devices was foreshadowed by Senior Counsel Assisting in his opening address to the Board. By the end of the Board of Inquiry hearing, it can be said that the issue of flotation devices had become a significant one for the Board to report on and if so concluded, make recommendations.

Ditching

15.2 Before examining the evolution of the issue, however and materials relevant to it, it is to be understood that ultimately there was uniformity of approach by all parties to one important aspect. The distinction between a "ditching" and what has been found as occurring in this accident is to be kept in mind.

15.3 A "ditching" has been described as "a deliberate and controlled emergency landing on the water with the intent of abandoning the helicopter". It has also been described as "a planned event in which a flight crew knowingly makes a controlled emergency landing in water". Further, in a "ditching", the helicopter is assumed to be intact prior to water entry with all controls and essential systems, except engines, functioning properly. COL Crocombe observed:

"I would point out that there's a slight distinction here, though, because the term "ditching" refers to a controlled landing on water, usually associated with a loss of engine power or some other problem with the helicopter, but you still have some control. If the helicopter crashes into the water, flotation devices may not survive that..."

15.4 The Board considers that what occurred on 29 November 2006 cannot be described

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1 T31.13
2 The Board has had such advantage as is available from one “study”, namely the Taber & McCabe Exhibit 181. On the 29 September 2007 the Board received an unsolicited submission document from CAPT C George RAN. This document was “CAA Paper 2005/06 Summary Report on Helicopter Ditching and Crashworthiness Research” published on the www by CAA.co.uk. Both documents have an inherent value but their relevance to the determination of the Board is limited by the failure to define with precision or differentiate at all between a “ditching” and a “crash”, something fundamental to the approach adopted by the Board.
3 Exhibit 67: paragraph 3, Minute of GPCAPT R. Thomasson 12 March 2004
4 Exhibit 181: paragraph 1, article from “SAFE” magazine Spring 2007, as defined by the Civil Aviation Authority (UK).
5 Exhibit 181: citing US Department of Transport Federal Aviation Administration definition at page one
6 T633.45-634.3
as a "ditching". The Board finds that the appropriate term in respect of both the collision with the deck of KANIMBLA and the passage into the sea is "crash". There is no evidence available to support a conclusion that Black 1 was under "control" after crashing on the deck (or indeed moments before), nor thereafter, without its tail rotor and attendant assemblage, during the mere second or so before it crashed into the sea.  \(^7\)

The Evolution of the Issue

15.5  A starting point in the evolution of this substantive issue is paragraph 166 of Exhibit 5 the AAIT Report which states:

"Witnesses reported that the aircraft sank very quickly. With both rear doors open and the loss of the tail section, it was unlikely that there would be any significant air pockets in the remaining fuselage that could have reduced the sink rate. The Black Hawk is not fitted with automatic flotation devices such as those on the Seahawk. If fitted, these may have reduced the sink rate or enabled the accident aircraft to remain on or just below the water's surface, providing the crew and passengers more time to egress and less distance to swim to the surface. Given that there were divers in the water within a minute of the accident, and had the aircraft not sunk immediately, assistance could have been provided to an incapacitated, entangled, or disoriented occupant."  \(^8\) (emphasis added)

15.6  The author of paragraph 166 was SQNLDR Pascoe. \(^9\) SQNLDR Pascoe is currently the Chief Instructor of the Royal Australian Air Force Institute of Air Force Medicine. He is an aviation medical expert. By the end of the hearing when all the material in relation to this subject matter was before the Board, the Board felt entitled to view the statements made in paragraph 166 in context (the "early days" AAIT Report) and with some degree of circumspection by reason of the generalities, many unsaid assumptions and hypotheses, within the paragraph and the area of expertise of its author.

15.7  In his oral evidence SQNLDR Pascoe elaborated upon the subject, affirming his view that flotation devices would have "improved survivability". There were two bases for this conclusion. The first was that the aircraft was going to depth and the deeper the aircraft went the less time a person within it would have to effect exit and to reach the surface. Such a person would have "pressure" working against him. The second basis was that if the aircraft was sinking, there was no way that anyone can come to the aid of people within it whether they are other occupants or divers. On the relevant occasion there were divers in the water very quickly and, according to SQNLDR Pascoe, if the aircraft remained on the surface or

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\(^7\) Exhibit 26: paragraph 26, Statement of LCDR Anthony Stringer. "The first unusual thing was when the Military Aeronautical Distress (MAD) alarm was triggered. It only sounded for about one second, which I now know is because the aircraft sunk so quickly and the MAD beacon cannot transmit a signal underwater."

\(^8\) Exhibit 5 paragraph 166 AAIT Report

\(^9\) SQNLDR Pascoe T420.20
close to it, “potentially” those divers could have got into the aircraft, given the person breaths out of their own regulators, disentangled them and pulled them out of the aircraft. 10

15.8 It can be seen, again, that a great deal of conjecture informs evidence of the kind given by SQNLDR Pascoe. At the end of the day the Board had reviewed much more material upon which it can make as informed findings as it must, and to make any recommendation that it might choose.

15.9 As was submitted by LEUT Nash (for Mrs Porter) a number of witnesses gave evidence that the issue of incorporating flotation devices on Black Hawk needs to be investigated. For example, in Exhibit 124 namely his statement, MAJ 4 says in paragraph 50:

“I believe that it is essential for the ADF to consider fitting floats to Black Hawks (and ARH and future Army utility helicopters such as the MRH 90). Army helicopters are conducting an increasing number of embarked operations and are required to conduct long over-water flights. In addition to this, 171 Avn Sqn crews are required to conduct specific roles that expose them to hazardous operations over water. From what I have read, the Seahawk floats apparently block the pilot’s and loadmaster’s exits on activation so these would not be suitable. However, American Naval Black Hawk variants can reportedly be fitted with removable floats which keep the aircraft afloat rather than merely reducing the rate of descent. I’m told that they are fitted to the outside of the cabin doors, and do not block egress from the crew or main cabin doors. I believe that such floats should be relatively easy to procure and engineer because they are a retro-fitted system. I discussed this matter with LCDR Glynn while on KANIMBLA.”11 (emphasis added)

15.10 In his oral evidence, MAJ 4 stated:

“I had discussed aircraft flotation with a lieutenant commander aviator on the KANIMBLA immediately after the accident, and he had informed me of flotation systems that he was aware of fitted to H60 variants within the American Navy. Reportedly, these flotation systems are detachable and they fit to the aircraft just aft of the cabin doors, and they don’t block the cabin doors. I’ve done a little bit of investigating on the net and have been able to find similar systems to these, but not this particular system.”12 (emphasis added)

15.11 CAPT 6 in paragraph 33 of his statement, Exhibit 132, said:

“I wish to take this chance to express my opinion that the aircraft needs floats for over water work. I understand that there is a product which can be attached and detached to the Black Hawk as required and which will not block egress from the helicopter when

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10 SQNLDR Pascoe, T420.20-T421.18
11 Exhibit 124 paragraph 50 Statement of MAJ 4
12 MAJ 4 T1275.5-17
activated. I think that this area needs to be explored. Seahawks have got floats, why not Black Hawks, especially with the introduction of the Landing Heavy Dock and Army’s increased operations from the LPAs.”  

15.12 These are examples of the Army’s view on the subject matter and with the utmost respect it must be said that the vague and uncertain generality of those remarks requires that they must be viewed with great care. It really does not assist the Board to have a witness say “I’ve done a little bit of investigating on the net…” for example.

15.13 SQNLDR Morris, an independent aviation expert witness argued that consideration should be given to the incorporation of flotation devices for Black Hawk when the aircraft is used for extended deep water operations.  

14 SQNLDR Morris, whose evidence was of much assistance to the Board, gave it as his opinion in relation to Black Hawks that crash or ditch into the water, he posited two alternatives: one, to adopt a flotation system or if flotation devices could not be fitted, then all doors including the cockpit doors should be kept open if possible (during over-water flights).  

15 In the light of all the evidence before it the Board cannot with the same facility as SQNLDR Morris blur the distinctions between “crashing” as the Board has found to have occurred in this inquiry and “ditching”.

15.14 Further, and this was not pursued with SQNLDR Morris or indeed anyone else, Exhibit 1 (video of incident) indicates that upon impact with the deck of KANIMBLA, the pilot’s door in fact sprung open. Not withstanding that it is clear that CAPT Bingley was able to effect egress, presumably from the “open” pilot’s door, and not withstanding that CAPT 7, the co-pilot, was also able to effect egress, the evidence is curiously silent as to how CAPT 7 egressed through the co-pilot’s door. He “found” the door and released his harness and “left the aircraft”.  

16 He was at a depth of between four and eight metres at a guess.  

17 His statement, Exhibit 98, only refers to his having “exited” the aircraft (paragraph 25). In the absence of any express testimony from CAPT 7 especially, it is difficult for the Board to test SQNLDR Morris’ alternative to flotation devices (even though the context might have been in a “ditching”). The more so, it must be added, when the tail assembly absence provided another entrance for seawater.

15.15 When he first gave evidence MAJGEN Fraser, for example, said “the standard US Army aircraft do not have floats. Indeed, I have been advised that the US Navy have taken their flotation systems off their aircraft.”  

18 On this occasion MAJGEN Fraser was not asked any questions by LEUT Nash. On the following day (19 June 2007) WGCDR Blais gave his evidence and was asked “Q: are you aware of a US Black Hawk variant that has removable floats? A: I was just made aware of that yesterday with MAJGEN Fraser’s comments.”  

There was nothing in MAJGEN Fraser’s evidence that supported the proposition put to

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Exhibit 132 paragraph 33 Statement of CAPT 6
Exhibit 175 paragraph 411 Reports of SQNLDR Morris; SQNLDR Morris T1941.33
SQNLDR Morris T1941.17
CAPT 7 T931.31
CAPT 7 T947.46
MAJGEN Fraser T45.20
WGCDR Blais T122.18
WGCDR Blais, nor the WGCDR's response; another instance where care must be taken in viewing the evidence sought to be relied upon in advancing the issue of flotation devices.

15.16 BRIG Bartels anticipated that he would be required to undertake a review of the earlier decision reached by MAJGEN Fraser not to have flotation devices installed.\textsuperscript{20} That piece of evidence was given on the 26 July 2007 by which time, it can be said, the evolution of the issue was quite clear. That evolution in effect concluded with the further evidence referred to below from MAJGEN Fraser.

15.17 One other aspect should be dealt with at this point in order to eliminate it. In both written submissions and oral submissions on behalf of the Porter family it was suggested that MAJGEN Fraser lacked objectivity when he re-examined the history of the issue of flotation devices before he returned to give further evidence.\textsuperscript{21} It is to be observed, first, that it was not put to MAJGEN Fraser that he lacked objectivity in the performance of the exercise he embarked upon. Secondly, it was not suggested that the use of the phrase "lack of objectivity" was to be taken as a criticism or in any way to be disparaging of the officer. Thirdly, in the end, the raising of the question of objectivity was of no assistance and could have been of no assistance to the Board (the more so when it was not put to the MAJGEN) and the Board proposes to give such proposition no weight.

15.18 The Board accepts that MAJGEN Fraser exercised "a significant degree of effort and rigour in reviewing the issues pertinent to the question whether or not flotation devices should be incorporated into the Australian Army Black Hawk Fleet" (para 60 of Counsel for LEUT Nash's written submissions).

**Evidence Relating to the Issue**

15.19 The Chief of Staff's Committee determined in 1986 that all battlefield helicopters would be transferred to the Army. The Black Hawk aircraft was first operated by 9 Squadron RAAF. 5 Aviation Regiment was established on 20 November 1987 with two Black Hawk squadrons and in January 1989 command transitioned from Air Force to Army. A and B Squadrons were operated in Townsville.\textsuperscript{22}

15.20 In recognition of the sustained requirement for an aviation squadron to support SO, particularly post 9/11, on 28 November 2004 A Squadron 5 Avn Regiment was made an independent unit and retitled 171 Avn Sqn. As at 29 November 2006 the squadron was in transition relocating from Townsville to Holsworthy. There are currently 34 operational Black Hawks.\textsuperscript{23}

\textsuperscript{20} BRIG Bartels T1822.28
\textsuperscript{21} Paragraph 60 of written submissions; T2269.
\textsuperscript{22} Exhibit 2 paragraph 7 Statement of MAJGEN Fraser.
\textsuperscript{23} Exhibit 2 paragraph 8 at Annexure C Statement of MAJGEN Fraser.
15.21 In December 2000 a decision was taken to rationalise the helicopter fleet under program Air 9000. The consequence of this decision was uncertainty over the current Black Hawk fleet as to whether to upgrade or replace with another aircraft type. In August 2004 it was announced that the MRH 90 would be procured and Black Hawk taken out of service. It is presently anticipated that the first MRH 90 will be delivered on or about 18 December 2007.\textsuperscript{24} Black Hawk, it is again presently anticipated, will be withdrawn from service over the period 2011-2015.\textsuperscript{25} 46 MRH 90 are to be procured for the ADF: the initial 12 authorised in the Defence 2000 White Paper; 6 to replace the Navy Seaking fleet and the remainder to replace Army Black Hawks.\textsuperscript{26} The MRH 90 will be equipped for the installation of flotation devices. There will be 20 available flotation kits.\textsuperscript{27}

15.22 KANIMBLA was commissioned into the RAN on 29 August 1994 and MANOORA on 25 November in that year.\textsuperscript{28} It is presently anticipated that TOBRUK and one of KANIMBLA and MANOORA will be replaced by two helicopter landing dock ships. The completion of this project is expected to take place in or about November 2016.\textsuperscript{29} To that extent of that timeline there will be a degree of overlap between the phasing out of Black Hawk and the introduction into service of the MRH 90 and the LHD.

15.23 It is apparent that documentation relating to the consideration of flotation systems has been sparse since about May 1988. At that time, Sikorsky presented a preliminary Engineering Change Proposal (ECP) which included emergency flotation devices.\textsuperscript{30} In 1989 the Project Office for Air 5046 was in negotiation with Sikorsky about this ECP. Inquiries by COL Crocombe indicate that negotiations did not proceed as cost was a significant issue.\textsuperscript{31} The Black Hawk was introduced into service without certification for ditching.\textsuperscript{32}

15.24 First of Class Flight Trials (FOCFT) were held in 1999-2000 with MANOORA to assess whether Black Hawk would be able to be embarked on naval vessels. There were concerns as to main wheel olio strength, the moving of Black Hawks in to the hangar, the removal and storage of blades, pitch and roll limits, and electronic interference between ship and aircraft systems.\textsuperscript{33}

15.25 The interim report of the FOCFT was issued in May 2000.\textsuperscript{34} The commentary for a "specific conclusion" that was deemed to be "Unsatisfactory – Correction Highly Desirable" was that:

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\textsuperscript{24} Exhibit 179 paragraph 66; Exhibit 2 paragraph 26; T1965.12 Statements and Evidence of MAJGEN Fraser; BRIG Bartels T1788.8
\textsuperscript{25} Exhibit 179 paragraph 66 Statement of MAJGEN Fraser 17 July 2007, BRIG Bartels T1788.16
\textsuperscript{26} Exhibit 2 paragraph 26 Statement of MAJGEN Fraser; Jane's Fighting Ships Website
\textsuperscript{27} MAJGEN Fraser T1980.31
\textsuperscript{28} Jane's Fighting Ships http://www.janes.com Retrieved on 16 October 2007
\textsuperscript{29} DMO website – Amphibious Deployment and Sustainment JP2048 Phase 4 A and B.
\textsuperscript{30} Exhibit 3 in summation Brief accompanying COL Crocombe page 1.
\textsuperscript{31} Exhibit 75 page 2 Minute COL Crocombe dated 13 June 2007
\textsuperscript{32} COL Crocombe T630.24
\textsuperscript{33} MAJGEN Fraser T1957.43-t1958.17; Exhibit 179 paragraph 5 Statement MAJGEN Fraser dated 17 July 2007
\textsuperscript{34} Exhibit 64 LPA First of Class Flight Trials dated 17 May 2000 Interim Report
"4.10.2.1 The Black Hawk helicopter was not fitted with any form of aircraft flotation equipment for use in a ditching scenario. This increased the risk to aircrew during all elements of embarked flight operations. The unquantified rate at which the helicopter would become totally submerged in the event of an aircraft ditching, coupled with unknown dynamic response of the aircraft while submerging may result in crew disorientation thus complicating egress. In the event of an aircraft ditching the absence of aircraft floats may result in the aircraft submerging and sinking at a high rate, greatly increasing the likelihood of crew disorientation and significantly reducing the chance of a successful egress.

4.10.2.2 The unknown ditching characteristics of the Black Hawk was an unsatisfactory deficiency, the correction of which is highly desirable. Recommend investigate the ditching characteristics of Black Hawk ditching to determine if floats are required for operations to RAN ships."35 (emphasis added)

15.26 Needless to say, this passage was seized upon, especially in support of either the need for the devices or the need for the issue to be restricted. It is to be noted, however that the extract focuses on “ditching”.

15.27 The question of flotation devices appears to move from FOCFT to the Black Hawk Weapon System Review Committee (WSRC). That committee, on 8 March 2001, eliminated two matters related to the sink rate retardation of Black Hawks: flight without doors and flotation. “After discussion within the committee, both of these items were removed from the list. It was emphasised that training within individual units must be at a level that will improve crew safety i.e. HUET.”36 MAJGEN Fraser recalled that the problem which was the subject of WSRC discussion was that the proposed flotation system folded up around the front part of the fuselage of the aircraft. In the event of the landing on water requiring the inflation of the flotation system, the device, upon inflation, would lock shut the two cockpit doors. Those doors were structurally part of the aircraft and could not be removed nor left open during flight.37

15.28 Exhibit 65 is the FOCFT Final Report delivered in July 2003. That report is silent as to the issue of flotation devices notwithstanding the raising of that issue in the interim report referred to above. It may well be, and the Board is in no position conclusively to decide, that the transfer of the process from FOCFT to WSRC might account for the omission from the final FOCFT report. In 2003 MAJGEN Fraser was the Operational Airworthiness Authority for Army, Commander 16 Bde (Avn). 16 Bde (Avn) was not on the distribution list for the formal report of FOCFT.38

15.29 Counsel Assisting were unable to locate any other evidence in relation to this apparent discrepancy between the Interim Report and the Formal Report.

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35 Exhibit 64 paragraph 4.10 LPA First of Class Flight Trials dated 17 May 2000 Interim Report
36 Exhibit 179 Statement of MAJGEN Fraser paragraph 7 and Reference E
37 MAJGEN Fraser T1958.43
38 Exhibit 179 Statement of MAJGEN Fraser paragraph 6
15.30 By reference to exhibit 64 (the Interim Report), it can be understood that the Black Hawk Airworthiness Board minute of 18 November 2003 was raising questions regarding the embarkation of Black Hawks at sea. It discussed whether the new amphibious role of the Black Hawks affected the structural integrity, management and aircraft preservation needs of the aircraft type. It also questioned whether the changed role was sufficiently significant so as to change the basis for certification and mandate a Supplemental Type Certificate (STC).

15.31 The Airworthiness Board raised Airworthiness Corrective Action Request (ACAR) A2507/2003 which directed the Army Aviation Systems Program Office (AASPO) and the Directorate General Technical Airworthiness (DGTA) to analyse the FOCFT data to determine whether an SPC was required. The minutes of the Airworthiness Board comment that "it is possible that, additional maintenance and flotation equipment aside, it may not be a significant certification issue."

15.32 At the tasking of the Airworthiness Board, DGTA considered options for the STC for embarkation of Black Hawk. By a Minute dated 12 March 2004 (author GPCAPT R. Thomasson) it was noted that Black Hawk was not certified for ditching at sea. In order to maintain Black Hawk in an amphibious role, it was said that two options appeared to be available:

"a. Operational Authorities use risk management principles in approving operations while accepting that the S-70A-9 is not certified for ditching. The operational risk may be difficult to quantify as the ditching, emergency flotation and emergency underwater egress properties of the S-70A-9 were not qualified in the original acceptance testing and, to some extent, are unknown.

"b. Mandate that the S-70A-9 must be certified for ditching prior to operations over water. This will require further analysis or testing of the airframe to assess its flotation and emergency egress properties after a controlled landing into the sea. Modifications to the airframe may be required to comply with the applicable design standards."  

15.33 Paragraph 9 of Exhibit 67 goes on to say:

"Flight manual procedures would also need to be developed to support either option. These should include as a minimum, procedures/techniques for ditching the helicopter in the sea and procedures for emergency egress of crew and passengers (including from underwater). DGTA also suggests that emergency equipment be provided for all crew and passengers during over water operations. This includes flotation equipment at all

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39 Exhibit 66 Minute of November 2003 and Attachments re Airworthiness Board
40 COL Crocombe T633.26, T637.29
41 Exhibit 66 enclosure 2, Minute of November 2003 and attachments re Airworthiness Board
42 Exhibit 67 paragraph 8 Minute GPCAPT Thomasson dated 12 March 2004
times and survival equipment for operations greater than 50 nautical miles from shore or helicopter capable ship."\textsuperscript{43}

15.34 Of the two options referred to above the first option was adopted.

15.35 In discussion about certification of ditching of the Troop Lift Helicopter, BRIG Fraser (as he then was), then Commander of 16 Bde (Avn) commented as follows:

"Certification-for-Ditching. Current Army aircraft are not certified for ditching. Whilst it is desirable that the aircraft are certified and fitted with all of the additional equipment this is not considered a higher priority than other unfunded aspects of the capability and the risk is managed procedurally. This management of risk includes that most Army over water operations are conducted utilising multiple aircraft and normally within the littoral environment rather than the single aircraft, blue water, longer range type mission profiles that are more typical of Fleet Air Arm requirements. Consistent with RAN requirements Helicopter Underwater Escape Training is provided to all Army aircrew and most passengers. Additionally all Black Hawk crews carry an emergency air source on their survival vest in the event that the aircraft does ditch and all personnel are required to wear life vests."\textsuperscript{44}

15.36 Just prior to the 2005 Airworthiness Board, the Airworthiness Coordination and Policy Agency (ACPA-ADF) directed that Black Hawk embarked operations did not require an STC.\textsuperscript{45} Rather, it should be treated as a Substantial Role Change (SRC) under Operational Airworthiness Regulation 3.5.\textsuperscript{46} An SRC occurs where a substantial change to the role of an aircraft does not justify a major design change, and sufficient operational airworthiness is applied through a structured evaluation of the impact of the substantial change.\textsuperscript{47}

15.37 CAR A2507/2003 was closed by the 2005 Black Hawk Airworthiness Board. It was noted that the Operational Airworthiness Authority (COMD 16 Bde (Avn)) was processing the SRC and would provide an update at the next airworthiness board.\textsuperscript{48} There was no airworthiness board in 2006.

15.38 The next airworthiness board was conducted in July of 2007. The current COMD 16 Bde (Avn), BRIG Bartels, approved the substantial role change for Black Hawk in embarked operations.\textsuperscript{49} In order to do so, he had to be satisfied that various conditions had been met in Operational Airworthiness Regulation 3.5 (OAREG).\textsuperscript{50} The conditions effectively perform a formalised risk management role. The matters considered and accepted in terms of their

\textsuperscript{43} Exhibit 67 paragraph 9 Minute GPCAPT Thomasson dated 12 March 2004
\textsuperscript{44} Exhibit 68 paragraph 2 Minute 23 June 2004 Certification-for-Ditching and Blade-Folding for TLH
\textsuperscript{45} Exhibit 189 paragraph 5 2 emails dated 4 December 2006
\textsuperscript{47} ibid
\textsuperscript{48} Exhibit 70 paragraph 5b
\textsuperscript{49} Exhibit 189 HQ 16 Bde (Avn) minute 1500-25-36(1) 2005/1037176, Supplemental Role Approval for Substantiation of S70A-9 for Embarked Operations of 13 July 2007
\textsuperscript{50} Part of Exhibit 205, above.
adequacy for the new role included: technical airworthiness, logistics, the flying management system aviation doctrine, training and competency requirements, and the availability of qualified aircrew.\textsuperscript{51} Flotation devices or systems are not mentioned in BRIG Bartels analysis of Black Hawk’s substantial role change.

15.39 BRIG Bartels in the Supplemental Role Approval for substantiation of S-70A-9 for Embarked Operations of 13 July 2007\textsuperscript{52} noted that Black Hawk is not compliant with the United States Federal Aviation Regulation (FAR) 29 “ditching standard”. While the FAR is a civilian standard it is widely acknowledged as the appropriate certification for helicopters.\textsuperscript{53} However, as noted in September 2005 by the ADF Liaison Officer at the US Army Aviation Centre at Fort Rucker, Alabama, the Black Hawk was designed long before the current FAR came into effect.\textsuperscript{54}

15.40 The United States Army is the largest user of Black Hawk. Black Hawk has never been tested in America or by the Americans to determine how it floats on ditching.\textsuperscript{55} The United States Army is not bound by FAR-29 and acts as an airworthiness authority in its own right, complying with FAR where mission capability is not affected.

15.41 As to FAR 29 ditching compliance, BRIG Bartels notes as follows:

“As an aid to supporting the role change, AASPO completed a report identifying aspects of the Black Hawk platform that are not compliant with the FAR-29 Ditching Standard. As noted by DGTA in reference C ditching refers to a controlled emergency landing onto water. The complete matrix does highlight deficiencies against the FAR. The main areas of non compliance relate to the unknown behaviour of the aircraft during ditching and subsequently on the water. In particular FAR-29.801(d) requires that “It must be shown that, under reasonably probable water conditions, the flotation time and trim of the rotorcraft will allow the occupants to leave the rotorcraft and enter the life rafts”. FAR-29 also contains standards regarding the requirements for emergency exits. In reference K, COMD 16 Bde (Avn) accepted these deficiencies and noted that most Army over water operations are conducted utilising multiple aircraft and normally within the littoral environment rather than the single aircraft, blue water, longer range type missions that are more typical of Fleet Air Arm Requirements. Additionally Army flying operations over water equates to less than 3% of total Black Hawk rate of effort.”\textsuperscript{56}

15.42 The Board received no material in relation to the testing of Black Hawk to determine

\textsuperscript{51} Exhibit 189 paragraph 11.
\textsuperscript{52} Exhibit 189 HQ 16 Bde (Avn) Minute 1500-25-36(1) 2005/1037176 Supplemental Role Approval for Substantiation of S-70A-9 for Embarked Operations of 13 July 2007
\textsuperscript{53} COL Crocombe T640.4
\textsuperscript{54} Exhibit 69 E-mail between LTCOL Andrew MacNab and a staff member of 15 Bde (Avn) (Robert Wildman); COL Crocombe T644.30
\textsuperscript{55} COL Crocombe T646.39
\textsuperscript{56} Exhibit 189 HQ 16 Bde (Avn) Minute 1500-25-36(1) 2005/1037176 Supplemental Role Approval for Substantiation of S-70A-9 for Embarked Operations of 13 July 2007 paragraph 12
its ditching qualities. The material it did receive was negative in relation to the United States. Further the Board received no material relating to any other maritime incident or accident involving Black Hawk. Thus it is more important to bear in mind the characteristics of a “ditching” as opposed to a “crash” referred to above.57

15.43 The Board is concerned, not with a “ditching”, but rather, with two “crashes”: the first to the deck of KANIMBLA followed by the second into the sea.

15.44 The circumstances of Black Hawk 221 on 29 November 2006 going into the sea cannot provide a model of the likely “ditching” behaviour of the Black Hawk helicopter. The physical state of the aircraft, its attitude and speed when it hit the water, the Board is satisfied, were not like anything contemplated by FAR-29. It is further to be borne in mind that the physical state of the aircraft was such that it lacked any air pockets for effective “natural” or “inbuilt” buoyancy. The action of it entering the water was the antithesis of a ditched helicopter as envisaged by FAR-29 by reason of the tail assembly becoming detached.

15.45 The impact and speed at the time of impact with the water of Black Hawk 221 raises the question of the durability of flotation devices in the event of a “crash” of the kind with which this Board has been concerned. It is important to remember that the fact that the aircraft had struck the deck of KANIMBLA with some appreciable violence before it went into the sea, raises doubts as to whether a flotation system, or whatever configuration, itself would have survived that impact or whether its integrity would have been preserved subject to the impact of the aircraft having an adverse effect upon the system when it crashed into the sea.

15.46 COL Crocombe expressed the view that if an aircraft enters the water very fast, the flotation devices could be torn off. There is in Exhibit 181 an indication that in the RAF context military ditching suggests that external flotation devices may become separated and/or deflate rapidly after impacted forces. It was urged by Counsel Assisting that it is possible that this could occur with a heavy impact on water. Given the state of the material before the Board, the Board accepts that submission. The idiosyncratic nature of this accident certainly precludes any finding that it would not have occurred, in terms of the aircraft not sinking, had there been fitted flotation devices. That takes, what in reality is speculation, just too far.

15.47 Further, the Board is satisfied that if that part of the aircraft that houses the flotation devices is damaged, the system may not deploy successfully. Most flotation devices are located around the undercarriage of the aircraft and crash damage to this area could cause failure to inflate on impact with the water.58

15.48 Again in relation to the RAF military context, to the extent that the Board knows

58 COL Crocombe T634.41
anything about it from Exhibit 181, aircraft flotation bags should be centred on the midline of the helicopter to reduce impact damage that would prevent deployment of the devices. Other studies appear to indicate, however, that flotation devices mounted low on the fuselage of the helicopter are linked with high survivability of the occupants. 59

15.49 The Board here interpolates that in relation to Exhibit 181, it is of course informing. The Board, however, was not provided with any reference material relied upon by the authors of the relevant article. The Board does not conclude from the article itself that it can be stated with confidence, or indeed that it can be stated at all, that had Black Hawk 221 been fitted in any manner with flotation devices, especially given the physical state of the aircraft after collision with the deck, survivability of the occupants would thereby have been improved.

15.50 At this point the Board also interpolates that it has had regard to Exhibit 212, ABR 5419 Volume 1 Chapter 12 Annex F which deals with helicopter ditchings with flotation devices in the Royal Australian Navy.

15.51 MAJGEN Fraser indicated a number of risks posed by flotation devices being both hazards inherent in the devices themselves or arising from secondary risks to the aircraft as a weapons system. In respect of the first category of risks the evidence appears anecdotal. MAJGEN Fraser noted that: “the risk of direct fire weapons to the pressurised containers required to inflate the floats (is) unknown.” 60 The bags are filled with carbon dioxide and nitrogen 61 and the effect of ballistic intrusion to those bags is also unknown. However with both the pressurised containers in the bags, there is clearly potential for catastrophic consequences during flight.

15.52 While flotation devices’ failure to activate is an oft mentioned risk, the inadvertent activation of flotation devices was also referred to as a risk. Activation methods may be manual or automatic. MAJGEN Fraser’s view was that if unplanned inflation occurred when the aircraft was flying at high speed, the results would be catastrophic. He described how the

15.53 MAJGEN Fraser stated that the US Army had started modifying their Black Hawks to fit them with “airbags”. The process was suspended because of inadvertent activation and concerns as to the reliability of the “airbags”. 63 It was MAJGEN Fraser’s position that the

59 Exhibit 181 Article – An Examination of Survival Rates based on External Flotation Devices – Taber & McCabe Safe Journal Vol 35(1) page 2, citing other reports
60 Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 59 (d)
61 Exhibit 181 Article – An Examination of Survival Rates based on External Flotation Devices – Taber & McCabe Safe Journal Vol 35(1) page 2
62 MAJGEN Fraser T1968.29; Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 58
63 MAJGEN Fraser T1968.22
considerations involved in that project were similar to those concerning "flotation devices".\textsuperscript{64}

15.54 The secondary risks to the aircraft caused by flotation devices are generally those associated with loss of capability. The five float devices posited as being the appropriate number for Black Hawk weigh approximately 400lbs.\textsuperscript{65} Externally fitted flotation devices may also reduce the speed and range of the aircraft by reason of drag on the fuselage.\textsuperscript{66}

15.55 On 31 July 2007 MAJGEN Fraser spoke to the ADF Liaison Officer in the United States about the removal of flotation devices from the United States Navy Seahawk Fleet in 1996. The floats were removed because of a range of concerns including the weight penalty, the reduced performance of the aircraft, the diversion of maintenance effort, and the problem of the floats upon inflation blocking cockpit doors.\textsuperscript{67}

15.56 Proposed modification and improvements to Black Hawk aircraft have always had to be prioritised. MAJGEN Fraser listed 15 other priorities which, he, as COMD 16 Bde (Avn) would have liked to fit to the fleet.\textsuperscript{68} MAJGEN Fraser stated:

"I was concerned that flotation devices were being allocated a higher priority than collision avoidance pilotage aids which reduce risk in all modes of flight, not just embarked operations. Moreover, there were serious deficiencies in staff, engineering and modification capacity for the remaining demands on the current fleet for inter alia:

\begin{enumerate}
\item a.
\item b.
\item c.
\item d.
\item e.
\item f.
\item g.
\item h.
\item i.
\item j.
\item k.
\item l.
\end{enumerate}

\textsuperscript{64} Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 46(c)

\textsuperscript{65} MAJGEN Fraser T1962.38

\textsuperscript{66} Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 59(b)

\textsuperscript{67} Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 46(c), 61; MAJGEN Fraser T1983.35; MAJGEN Fraser T1964.22

\textsuperscript{68} Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 26
15.57 The main concept of capability improvements to Black Hawk was to prevent accidents from occurring at all and thereafter, the highest priority upgrade was to remedy the highest risk confronting personnel in Army Aviation Flying Operations. With this risk management philosophy as guidance, flotation devices were assessed against other capability improvements. An analysis of Australian and American military helicopter accidents was conducted, with a view to determining where the highest risks were. Dust landings, flight into terrain and loss of situational awareness at night, were considered the most urgent risks to address. Additionally, MAJGEN Fraser refers to the Black Hawk fleet spending less than 3% of its flying hours over water. Thus it was his view that the requirement for flotation devices was therefore only “desirable” compared to projects to increase the safety of land based missions.

15.58 Clearly, the decision having been taken not to fit flotation devices to Black Hawk, the risks associated with over-water flight had to be ameliorated by other means. DGTA recognised that the risks were difficult to quantify, given that the buoyancy characteristics of the aircraft were not known. Having identified that there were risks, albeit measured risks, mitigation strategies were put in place to manage the risks. Again, without knowing how a Black Hawk will behave in water, assessment of the effectiveness of these risk mitigation measures is very difficult.

15.59 The approach of the US Army to such unknown factors was: “the US Army has done no specific testing on float times for S-70 hulls etc and is happy with the HEEDs/DUNKER/Lifejacket/Raft approach.” MAJGEN Fraser described four means to manage the risks namely by: “conducting (over-water operations) utilising multiple aircraft and normally within the littoral environment... Helicopter Underwater Escape Training is provided to all Army aircrew and most passengers. Additionally, all Black Hawk crews carry an emergency air source on their survival vest in the event that the aircraft does ditch and all

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69 Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 26
70 Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 28; Exhibit 68 Minute from BRIG AP Fraser dated 23 June 2004 paragraph 2
71 Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 37-45
72 Exhibit 179 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted paragraph 37-44; MAJGEN Fraser T1961.25
73 Exhibit 180 Statement of MAJGEN Fraser 30 July 2007
74 Exhibit 67 paragraph 8(a) Minute GPCAPT Thomason dated 12 March 2004
75 COL Crocombe T658.13
76 Exhibit 69 E-mail between LTCOL Andrew MacNab and a staff member of 16 Bde (Avn) (Robert Wildman)
personnel are required to wear life vests."\footnote{Exhibit 68 paragraph 2; see Section 13 of the report.}

15.60 It is to be observed, first, that the four risk management measures were provided in the context of “ditching”; secondly, two of the measures HUET, and emergency air sources, in the survival vest, provided some comfort and assistance to crew and passengers.

15.61 It is a matter of common sense, the Board concludes, that the fact that there were other aircraft in the air was not of assistance given the speed at which Black Hawk 221 sunk. Further, KANIMBLA was not in the littoral, it is unlikely however that this would have made a difference. A number of the survivors used the emergency air source (HEED/EBA) and several noted that it helped reduce panic. All but one of the SASR passengers had completed HUET training, and while there was generalised criticisms of what it teaches vis-à-vis a sinking aircraft and vis-à-vis the requirement for the HUET trained person to await the cessation of movement of the aircraft, most survivors noted the value of having been HUET trained. Thus it can be said that the use of the extant risk mitigation procedures by personnel in Black Hawk 221 could well have accounted for the high survival rate (eight out of ten).\footnote{For a range of opinion from HUET being adversely viewed (as a civilian run program) through to HUET being required to be changed for an in depth situation “get out as quickly as you can” to HUET “worked perfectly” and was of assistance see: Exhibit 124 MAJ 4 paragraph 59; MAJ 4 T1294.37; Exhibit 132 paragraph 34 Statement of CAPT 6; CAPT 6 T1367.13-18; Exhibit 98 Statement of CAPT 7 (co-pilot); Exhibit 92 Statement of CAPT 8; Exhibit 106 paras 33-34 Statement of WO2 12; WO2 12 T1045.31-T1046.2 see also T1061.28-41; Exhibit 108 Statement of CPL 13; CPL 13 T1102.31-38}

15.62 Turning now to “potential” flotation devices, the position, as the Board sees it in the light of the material tendered, is that in January 1998 Sikorsky offered the ADF an externally mounted, four-float system that could be retrofitted to the Black Hawk fleet.\footnote{Exhibit 187 Sikorsky letter to LTCOL Leo O’Reilly Shipboard Compatibility Report – Black Hawk of 29 January 1998}

15.63 The current product from Sikorsky is a five-float system designed for controlled ditching. It is used by the Republic of China (Taiwan) Air Force and by the Sultan of Brunei. The salient features are as follows: activation occurs on water entry only, not for in-flight activation; primary activation is automatic by use of submersion switches, with a manual system provided for backup; activation occurs on water entry only and the rotors must provide the lift until the floats are fully inflated (approximately ten seconds), it is capable of keeping an aircraft afloat in a Sea State 4 conditions.\footnote{Exhibit 188 Sikorsky letter to LTCOL Barton, Request for information – Black Hawk Flotation Equipment of 27 July 2007}

15.64 It is obvious that the criteria for features set out above could have had no application to the peculiar circumstances of the two “crashes” as opposed to ditching of Black Hawk 221.

15.65 In any event Sikorsky estimates that the process to incorporate the five float model onto ADF Black Hawks would cost $25 million.\footnote{Exhibit 188 Sikorsky letter to LTCOL Barton, Request for information – Black Hawk Flotation Equipment of 27 July 2007} It is estimated by Sikorsky that it would
take four years from contracting the modification, through testing, service release, floor modification and training for personnel.82

15.66 Japanese Self Defence Forces is believed to have a two float system developed by the Japanese themselves.83 Sikorsky was not involved in the development of the system which is apparently similar to a Seahawk flotation system and is designed to keep the aircraft afloat in Sea State 2 for long enough to allow egress of any personnel. Its weight is reported to be 100lbs. Neither of the systems, that is the Sikorsky and the Japanese system to the extent that it is understood, is capable of being removed from the aircraft. In other words when the aircraft is modified and fitted with those flotation systems, it then remains with the aircraft during all operations.84

15.67 It is not apparent to the Board that either system, and it is a matter of grave doubt as to whether any system, would have performed any useful function, assuming it having been capable of performance in the context of the two “crashes”, which would have ameliorated the peculiar dangers and conduct of the aircraft upon entering the sea and thus promoting “survivability” for the crew and passengers.

15.68 Black Hawk, as presently anticipated, will be withdrawn from service during the period 2014-15 and will be replaced by the MRH-90 from 2011.85 The new aircraft will be fitted for (but not with) emergency flotation devices. 20 sets of a modular flotation service have been purchased so that they can be fitted whenever the aircraft so require and can be removed for over-land operations.

15.69 As stated above, the Board cannot, on any reasonable and rational basis, make any positive finding in relation to flotation devices and Black Hawk 221. It would be contrary to the evidence and certainly the weight of the evidence for the Board to suggest that had Black Hawk 221 been fitted with flotation devices, first, taking into account the crash onto the deck of KANIMBLA, such flotation devices would have survived and remained operable, and secondly, had they done so, given the state of the aircraft that they would in fact have retarded the rate of sinking. The unique nature of the two crashes which constitute the “accident”, precludes it being in anyway a model illustrative of the value of flotation devices.

Finding:

15.1 The Board finds that there is insufficient evidence rationally to conclude that the fitting of flotation devices to Black Hawk 221 would have improved its survivability in the circumstances of the events of the 29 November 2006.

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82 Exhibit 188 Sikorsky letter to LTCOL Barton, Request for information – Black Hawk Flotation Equipment of 27 July 2007 and Exhibit 179 paragraph 67 Statement of MAJGEN Fraser dated 17 July 2007 together with annexes some being Restricted.
83 Exhibit 250 Statement Mr Chris Clapperton for Sikorsky; MAJGEN Fraser T1964.45
84 MAJGEN Fraser T1966.22
85 MAJGEN Fraser T1966.22
15.70 It was submitted to the Board that Defence was put on notice in 2000 about the problems with Black Hawk flights over water and the risks posed by operating an aircraft with unknown ditching characteristics.\textsuperscript{86} That is certainly arguable.

15.71 Whilst the FOCFT uses the expression "correction highly desirable", the Board is satisfied that that means "important but not necessarily essential".\textsuperscript{87} More importantly, such a proposition must be put into context. Risk management principles were introduced to Army Aviation in 1996.\textsuperscript{88} The role change involving Black Hawk began to evidence itself in the year 2000 when for the first time consideration was given to the deployment of the aircraft to the Solomon Islands. Especially there were concerns arising from its non-marinisation.\textsuperscript{89} Further, as has been repeatedly stated, the circumstances of the "accident" on the 29 November 2006 cannot be seen as constituting a "ditching".

15.72 The empirical evidence constituted by the material establishing the facts of the accident does not point to any rational basis for concluding that it was foreseeable, or reasonably so, in any sense in terms of a risk against which flotation devices were potentially an alleviating factor. Whilst, as the Board has remarked, it is arguable that Defence was "put on notice", the Board is satisfied that the way in which Defence in fact went about, through MAJGEN Fraser, adopting the alternative, namely risk management principles, was reasonable and appropriate in the circumstances.

15.73 It can be said that some of those risk management principles as applied to the events are indicative of their having borne fruit in terms of what the number of survivors indicates.

\textbf{Finding:}

\textit{15.2 The conduct of Defence in general and Army Aviation in particular cannot be impugned or criticised in relation to the consideration of flotation devices and the reasonable and appropriate decision to employ risk management principles in their stead.}

15.74 The Board accepts that it will not be, at least, until eight years before Black Hawk is seen to be no longer a component of ADF or Army Aviation. Indeed it might be longer.\textsuperscript{90}

15.75 MAJGEN Fraser considered it appropriate to review in a detailed and comprehensive way the issue of flotation devices. That review would include HUET training and SQNLD

\textsuperscript{86} Exhibit 64 paras 4.10.2.2 and 5.2.1.1 FOCFT 17 May 2000
\textsuperscript{87} COL Crocombe T635.39
\textsuperscript{88} MAJGEN Fraser T1960.36
\textsuperscript{89} MAJGEN Fraser T1957.46-T1958.20
\textsuperscript{90} BRIG Bartels T1788.15
Morris’ suggestion of removal of cockpit doors. Such a review would have to include an examination of Black Hawk fleets employed by other nations to the extent that is practicable (Taiwan, Japan and the Sultanate of Brunei). As has been mentioned above, present knowledge in relation to those fleets is, if not limited, is non-existent.

Finding:

15.3 The remaining life of Black Hawk in ADF is of such duration as to warrant the revisiting of the consideration of the installation of flotation devices and cognate issues.

15.76 As stated above the Black Hawk will be withdrawn from service during the period 2014-15 and there will be an overlap with the introduction of the MRH 90, principally from 2011. The MRH 90, as has been referred to, is equipped for emergency flotation devices, 20 sets of which will have been acquired. In view of the fact that some of the MRH 90 aircraft will perform the role presently performed by Black Hawk vis-à-vis 171 Avn Sqn, it seems to the Board appropriate that consideration be given to the prioritising of the deployment of the new aircraft to the benefit of 171 Avn Sqn.

Recommendations

15(a) A detailed and comprehensive review be conducted into the fitting of the current fleet of Army Black Hawk helicopters flotation devices and cognate issues.

15(b) Defence considers the priority allocation to 171 Avn Sqn of MRH 90 aircraft upon their acquisition by reason of the operations known to be performed by 171 Avn Sqn over water.

DIGITAL ELECTRONIC CONTROL UNIT (DECU)

15.77 Another possible solution to the problem or phenomenon of main rotor droop is the fitting of a digital electronic control unit (DECU). The Australian Black Hawk has a hydromechanical engine unit. It operates on fuel pressures to calculate the best fuel metering for the engine. It is “relatively old technology”. The American Army Black Hawk is now

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92 Exhibit 273 October 1990 ARDU Report
93 Col Crocombe T627.25
fitted with a C type engine. The C type engine is more powerful than the “A” type and is fitted with a DECU. On 13 August 2007 General Electric issued a press release advising that an upgraded engine to power US Special Forces helicopters is to go into production for delivery beginning in 2008. That document states that the new engine (the YT706) “has more than 30% more power than the T700-701C engine currently powering the MH-60M”. The MH-60M is a version of the Black Hawk currently in service in the US Army.

15.78 CW5 King indicated that, with the DECU fitted to the US Army Black Hawk variant, he was “unable to replicate rotor droop in the simulator”. Even with the addition of an extra 1,000lbs over that which was present in Black Hawk 221 on 29 November 2006, he was unable to get the aircraft to droop so that the horn would sound. CW5 King stated that the DECU actually prevents drooping and, later, that it “greatly reduces the risk of droop becoming a problem”. The DECU enables a faster metering of fuel to the engine and thus a better response capacity. The T700 GE701A Engine is not capable of accepting the DECU.

15.79 According to COL Crocombe, to “convert” the analogue Black Hawk to the digital Black Hawk would involved “basically replacing virtually every component in our engines to get to the new standard”. It would also involve considerable flight testing and certification which would require a long process before there was a rolling out into the Black Hawk fleet as a whole. Assuming that funding was approved, COL Crocombe was of the view that there could be a design within about two years and modification of one aircraft, followed by flight testing of that aircraft and then the commencement of the incorporation of the unit into the fleet. Typically modifications have taken about three years to install into every aircraft. COL Crocombe was also of the view that it would be a very expensive modification and that given the life of the aircraft, it’s unlikely to be approved. His evidence was:

“Q. I believe you said that it would be very expensive to implement that upgrade?

A. Yes.

Q. Are you able to say exactly how much that would cost?”

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94 CW5 King T2029.33: the US Army has the GEC 701C engines fitted to the “Lima” type Black Hawk
95 Exhibit 272 Online Article Business Courier re new Black Hawk engine 13 August 2007
96 CW5 King T2029.33
97 CW5 King T2030.3
98 CW5 King T2046.37
99 CW5 King T2058.18
100 COL Crocombe T627.29
101 COL Crocombe T627.39
102 COL Crocombe T628.31
103 COL Crocombe T628.35
104 COL Crocombe T628.40
105 COL Crocombe T629.10
A. Not exactly. It's our estimate that it would be between $60m and $100m, and that would depend on whether or not it was incorporated into the whole fleet, because by the time we got there, there may be fewer - well, we may choose to have fewer Black Hawks in service by that time and therefore reduce the number that it would need to be incorporated into. That's why there's a variation.

Q. Was a formal study done to produce that number, or was that something that was informally done?

A. We made a request to Sikorsky, as the aircraft manufacturer, to give us what's called a rough order of magnitude, ROM, price, and that would be to design the aircraft part of the modification. We've also approached General Electric, the engine manufacturer, to estimate to us how much it would cost to get the new engines, but it's not simply the price of the new engines, because there are some components in our engines that we could reuse, so that would bring the price down. So we have estimates from both General Electric and Sikorsky on how much it would cost from their point of view. Then we have to incorporate the modification into our fleet using our deeper maintenance contractor, and we've made estimates of what that cost might be as well.

Q. You came up with a figure of between $60m and $100m?

A. That's correct. 106

15.80 He also went onto say107 that a history of stress cracking would be a factor to be taken into account in contributing to further expense and greater expense in the installation of DECU. 108 The ultimate position is probably that extending the Black Hawk beyond 2015 would make it expensive (i.e. to install and justify the DECU cost in addition to the cracking repairs) so it makes that decision less likely i.e. the decision to acquire and install DECU. 109

15.81 Counsel Assisting submitted that should it happen that service of the Black Hawk be extended beyond 2015, this Board should recommend a replacement of the current engine. The Board cannot accede to this submission.110 It involves a hypothetical state of affairs. What is not known is whether in fact, for any reason, and importantly when the life of Black Hawk could or will be extended beyond 2015. That being so, when, during the period from now to any extended life span, would consideration of DECU be recommended have to be given?

15.82 Counsel for Mrs. Bingley have submitted111 that it is appropriate “to give serious

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106 COL Crocombe T654.32-T655.16
107 COL Crocombe T629.24
108 COL Crocombe T629.29
109 COL Crocombe T629.36
110 Paragraph 4.41 of Counsel Assisting’s Written Submissions
111 Paragraph 393 of Written Submissions
consideration and full investigation to the introduction of DECU”.

15.83 The Board has viewed the evidence of CW5 King as compelling in relation to the advantages of having a DECU fitted engine. The Board also is sensitive to all the uncertainties that may attend the extension of the lifespan of Black Hawk in the ADF. In those circumstances it is appropriate that further consideration be given forthwith in as complete way as is reasonable to DECU and the new engines which in effect would be required. This would be “revisiting” a matter cognate with flotation devices referred to above.

Finding:

15.4 There have been reasonable grounds for considering as impracticable to fit the Black Hawk with a DECU given the present time frame for the phasing out of the aircraft and the cost of the refurbishment.

Recommendation:

15(c) As part of the review of Black Hawk generally in relation to flotation devices and cognate matters, the issue as to whether or not the Australian fleet of Black Hawk reasonably should be modified to accommodate a DECU compatible engine should be considered.

ROTOR REVOLUTIONS PER MINUTE (RPMR) LIMITS

15.84 During the hearing much evidence was heard on rotor RPM limits particularly in relationship to main rotor droop. Of concern were the RPMR range that is permissible during normal operation and below what RPMR does an episode of main rotor droop had enough significance significant to be reported.112 A readily identifiable issue emerged with respect to the allowable or continuous range of RPMR permitted for normal operations. Figure 15.1 has been extracted from the Flight Manual to highlight the anomaly between the colour banding on the RPMR gauge in the Black Hawk cockpit and the associated nomenclature describing it in the Black Hawk Flight Manual.

“[T]he flight manual specification is that 91 to 105 per cent is the transient range, with the horn being activated at 95 per cent. Operating in the transient range is acceptable, because that's what the transient range is for. Once you get to 95 per cent and the horn sounds, that is the aircraft's warning system to you that you need to stop doing what you're doing and do something differently to recover rotor RPM.” 113

112 Section 10 covers the reporting of main rotor droop at 171 Avn Sqn in detail.
113 BRIG Bartels T1793.28
Figure 15.1: Blackhawk Flight Manual - Instrument Markings and Limitations

15.85 This tension has manifested itself as confusion to the real RPMR limits, in turn leading to confusion as to what constitutes reportable main rotor droop.

"The tension for me and the tension for the pilots who are flying Black Hawk is that, on the one hand, we are being asked to report incidents or events, and it is incongruous to be reporting an event that the flight manual says is okay for continuous operation. I'm not suggesting to you for a second that this is good. What I'm suggesting is that it is bad, and this event has highlighted this tension to me and I'm going to take action to fix it. I would want to know if we were doing something that was causing us to get into operation with the rotor RPM below 95 per cent."¹⁴

Finding:

15.5 There is an anomaly in the Black Hawk Flight Manual between the diagrammatic depiction of rotor RPM limits and those limits described in the text.

¹⁴ BRIG Bartels T1794.40
Recommendations

15(d) The anomaly referred to in Finding 15.5 be eliminated.

15(e) An analysis should be performed to establish the correct RPMR limits for the Black Hawk and the Flight Manual amended accordingly. In the meantime the Board recommends that the most conservative limits be applied. That is the continuous RPMR operating range of 96% to 101% as indicated on the cockpit gauge should be applied.
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SECTION 16

MAJOR 3

16.1 The 171 Avn Sqn detachment was commanded by MAJ 3. MAJ 3 joined the Army in 1988. Prior to transferring to Army Aviation in 1999, he held officer appointments with Royal Australian Electrical and Mechanical Engineers (RAEME) and then with SASR. As at 1 August 2007 MAJ 3 had flown 1735 hours of which 1500 were on Black Hawk aircraft. MAJ 3 is currently the XO of 171 Avn Sqn.

16.2 In about early May 2007 Counsel Assisting advised the Board of their opinion that MAJ 3 would be the subject of evidence which may affect him for the purposes of Defence (Inquiry) Regulation 33(1). MAJ 3 was duly served with relevant process and requested to provide a statement if he chose to do so. MAJ 3 was good enough to provide the Board with a statement dated 1 August 2007 and he was ably represented by MAJ N.J. Gabbedy.

16.3 The formal notification that MAJ 3 may be potentially affected identified the anticipated relevant evidence to be:

a. As Authorising Officer for the serial, which led to the incident, MAJ 3 failed to ensure the briefing of force preservation considerations for aircraft conducting the serial down port side of the ship when such aircraft were terminating the serial in an out of wind condition.

b. As Officer Commanding the embarked detachment from 171 Avn Sqn for Operation QUICKSTEP, MAJ 3 failed to ensure, in the context of previous episodes of transient main rotor droop during flying serials, that aircrew were directed to operate Black Hawk helicopters within published limits.

16.4 During the course of the hearing it became clear that on 30 November 2006 MAJ 3 authorised CAPT 7 (CAPT Bingley’s Co pilot) to fly without having obtained an AVMED clearance or a waiver from Brigade Headquarters.

16.5 This action of MAJ 3 was strictly unauthorized and improper. It was NOT however a basis for his being identified as a “person affected.”

16.6 MAJ 3 promptly emailed LTCOL 1 and BRIG Bartels disclosing what he had done.

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1 MAJ 3 T2067.37 - 2068.30
2 Exhibit 184, Statement of MAJ 3, paragraphs 6-7
3 Exhibit 186
4 Exhibit 184, Statement of MAJ 3
5 Exhibit 284, Letter Counsel Assisting to CDF re potentially affected Person (MAJ 3) 22 May.07
6 Exhibit 184, Statement of MAJ 3, paragraph 47
and his reasons. The contemporaneous communications and MAJ 3’s oral evidence, in short, identifies morale and operational capability as having been at the forefront of his mind.

16.7 The Board without reservation is of the opinion that in the circumstances, MAJ 3 conducted himself quite appropriately and without prejudice to operational requirements.

Finding:

16.1 MAJ 3’s action in relation to CAPT 7 on 30 November 2006 was unauthorized in the strictest technical sense but beneficial in terms of morale and operational capacity.

Recommendation:

16(a) No administrative or disciplinary action be taken.

16.8 In relation to the two areas referred to above as founding Counsels’ Assisting opinion that this officer should be identified as a person likely to be affected, MAJ 3’s statement recites matters of practice and routine in which he was engaged prior to 29 November 2006.

16.9 He acknowledges that it was brought to his attention by CAPT Bingley and MAJ 4 (then a CAPT) that there was a need to conduct assault training to a static target. MAJ 3 confirmed that the longer the detachment was at sea the skills set would degrade unless regular training was engaged in to maintain proficiency. This was a view he shared with LTCOL U.

16.10 MAJ 3 said he agreed with CAPT Bingley and MAJ 4 as to the necessity for conducting assault training to a static target for at least a period of four weeks. He stated that like CAPT Bingley and MAJ 4 he was concerned that pilot and troops would be developing an artificial appreciation of the final stages of the assault serial in the light of serials up until that point having been conducted to ships making way.

16.11 MAJ 3 directed CAPT Bingley and MAJ 4 to investigate the possibility of conducting assault training against a stationary target and for them to prepare necessary training and briefing packages which would be and in fact were referred to MAJ 3 for authorisation. MAJ 3 stated his satisfaction with the thoroughness of those packages.

16.12 With respect to risk management, MAJ 3 wrote the overall Risk Management Plan

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7 Exhibit 185
8 MAJ 3 T 2087-2091; Statement MAJ 3 Exhibit 184 paragraphs 45 & 48
(RMP) for Operation QUICKSTEP in conjunction with CAPT 9. In relation to the serials of 29 November 2006 they were recorded using the extant authorised mission risk profiles. In his statement he deposes that each aircraft captain had to read the authorisation sheet and had to sign off to confirm he had done so as well as that he understood the risks associated with the particular exercise. The various documents making up the aviation risk plans were located next to the authorisation book so that the aircraft captains could refer to them if need be when signing off prior to the mission. It was the responsibility of individual aircraft captains then to brief their crews in relation to the serial to be conducted and its associated risks. This followed the 171 Avn Sqn briefing.

16.13 MAJ 3 in his statement candidly acknowledges (as he had to) that at the time of making his statement he had listened to vast bulk of the evidence led before the Board.

16.14 In relation to the Ship’s flying brief (at 1400), it was attended by MAJ 4 and CAPT Bingley. Wind was briefed as “it always is”\(^9\). CAPT Bingley, according to MAJ 3 presented his mission to 171 Avn Sqn and that briefing was very thorough. In the course of the brief, MAJ 3 says that it was “mentioned and understood”\(^10\) that approach height should be 100 feet above sea level, that the approach speed should be the standard speed for performance of the serial and again MAJ 3 says he recalled wind being briefed.

16.15 At the end of the briefing in accordance with his usual practice MAJ 3 spoke to the assembled Squadron members and said he said words to the effect: “This is something a little different. Let’s make our approaches 80 percenters. Let’s creep up on this one.”\(^11\)

16.16 This assertion in the written statement was not inconsistent with such evidence as exists as to MAJ 3 having made an observation to that effect.

16.17 MAJ 3 was examined at length not only by his own Counsel, MAJ Gabbedy, but also by CMDR Rush RFD QC RANR, Senior Counsel Assisting. In the light of the conclusion to which the Board has come in relation to MAJ 3 it is not necessary to repeat the wide ranging issues that Counsel chose to make the subject of their questions of this witness. Aviation Risk Management, the briefing, wind, the issue of the lateral distance from the ship, recency of training have all been thoroughly canvassed elsewhere in this Report and in the context of which MAJ 3’s conduct has been the subject of scrutiny and remark. A similar observation can be made in respect of main rotor droop, the then extant system of reporting (to the extent that any such system existed at all) and post-29 November 2006 developments have also been considered.

16.18 It is to be borne in mind that MAJ 3 did not have the experience, (and what is clear from the evidence) or the concomitant reputation of CAPT Bingley and MAJ 2. There was express evidence given as to the subjective position of MAJ 3 vis à vis these other officers\(^12\).

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\(^9\) Exhibit 184 paragraph 25
\(^10\) Exhibit 184 paragraph 27
\(^11\) Exhibit 184 paragraph 28
\(^12\) MAJ 3 T2129.1-T2130.4 (see Section 9 above)
The Board has expressed its view that the reality of the experience gradient may have been to some extent obscured by MAJ 3’s belief in his own position and perceptions.

16.19 MAJ 3, however, by his testimony generally and his demeanour impressed the Board as a person of maturity and good sense on the one hand. On the other, he also presented as a person not immune to the cultural flaws which have been identified in relation to 171 Avn Sqn.

16.20 The Board nonetheless considers that it would be an invidious decision to isolate MAJ 3 from the whole of the relevant service environment for either administrative or disciplinary action in relation to any act or omission on his part in the circumstances leading up to 29 November 2006, the circumstances of that day itself, or the culture of his Squadron throughout that period.

**Recommendation:**

16(b) No disciplinary or administrative action be taken in relation to MAJ 3 as Detachment Commander of 171 Avn Sqn for Operation QUICKSTEP.
SECTION 17

FLYING SIMULATIONS AND DSTO SUPPORT

17.1 Prior to the recovery of the Flight Data Recorder (FDR) the Aircraft Accident Investigation Team (AAIT) tasked the Defence Science and Technology Organisation (DSTO) to conduct a series of trials in an attempt to replicate the flight path and accident sequence of Black Hawk 221\(^1\). Specifically, DSTO’s Air Operations Division was tasked to evaluate video footage of the accident and to produce a simulation of the aircraft flight profiles based on the approach profile determined from the videos taking particular account of the reported wind direction. Photogrammetry techniques were used to determine the likely conditions of the helicopter approach to the ship and estimate of the conditions immediately prior to impact with the ship\(^2\).

"Photogrammetry is the engineering and science discipline of measuring the position of objects using only images. If you see here, I’ve given a diagram where there are five points in the 3D space, and then down here we have three different camera positions taking images of those five points. Using triangulation, you can then determine where they are in three-dimensional space."\(^3\)

17.2 Once the likely helicopter approach conditions and final impact parameters had been established using this technique three simulation trials were performed using two pilots from 171 Avn Sqn. Two trials took place in DSTO’s Simulation Centre in Melbourne and one trial took place in the operational flight trainer at AAvnTC. In the absence of absolute FDR data:

"[W]e initially went to try to replicate the event, and that in itself is not enough to give us the information we need to try to understand what occurred, so we have to put variables in. In doing that, we put changes in wind direction, changes in weight, changes in direction. We also do what we call a substitution test, so we use different aircrew to fly the same profile to see if we can understand the manipulation of controls. We also, in a simulator, can induce emergencies in the systems to try to understand whether the aircraft power plant and systems were working prior to the event."\(^4\)

"The simulations enabled aircrew, with relevant operational experience, to fly a series of manoeuvres that started with defined initial conditions and ended in a manner similar to that recorded by the video imagery of the actual accident."\(^5\)

17.3 The DSTO produced a report in support of the accident investigation entitled

\(^1\) Exhibit 5, paragraph 123 and MAJ 5 T983.28  
\(^2\) Mr Fulton T1570.24 and Exhibit 147  
\(^3\) Mr Fulton T1570.7  
\(^4\) WGCYR Blais T96.26  
\(^5\) Exhibit 151, Executive Summary
"Simulation Support and Video Analysis of Black Hawk A25-221 Accident"⁶ that included a complete analysis and a DVD⁷ showing the simulation runs that provided a reasonably close match with the accident conditions as determined from the video imagery.

17.4 In the absence of FDR data, the DSTO’s analysis and simulations enabled the AAIT to produce its report with some confidence in its findings. WGCDR Blais further stated:

"We have simulators in Australia for the Black Hawk, we have simulators at the Defence Science and Technology Organisation. To use these tools is invaluable to us as investigators."⁸

17.5 The recovery of the FDR on 08 March 2007 within the wreckage of Black Hawk 221⁹ enabled a comparative analysis between the simulations conducted by DSTO and the actual flight profile as recorded on the FDR. The comparative analysis was conducted by DSTO¹⁰ and the AAIT concluded that:

The data provided by the simulators at Fisherman’s Bend and at Oakey proved invaluable in assisting the AAIT to theorise the final sequence of events leading up to the accident. This data was validated once the FDR of Black Hawk A25-221 was recovered. Whilst minor variations in the parameters were noted, these were considered negligible and without deviation from the overall flight profile... The AAIT therefore considers the conclusions made at [Exhibit 5] remain extant."¹¹

17.6 The Board considers that the analysis by DSTO and subsequent replication of the flight path using simulation, provided significant supporting data to that contained on the FDR. A complete analysis of the flight path of Black Hawk 221 was possible given that key information such as helicopter speed relative to the ship at impact would not have otherwise been obtained. The degree of correlation between the simulation runs and the FDR was remarkable given the information to hand at the beginning of the analysis. The DSTO and the AAIT are to be commended for this invaluable contribution.

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⁶ Exhibit 151 (also Exhibit 147 is a PowerPoint presentation provided by DSTO on its simulation activities)
⁷ Exhibits 104, 105 and 148
⁸ WGCDR Blais T96,17
⁹ Exhibit 91 paragraph 3
¹⁰ Exhibit 8 includes a copy of DSTO’s “Flight Data Recorder Comparative Analysis” dated 27 April 2007
¹¹ Exhibit 8, paragraphs 7-8
SECTION 18

INVESTIGATIONS OF SURVIVORS

18.1 CO NEWCASTLE noted that there were two ADF investigative teams and a CMS Team waiting on the dock in Noumea, but he held them off until after the repatriation was complete.¹

18.2 The first of these investigative teams was the Aircraft Accident Investigation Team lead by WGCDR Blais. The AAIT conducted interviews in NEWCASTLE on transit from Noumea to KANIMBLA and interviewed witnesses in KANIMBLA during 2-4 December 2006.² Most of the documentation had already been collected and quarantined by 171 Avn Sqn’s Engineering Officer, Aviation Safety Officer and Operations Corporal, and KANIMBLA’s Flight Commander³ in accordance with 171 Avn Sqn’s Crash Orders.⁴ OIC AAIT noted that this was done very professionally and made the AAIT’s task much easier.⁵

18.3 In Townsville, members of the AAIT interviewed the survivors. In both Townsville and in KANIMBLA, ADF members commented on the professionalism and effectiveness of the AAIT in obtaining the information they needed.⁶

18.4 The second investigative team was from the ADF Investigative Service Major Investigation Team. They also spoke to witnesses in both KANIMBLA, NEWCASTLE and in Townsville, and in some cases took taped records of interview which were later transcribed. The interviews were video recorded. The OIC AAIT characterised the role of the military police as “assisting us in ensuring that we were doing the correct thing in gathering all the information”.⁷

18.5 One witness commented that he felt confused as to the necessity of speaking to the Military Police after the AAIT, and also that the insensitive tone of the interview was akin to a criminal investigation in terms of finding someone or something to blame for the accident.⁸

18.6 Of relevance to this matter is the Convention on International Civil Aviation⁹ which recommends that States endeavour to conform to the following practice:

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¹ Exhibit 229, Statement of CAPT Johnston, paragraph 15
² Exhibits 5, AAIT Report, paragraph 6
³ Exhibit 35, Statement of LCDR Glynn, paragraph 17; Exhibit 107, Statement of CAPT 9, paragraph 11
⁴ Exhibit 206, Crash Orders Fiji 06
⁵ WGCDR Blais T91.8-14
⁶ Exhibit 246, Statement of CAPT T, paragraph 24; Exhibit 10, Statement of TPR C, paragraphs 34-35
⁷ WGCDR Blais, T91.12-14
⁸ Exhibit 10, Statement of TPR C; TPR C T158.30-40
⁹ Exhibit 278, Convention on International Civil Aviation “Chicago Convention”, Annex 13, Chapter 5, paragraph 5.4.1
“Any judicial or administrative proceedings to apportion blame or liability should be separate from any investigation conducted under the provisions of this Annex.”

18.7 The Board does not doubt that the presence of the military police may have been of assistance in ensuring the safety and security of the evidence collected by the AAIT. Even if the military police inquiries were not conducted with the intent of apportioning blame, the Board has reservations about the appropriateness of their conducting taped records of interview with witnesses in the immediate aftermath of the AAIT inquiries. The degree of separation envisaged by ICAO (cited above) was compromised and risked understandable and natural human confusion.

Findings

18.1 The investigation conducted by the AAIT insofar as it was constituted by interviews with the survivors was carried out with professionalism and effectiveness which contributed to the value of Exhibits 5 and 6 to the conduct of the hearing and the deliberation of the Board.

18.2 On the limited material available, the Board finds that there appears to have been no good reason for the presence of the military police/provost marshal during and after the AAIT investigation.

18.3 The Board also finds that the presence of the military police/provost marshal constituted at least a confusing intrusion as far as the survivors were concerned.

Recommendation

18(a) That consideration be given to the promulgation of a protocol to the effect that when the AAIT is engaged, the necessity to have involved at the same time elements of the military police/provost marshal be the subject of separate convening authority.
SECTION 19

SUPPORT TO FAMILIES

19.1 In relation to the actions and support provided to the family members by the Defence Community Organisation (DCO), the only source of evidence is the statement of Mrs Melissa Bingley. She says about the care she and her son received by the Defence Force in the aftermath of the accident:

"I am aware that, in the past, there has been criticism by some family members of the way that Defence has treated them following the death of a family member.

I wish to state clearly that my experience of Defence has been of an efficient, compassionate and caring organisation who has given me and my son the best help that could be given under the circumstances.

I have been very happy and appreciative of the support I have received from the moment I was told about the accident. I cannot identify anything else that realistically could have been done."  

19.2 In relation to DCO in particular she states:

"I thank the Defence Community Organisation for their caring and sincere support. In particular, Karen Carnes has provided me with tireless and genuine support, and I have been comforted by her friendship."

19.3 These comments were echoed by Mrs Bingley’s Counsel MAJ Campbell SC in his oral submissions.

19.4 As to family of TPR Porter no evidence was tendered as to the role of DCO. However, it is appropriate to note the following from LEUT Nash’s closing oral submissions:

"Can I say that the family of TPR Porter, and particularly his wife, Carinna, have had the benefit of being here for most of the evidence at this Board of Inquiry. It has given them considerable insight and understanding as to the events that occurred. With the benefit of that insight and understanding, they do not desire or seek to make a submission that any individual should be blamed for the accident. They regard it, based on what they’ve heard, as a tragic accident."

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1 Exhibit 251
2 Exhibit 251, paragraphs 5, 6 and 7
3 Exhibit 251, paragraph 10(e)
4 MAJ Campbell T2252.26
5 LEUT Nash T2261.17-25
19.5 It is also appropriate at this point to set out what Mrs Carinna Porter says in paragraph six of her statement.⁶

"I have been given strength by the wonderful support I have received from the SAS Community. In particular I would like to express my sincere gratitude to SGT AB for the huge support he has given me since Josh's death. SGT AB, who was Josh's Troop Sergeant, did not know me before Josh died, but had been someone Josh would speak about fondly. Since the accident, SGT AB has been an ongoing support to me on a continuous basis often ringing and visiting me to see if I needed anything and buying gifts for Maddison. His commitment to support and help me in this difficult time is a testament to the strength of the bond of loyalty between SAS Troopers."

19.6 The Board can add that from its observations while conducting its business, DCO staff were highly visible and appeared supportive of the families.

Finding

19.1 The Board is satisfied that the families of CAPT Bingley and TPR Porter were well served by the resources of DCO.
SECTION 20

RELEASE OF AAIT REPORT TO THE "BINGLEY FAMILY" AND TO "AVIATION COMMANDERS"

20.1 Under the heading Sufficiency of Defence Actions After the Accident in the written submissions for Mrs. Bingley and the next of kin of her late husband, there is included formal application for release of the AAIT Report (Exhibit 6) – the “sanitised” version – to “the Bingley family” and “to aviation commanders”.

20.2 It has to be observed that during the course of the hearing before the Board, no substantive application was made for the Bingley interests or indeed by anyone else on anyone else’s behalf (particularly service heads or “aviation commanders”) for the release by the Board, on the exercise of the President’s discretion, of the AAIT Report in its original or “sensitized” form. It may well be that had such a formal application been made earlier, the Board would have been in a position to obtain information as to whom and by whom precisely the AAIT Report had in fact been circulated in a draft or final form. Certainly BRIG Bartels had received a draft but not the final form of the report.¹

20.3 The application now under consideration is made under Regulation 62 of the Defence (Inquiry) Regulations 1985 (DIR) which states:

62(1) Where the President of a Court of Inquiry is satisfied that it is necessary to do so in the interests of the defence of the Commonwealth or of fairness to a person who the President considers may be affected by the inquiry conducted by the Court, the President may give directions relating to the disclosure of:

(b) Any documents received by the Court and accepted as evidence;

... during the course of the inquiry by the Court.

20.4 The exercise of the President’s discretion may be enlivened by “fairness to a person who the President considers may be affected by the inquiry...” Mrs. Bingley falls within regulation 33(2) which states:

“If the President of a Board of Inquiry considers that the record or reputation of a person who has died (person B) may be affected by the inquiry conducted by the Board, a single representative of person B is authorised to appear before the Board.”

20.5 The relevant entity affected, or which “may” be affected, is the “record or reputation” of CAPT Bingley, her late husband. However the representative must be

¹ BRIG Bartels T1790.45; T1791.7
appointed for a purpose, one would think, namely to ensure that the “record or reputation” is “fairly” the subject of scrutiny. The President believes it appropriate to consider the application in the terms in which it was made, especially given the reference to “moral” rights in supplementary Defence documentation referred to below.

20.6 The application appears also to be made on behalf of what is described as “key aviation command elements (including CO 171 Avn Sqn and COMD 16 Bde (Avn))”. The Bingley interests are said to incorporate “extended next of kin”, including Mrs Melissa Bingley, Mr Tony Bingley and Mrs Deris Thow in addition to any adult siblings of CAPT Bingley.

20.7 It is contended that the exercise of the President’s discretion in favour of disclosure is enlivened under DIR 62 in that it is necessary in the interest of the Defence of the Commonwealth to release the AAIT Report to “aviation command elements” so that they can be informed as to the circumstances of the accident and take “immediate” steps to prevent a recurrence as necessary.

20.8 It is also necessary, it is said, in the interests of fairness to the Bingley family, to disclose the AAIT Report pursuant to their recognised “moral right” to be informed of the full circumstances of the accident. Further it is contended that disclosure of Exhibit 6 will conform with express Defence policy and will not breach any legislation or international convention.

THE LEGISLATIVE BACKGROUND

20.9 There appears to be no legislation dealing expressly with the investigation of Defence aircraft accidents. The Transport Safety Investigation Act 2003 (Cwth) (TSI Act) is the principal statute dealing with investigation of [domestic] aircraft accidents or accidents involving Australian aircraft (see sections 22 and 23). It expressly provides that the TSI Act does not generally apply to accidents involving or relating to ADF aircraft unless an appropriate ADF authority requests otherwise (sections 21-22).

20.10 The Air Navigation Act 1920 (Cwth) (ANA) which ratifies and gives domestic legal effect to the Chicago Convention, also expressly provides that that Act does not apply to ADF aircraft.2

20.11 Whilst the Chicago Convention does not apply to military aircraft, it is submitted that the Convention applies “as a matter of policy” to ADF accident investigations. Chapter 11 Part 1 Volume 3 of the ADF Safety Manual deals with investigations and inquiries into

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2 The convention on International Civil Aviation was concluded in Chicago on 7 December 1944; see Air Navigation Act section 2B (act not to apply to state aircraft) read in conjunction with the definition of “state aircraft” in section 3.
aerial accidents. It states at paragraph 11.14 (on page 11-2):

ADF aircraft accidents are investigated in accordance with the guidelines in Annex 13 to the Chicago Convention.

(a) While there is no legislation in place to ensure that Defence applies Annex 13 of the Chicago Convention, the current Defence position is to apply to its provisions.

(b) ‘BOIs should be conversant with the provisions of this requirement and the implications for evidence obtained by the AAIT.’

20.12 Accordingly, it is submitted that although the Chicago Convention does not apply to ADF aircraft accident investigations by the force of law, it is applied as a matter of policy and in recognition that the Convention is best practice for investigating aircraft accidents.

20.13 Australia is a signatory to the Chicago Convention and has given it domestic legal effect (ANA section 3A: see also Airlines of NSW v NSW (2) (1964) 113 CLR 54)

20.14 Article 37 of the Convention provides that the International Civil Aviation Organisation (ICAO) shall adopt standards and recommend practices for aircraft accident investigation. Such standards and practices were first adopted by ICAO in 1951 and designated as Annex 13 to the Chicago Convention.3 Article 26 of the Convention requires member countries to investigate aircraft accidents in accordance with procedures recommended by ICAO as contained in Annex 13.

20.15 Annex 13 to the Convention deals with aircraft accident and incident investigation. It was ratified under the ANA, part 2, section 3A (1). The annex documents all of the international standards and recommended practices that apply to the investigation of accidents and incidents. Between April 1951 and July 2001, Annex 13 was under review and amended to apply to all aircraft accidents and incidents over a specific weight. It gives specific rights to not only the country of aircraft registration, but also to the countries where the aircraft was designed and manufactured. It is thus contended, and this seems to be correct, that Annex 13’s applicability has changed but most of its basic requirements have not. Importantly Annex 13 states that the sole objective of an aircraft accident investigation under the Convention is the prevention of accidents and incidents. It is not the purpose of the investigation to apportion blame or liability.4

20.16 Chapter 5, Annex 13 of the Convention deals with the investigation. Paragraph 5.12 states essentially that the State conducting the investigation of an accident shall not make certain records available for purposes other than accident investigation, unless the appropriate authority for the administration of justice in that State determines that their disclosure outweighs the adverse domestic and international impact such action may have on that or any

3 See page (v) of Annex 13 to the Chicago Convention (titled Historical Background)
4 Chicago Convention, Annex 13, article 3.1, chapter 3, page 3-1.
future investigations. The “records” include witness statements, medical information, cockpit voice recordings and opinions expressed in the analysis of information, including flight recorder information.

20.17 Paragraph 5.12.1 provides that the records shall be included in the final report or its appendices only when pertinent to the analysis of the accident. Parts of the records not relevant to the analysis are not to be disclosed. A note to paragraph 5.12 of Annex 13 states:

"Information contained in the records listed above, which includes information given voluntarily by persons interviewed during the investigation of an accident or incident, could be utilised inappropriately for subsequent disciplinary, civil, administrative and criminal proceedings. If such information is distributed, it may, in the future, no longer be openly disclosed to investigators. Lack of access to such information would impede the investigation process and seriously affect flight safety."

20.18 The terms of paragraph 5.12 were judicially considered in Fitzhenry as agent for the Boeing Company [2002] ACTSC 93 where Miles CJ said:

"It is also clear in my view from the note appearing at the end of para 5.12 that the prohibition on disclosure is aimed particularly at inappropriate use in subsequent judicial proceedings, including civil proceedings in the nature of the claim made in the US District Court against Boeing. It appears therefore that Indonesia is bound, in the absence of a determination in favour of disclosure in that country, not to make available to the US District Court documents in the categories identified in Article 5.12."

20.19 Paragraph 5.4.1 of Annex 13 recommends that any judicial or administrative proceeding to apportion blame or liability should be separate from any investigation conducted under the provisions of the annex. This, in the President’s opinion, is part of the fundamental rationale underpinning non-disclosure.

20.20 Chapter 6 (Final Report) of Annex 13 to the Convention is concerned with the final report of the investigating authority. Paragraph 6.2 deals with the release of information and the issue of consent (page 6-1). It provides that states shall not circulate, publish or give access to a draft report, or any documents obtained during an investigation of an accident, without the express consent of the state which conducted the investigation. It can only be assumed in this inquiry that the inspection by BRIG Bartels of a “draft” report was with the express consent either of the Commonwealth or of the AAIT Convening Authority, MAJGEN Power.  

20.21 Paragraph 6.5 of the annex permits that in the interest of accident prevention, the state conducting the investigation of an accident shall release the final report as soon as possible. Paragraph 6.8 provides that at any stage of the investigation the accident

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5 The identity of the Convening Authority was, at the Board’s request, provided merely as a piece of information and for no other purpose, by WGCDDR F.J. Blais on 19 June 2007.
investigation authority shall recommend to the appropriate authorities any preventive action that it considers necessary to be taken promptly to enhance safety.

20.22 It is submitted that the underlying purpose of Annex 13 to the convention is to maintain the confidentiality of AAIT investigations. If the AAIT is to perform its mandated function effectively, with the aim of preventing a recurrence of the accident, it is vital that persons with relevant information should feel free to disclose such information to the AAIT without fear of jeopardy of their identity being revealed in later proceedings. AAIT investigators as a standard practice, the Board was informed in submissions in support of these applications, indicate to witnesses during their investigations that information sought is for the sole purpose of enhancing aviation safety and that such information would be regarded as confidential. (emphasis added)

20.23 The Safety Manual provides:

"It is reasonable to suppose that but for the confidentiality that AAIT attempts to afford the contents of investigators’ notes, persons involved in aviation accidents and incidents would not be full and frank with investigators and AAIT may not be provided with information of an important nature. If lack of confidentiality resulted in persons with relevant information being less likely to be full and frank in the same circumstances then it may be concluded that a consequential reduction in relevant information available to AAIT will compromise its capacity to effectively improve aviation safety." (emphasis added)

20.24 The President considers that the passages emphasised articulate the overarching rationale: the withholding of the records, and knowledge of the withholding, will promote the principal objective of an AAI: safety is paramount and the attribution of fault is not. The former will be promoted in the exercise of that discretion reflected in the rationale. The latter must be left to the scrutiny of another body or tribunal.

20.25 If the nature of a safety investigation was in anticipation of an adversarial process seeking to affix blame or assign liability, it is clear that the cooperation sought to be nurtured would be less likely to be forthcoming. Parties may find themselves as “defendants” in the investigation if such a model was used. The result would be that vital safety information that may help to prevent similar accidents could be denied to the safety investigation and an opportunity to improve safety for the benefit of the travelling public, lost.  

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7 See paragraph 367 of the Bingley written submissions where reference is made to David Adams, “A Laymen’s Introduction to Human Factors in Aircraft Accident and Incident Investigation”: Australian Transport Safety Bureau (ATSB) Safety Information Paper, June 2006.
THE MERITS OF THE APPLICATIONS

20.26 Counsel Representing Mrs Bingley point to the TSI Act of 2003 as an example of a mechanism for the disclosure of reports. Annex 13 to the Convention initially applied only to aircraft involved in international air navigation. All signatories to the Chicago Convention however were faced with the question of what standards and practices should be applied to domestic aircraft accident investigation. Australia, amongst most of the other countries, elected simply to mirror the requirements in Annex 13 in the legislation that applied to domestic operations.

20.27 In the President’s view, whilst requirements may be “mirrored”, it does not and should not follow that the rationale for them is not.

20.28 The requirements for the investigation of domestic aircraft accidents were given legal effect in the Air Navigation Act 1920. In 1999 however the then Bureau of Air Safety Investigation became a multimodal safety body known as the Australian Transit Safety Bureau (ATSB) and the legislation was reviewed. The TSI Act and associated regulations came into effect on 1 July 2003. That act and regulations included a continued authority for the investigation of aviation and marine accidents and incidents and new powers to investigate interstate rail accidents and incidents.

20.29 The TSI Act does not generally apply to accidents involving or relating to ADF aircraft unless an appropriate authority in the ADF requests the Executive Director under the TSI Act to conduct an investigation.⁸

20.30 Section 27 of the TSI Act makes provision that reports on investigations are not admissible in evidence in any civil or criminal proceedings (save for a coronial inquiry). This again reflects the importance of what the President has described as the overarching rationale.

20.31 Essentially the TSI Act reflects the international agreements in Annex 13 of the Convention that investigations into domestic aircraft accidents are for the sole purpose of maintaining and improving transport safety and not for the attribution of fault or blame. (emphasis added)

20.32 The TSI Act however does contain provisions permitting the disclosure of information from investigations. Section 60 (5) enables the Executive Director to issue a certificate in relation to restricted information (defined in section 3) stating that the disclosure of the information is “not likely to interfere with any investigation”.⁹ Particular note should be given to this phrase.

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⁸ TSI Act sections 21-22
⁹ The information types referred to in section 60 (5) and section 3 of the TSI Act are a similar list to that in article 5.12 of Annex 13 of the Chicago Convention.
20.33 Section 60 (6) of TSI Act provides that if the court is satisfied that any adverse domestic and international impact that the disclosure of the information might have on any current or future investigations is outweighed by the public interest in the administration of justice, the court may order such disclosure.

20.34 It is submitted for Mrs Bingley that these two provisions allow for disclosure of an accident report in circumstances where the disclosure is not likely to offend the sole object of the investigation which is the prevention of accidents and not the apportionment of blame or liability. It was put that these provisions highlight the existence of examples for the disclosure and the fact that there is no blanket rule that investigation reports or related information is never to be disclosed – in a civil context. That may be quite arguable. However, in the President's view, the overarching rationale provides the backdrop against which such a proposition must be tested.

20.35 In the Defence context, chapter 11, part 1, volume 3 of the ADF Safety Manual contains a section commencing at page 11-11 which deals with the release of inquiry reports and aircraft accident investigation reports to external agencies.

20.36 Paragraph 11.74 is as follows:

"With respect to the release outside the Department of Defence of reports arising from aircraft accident investigations and inquiries, the Minister approved the following policy in April 1992 (Air Force Office AF85/33829 Part 3 (32) – CAS 319/1992 of 30 March 1992 refers):

For reasons long accepted in the Australian and international civil aviation sectors, which are equally as valid in the military sector, and which are related to ensuring the continued efficacy of the aircraft accident investigation/inquiry process, it is recognised that a degree of confidentiality must be attached to information acquired by, and documented in the reports of, personnel conducting investigations/inquiries into ADF aircraft accidents.

Given this requirement for confidentiality, the release of such reports outside the Department of Defence should be limited to:

a. persons who require, or should be granted, access in order to perform some specific official duty directly related to the accident, its consequences or the outcome of the associated inquiry (eg a coroner); and

b. persons with a moral right to be informed of the full circumstances of the accident and of the outcome of the associated inquiry (ie the next-of-kin of members killed or seriously injured as a direct result of the accident. In this context, the broader definition of the term 'next-of-
kin' should apply and should include, in addition to the immediate next-of-kin (eg wife), parents, adult offspring and adult siblings. However, this definition notwithstanding, only the immediate next-of-kin should be provided with a copy of the report. The remaining next of kin are to view that copy).

Excisions required to meet the provisions of the Privacy Act 1988 are to be made before release to persons other than those required to perform some official duty directly relating to the accident, its consequences or the outcome of the associated inquiry.

Classified material should be excised from all copies released outside the Department of Defence.

A condition, as is permitted by Defence (Inquiry) Regulation 63(4)(b), should be attached to BOI report releases, this condition to be to the effect that the report should be viewed by the recipient only, is not to be copied, and should be returned to the Department of Defence when no longer required.

This policy should be without prejudice to the more general release of a summary of the general circumstances of the accident, and of the primary and contributory causes as extracted from the report. "(Emphasis added)

20.37 Paragraphs 11.75 and 11.76 provide further guidance including a need to excise all classified material and information subject to the Privacy Act 1988 (Cwth) from reports to be disclosed.

20.38 It is submitted on behalf of all the parties referred to earlier that Exhibit 6, the "declassified" version of the AAIT Report, should be disclosed to the Bingley family and aviation commanders because Defence policy expressly recognises disclosure of aircraft accident investigation reports to the next of kin of a member killed in an accident provided that classified material and information subject to the Privacy Act is excised. Whilst the position is that classified information has been excised, the President cannot come to a concluded view as to whether or not Privacy Act "information" has been excised. This was never raised during the course of the hearing nor in relation to the tender of Exhibit 6.

20.39 It is further submitted that although Annex 13 of the Convention does not apply by the force of law to accidents involving military aircraft, it applies as a matter of stated ADF policy. This proposition cannot be disputed. The Convention, however, is principally concerned with the prevention of accidents, and as it cannot be too often repeated, not the apportionment of blame or liability. Confidentiality is assured to encourage witnesses to be open and frank with investigators with a view to achieving that objective. Thus investigators in turn are allowed to gather the relevant information quickly and recommend immediate action to prevent a recurrence of the accident.
20.40 In the present circumstances, it is submitted, Exhibit 6 removes any references to witnesses' names and does not disclose statements from them. There can be no fear, it is said, that the confidentiality of the witnesses will be compromised by the disclosure or that future investigations will be compromised through the witnesses fears of breach of confidentiality. It is said there is no apportionment of blame or liability in the AAIT Report. Thus there is no breach of any legislation in disclosing the exhibit nor is there any question of any prejudice to the investigation which has been completed or indeed to this Board of Inquiry which at the time of the making of the written submissions, had completed taking its evidence.\(^{10}\)

20.41 The President makes the following observations: first, the “moral right” referred to in 11.74b above provides powerful support, one might think, for the applicant, Mrs Bingley and CAPT Bingley’s next of kin. It constitutes an avenue by which DIR Regulation 62 could be read down contrary to the process of reasoning referred to at the outset of this part of the BOI Report.

20.42 Secondly, and very importantly, the AAIT Report was admitted into the Board’s proceedings very early and became the subject of evidence given by participants in the investigation team, other experts and identified personnel or personnel who enjoyed anonymity before the Board. In other words, the status of the AAIT Report changed from that which it enjoyed upon its being produced before the commencement of the hearing of the Board of Inquiry. It then stood alone as an authoritative document. Thereafter it has been subject to “forensic scrutiny” throughout the Board of Inquiry. The Board of Inquiry in effect subsumed the Aircraft Accident Investigation because it was constituted to conduct “an investigation” according to its Terms of Reference (TOR). The Board of Inquiry was an “open” inquiry at which the families of the deceased were present and were represented.

20.43 The conduct of the Board of Inquiry as an open inquiry at which Mrs Bingley was represented, and at which she and her family were present, discharged the moral right to be informed of the full circumstances of the accident.

20.44 Thus, to make any order under Regulation 62, \textit{now}, would in the President’s view, give to the AAIT Report a status which it cannot enjoy any longer in isolation. The AAIT Report is now but one component of the whole body of evidence that was put before the Board for the purposes of its investigation in accordance with its TOR.

20.45 In relation to whether or not Exhibit 6, or in its non-declassified state Exhibit 5, should be disclosed to aviation command elements referred to (CO 171 Avn Sqn and COMD 16 Bde (Avn)) it is necessary for the President to decide that it is in the interest of the Defence of the Commonwealth that they have access to it in order to inform them as to any immediate action required to prevent a recurrence of the accident. Action has been taken, and in certain respects examined above\(^{11}\), consequent at least upon BRIG Bartels’ sighting of the

\(^{10}\) In this context I was referred to a decision of Hidden J in \textit{Cook v Hawker Pacific Pty Ltd} [2000] NSWSC 1238 at [19]

\(^{11}\) See Exhibits 199, SFI 12/2003, Use of Aircrew Safety Survival Equipment Ensemble of 19 June 2003; Exhibit 200, SFI 12/2003 AL1, Use of Aircrew Safety Survival Equipment Ensemble of 7 October 2004; Exhibit 201,
draft AAIT Report. There has not been part of any submission in relation to Exhibit 5, or 6 as to what would be the nature of any step that should “immediately” be taken to ensure that the accident does not occur again.

20.46 Given that, all the more is it this Board’s function to make recommendations on all the evidence it received to CDF who will be free to take such action in connection with those recommendations as he considers appropriate or as he may be advised.

20.47 The President is not presently persuaded in relation to either form of the AAIT Report that it is in the interests of the Defence of the Commonwealth that aviation command elements (see above) or anyone else should necessarily have immediate access to the report in order to take action to prevent a recurrence of the accident, the more so absent any indication of what that action might be.

20.48 With regard to the disclosure to the Bingley family, the President has not been persuaded that as a matter of fairness to Mrs Bingley or to the extended next of kin nominated, that the AAIT Report as edited, should now be made available. As stated, the families have been present with advisers throughout. It may be more appropriate that this question be reconsidered in the event an application being made to the Minister under DIR 63. That application will be considered by the Minister. The decision upon it will be for the Minister. Nonetheless the President indicates his view that a matter for the Minister’s favourable consideration might well be the release to Mrs Bingley of the report of this Board of Inquiry in such form as the Minister considers appropriate accompanied by either the whole or so much of Exhibit 6 as the Minister considers necessary.

The BOI President finds:

20.1 That it is not necessary in the interests of the Defence of the Commonwealth that aviation command elements or any other personnel, now have access to the AAIT Report to inform them as to any “immediate” action, or otherwise, required to prevent a recurrence of the accident;

20.2 That it is not necessary in fairness to Mrs Bingley or extended next of kin, in order that they have an understanding of the AAIT Report’s findings and recommendations as to the death of CAPT Bingley or otherwise, that Exhibit 6 be now provided to Mrs Bingley or the extended next of kin.
SECTION 21
OFFICIAL RECOGNITION OF INDIVIDUAL ACTIONS

21.1 The Board heard a substantial amount of evidence of highly commendable and courageous actions by service personnel in the aftermath of the accident.

21.2 The Board has noted ADF policies on commendations, honours, awards and other decorations which generally state that nominations should be initiated at unit level. It is not the wish nor the intention of the Board to pre-empt or otherwise interfere with due service process in this regard.

21.3 Further, by referring to the three persons below, the Board is not to be taken as establishing an exclusive list. Rather the Board acknowledges the involvement of all service men and women engaged in Operation QUICKSTEP and the tragic event of 29 November 2006.

21.4 The three soldiers’ actions, in themselves particularly engaged the attention of the Board, and additionally as examples of the conduct of many others.

WO2 F. His exceptional leadership from the first RHIB contributed significantly to the effectiveness of the rescue of survivors.¹

TPR B. Having survived the crash and despite his own injuries, he gave CPR to CAPT Bingley in the RHIB.²

CPL 13. Having survived the crash and despite his own injuries he gave CPR to CAPT Bingley in the RHIB.³

¹ Exhibit 14, Statement of WO2 F; Evidence of WO2 F, T210
² Exhibit 246, Statement of CAPT T, paragraph 16; Exhibit 237, Statement of CPL A, paragraph 26; Exhibit 154, Statement of TPR B, paragraph 21; Exhibit 10, Statement of TPR C, paragraph 43; Exhibit 13, Statement of CPL G, paragraph 16; Evidence of CPL G, T202.24; Evidence of TPR B, T1663.16; Exhibit 238, Statement of TPR D, paragraph 22
³ Exhibit 154, Statement of TPR B, paragraph 21; Exhibit 10, Statement of TPR C, paragraph 28; Exhibit 10, Statement of TPR C, paragraph 43; Evidence of TPR B, T1663.16; Exhibit 238, Statement of TPR D, paragraph 22
AFTERWORD

I do not think the Australian public has any true understanding of the sacrifices that the men and women of the Australian Defence Force make every day in the service of our country. The sacrifices and pressures put on our service members, their families and children are not sufficiently appreciated in my view. They do their job for the love of their country and to help keep us safe from harm and for that I am truly thankful. The mateship and concern they have all shown to the families involved makes me believe the ANZAC Spirit lives on.

Statement of Mrs Melissa Bingley
Exhibit 251 Paragraph 21
DEFENCE (INQUIRY) REGULATIONS
BOARD OF INQUIRY
INSTRUMENT OF APPOINTMENT

Pursuant to Regulation 23 of the *Defence (Inquiry) Regulations* 1985, I, Air Chief Marshal Allan Grant Houston, AO, AFC, Chief of the Defence Force, hereby appoint a Board of Inquiry constituted by:

a. The Hon David Levine, RFD, QC;
b. Group Captain Stephen Fielder, AM; and
c. Commander Andrew Rourke, RAN;

for the purpose of inquiring into and reporting on the circumstances surrounding the fatal aircraft incident involving a Blackhawk helicopter during OP QUICKSTEP on 29 November 2006, as will be specified in the terms of reference;

And pursuant to Regulation 27 of those Regulations, I appoint The Hon David Levine, RFD QC, to be the President of the Board of Inquiry;

And pursuant to Regulation 28 of those Regulations, I direct the Board of Inquiry to adopt procedures consistent with those Regulations and that are otherwise appropriate and adapted to the expeditious collection of reliable and accurate evidence in the circumstances of this matter—consistent with requirements to ensure fairness to those persons who are affected by the Inquiry (to this end, the Board of Inquiry may be guided by sample procedures contained in annex B to chapter 7 of Australian Defence Force Publication 06.1.4 (2nd Edition)—*Administrative Inquiries Manual*);

And pursuant to Regulation 28 of those Regulations, the President may issue Practice Notes in respect of practices proposed to be adopted in respect of hearings before the Board of Inquiry;

And pursuant to Regulation 28 of those Regulations, I direct that the Inquiry submit such interim reports as specified in the terms of reference;

And in accordance with Regulation 29 of those Regulations, I direct that the Board of Inquiry shall conduct its inquiry in respect of the taking of evidence and the making of submissions in public, subject to the following qualifications;

a. The Board shall not conduct in public such parts of its inquiry that involve the disclosure of security classified information; and
b. Only:
i. persons holding an appropriate security clearance and who have a need to know the information; or

ii. with respect to information classified up to and including SECRET, persons who, in the opinion of the President, are immediate family members of Captain Bingley or Trooper Porter, but only where such persons are made subject to a direction issued by the President under Regulation 62 prohibiting absolutely disclosure of security classified information from that part of the Inquiry;

may be permitted by the President to attend that part of the Inquiry or have access to the information disclosed therein;

And pursuant to Regulations 31 of those Regulations, I direct that all oral evidence to be given before the Board of Inquiry shall be on oath or affirmation; and

And pursuant to Regulation 51 of those Regulations, I appoint Commander John Rush, RANR, QC as Senior Counsel Assisting, and Colonel Gary Hevey RFD and Lieutenant Patience Neal, RAN as Junior Counsel Assisting the Board of Inquiry.

A.G. HOUSTON, AO, AFC
Air Chief Marshal
Chief of the Defence Force

Appointing Authority

15 June 2007
### GLOSSARY OF TERMS

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<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>5 Avn Regt</td>
<td>5th Aviation Regiment</td>
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<tr>
<td>AAIT</td>
<td>Aircraft Accident Investigation Team</td>
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<td>AASPO</td>
<td>Army Aviation Systems Program Office</td>
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<td>AASSPO</td>
<td>Amphibious and Afloat Support System Program Office</td>
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<td>AAvnTC</td>
<td>Army Aviation Training Centre</td>
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<td>AAAvn</td>
<td>Australian Army Aviation</td>
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<td>ABS</td>
<td>Aircrew Breathing System</td>
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<td>ABR</td>
<td>Australian Book of Reference</td>
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<td>ACAR</td>
<td>Airworthiness Corrective Action Request</td>
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<td>ACPA-ADF</td>
<td>Airworthiness Coordination and Policy Agency – Australian Defence Force</td>
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<td>ADF</td>
<td>Australian Defence Force</td>
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<td>ADFHHS</td>
<td>ADF Helicopter School</td>
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<td>AEA</td>
<td>Annual Embarked Audits</td>
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<td>AEO</td>
<td>Authorised Engineering Organisation</td>
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<td>AESSO</td>
<td>Aerospace Equipment Systems Support Office</td>
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<td>AFHRs</td>
<td>Aircraft Flying Hours</td>
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<td>AFS</td>
<td>Aerial Fire Support</td>
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<td>ALSE</td>
<td>Aeronautical Life Support Equipment</td>
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<td>AVMED</td>
<td>Aviation Medicine</td>
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<td>AFO</td>
<td>Army Flying Order</td>
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<tr>
<td>AGL</td>
<td>Above Ground Level</td>
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<td>AHO</td>
<td>Above Highest Obstacle</td>
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<td>AHQ</td>
<td>Army Headquarters</td>
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<tr>
<td>AME</td>
<td>Aero Medical Evacuation</td>
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<td>AMO</td>
<td>Air Mobile Operations</td>
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<td>AMO</td>
<td>Authorised Maintenance Organisation</td>
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<td>AMSL</td>
<td>Above Mean Sea Level</td>
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<tr>
<td>AO</td>
<td>Area of Operations</td>
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<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>AOSG</td>
<td>Aerospace Operational Support Group</td>
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<td>ARFOR</td>
<td>Area Forecast</td>
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<td>ASOR</td>
<td>Aviation Safety Occurrence Report</td>
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<td>ATT</td>
<td>Aviation Team Training</td>
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<tr>
<td>ARDU</td>
<td>Aircraft Research and Development Unit</td>
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<td>AVMED</td>
<td>RAAF Institute of Aviation Medicine</td>
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<td>AVMO</td>
<td>Aviation Medical Officer</td>
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<td>AVRMI</td>
<td>Aviation Risk Management</td>
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<td>B/F</td>
<td>Before flight</td>
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<td>BoM</td>
<td>Bureau of Meteorology</td>
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<td>CAMM</td>
<td>Computer Aided Maintenance Management</td>
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<td>CASA</td>
<td>Civil Aviation Safety Authority</td>
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<td>CFU</td>
<td>Carried Forward Unserviceability</td>
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<td>CO</td>
<td>Commanding Officer</td>
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<td>COI</td>
<td>Course of Instruction</td>
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<td>COMDT</td>
<td>Commandant</td>
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<tr>
<td>CONFIR</td>
<td>Confidential Incident Report</td>
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<td>CPI</td>
<td>Crash Position Indicator</td>
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<td>CRM</td>
<td>Crew resource Management</td>
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<td>CTU</td>
<td>Commander Task Unit</td>
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<td>CURV</td>
<td>Cable-Controlled Underwater Recovery Vehicle</td>
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<td>CVR</td>
<td>Cockpit Voice Recorder</td>
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<td>DACPA</td>
<td>Director- Airworthiness Coordination and Policy Agency</td>
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<td>DAHRTS</td>
<td>Defence Aviation Hazard and Report Tracking System</td>
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<td>DASM</td>
<td>Defence Aviation Safety Manual</td>
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<tr>
<td>DCOMDT</td>
<td>Deputy Commandant</td>
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<td>DECU</td>
<td>Digital Electronic Control Unit</td>
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<td>DGTA</td>
<td>Directorate General Technical Airworthiness</td>
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<td>DI</td>
<td>Defence Instruction</td>
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<td>DRN</td>
<td>Defence Restricted Network</td>
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<td>DSTO</td>
<td>Defence Science and Technology Organisation</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>EBA</td>
<td>Emergency Breathing Apparatus</td>
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<td>EBS</td>
<td>Emergency Breathing System</td>
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<tr>
<td>ECDIS</td>
<td>Electronic Chart Display Information System</td>
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<td>ECP</td>
<td>Engineering Change Proposal</td>
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<td>EO</td>
<td>Explosive Ordnance</td>
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<td>ES</td>
<td>RAAF East Sale</td>
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<td>ETL</td>
<td>Effective Translational Lift</td>
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<td>FAR</td>
<td>Federal Aviation Regulation</td>
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<td>FDR</td>
<td>Flight Data Recorder</td>
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<td>FEG</td>
<td>Force Element Group</td>
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<td>FF&amp;MS</td>
<td>Full Flight And Mission Simulator</td>
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<td>FIHA</td>
<td>Flight Information Handbook</td>
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<td>FOCFT</td>
<td>First of Class Flight Trials</td>
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<td>FLIR</td>
<td>Forward Looking Infrared</td>
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<td>FLTCDR</td>
<td>Flight Commander</td>
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<td>FLYCO</td>
<td>Flight Control Office</td>
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<td>FRRD</td>
<td>Fast Roping Rappelling Device</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<td>GR</td>
<td>Grid Reference</td>
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<td>GSSPO</td>
<td>General Support Systems Program Office</td>
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<td>HABD</td>
<td>Helicopter Aircrew Breathing Device</td>
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<td>HCO</td>
<td>Helicopter Control Office</td>
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<td>HEED</td>
<td>Helicopter Emergency Egress Device</td>
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<td>HMAS</td>
<td>Her Majesty's Australian Ship</td>
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<td>HMU</td>
<td>Hydomechanical Unit</td>
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<td>HOGE</td>
<td>Hover out of ground effect</td>
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<td>Hpa</td>
<td>Hectopascals</td>
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<td>HQAAVNTC</td>
<td>Headquarters Army Aviation Training Centre</td>
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<td>Helicopter Restraint Strop</td>
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<td>Helicopter Underwater Escape Training</td>
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<td>IAW</td>
<td>In Accordance With</td>
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<td>ICAO</td>
<td>International Civil Aviation Organisation</td>
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<tr>
<td>ICAT</td>
<td>Image Capture And Transfer</td>
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ICS: Internal Communications System
IFR: Instrument Flight Rules
IMC: Instrument Meteorological Conditions
IP: Initial Point
ITT: Inlet Turbine Temperature
KIAS: Knots Indicated Air Speed
KTS: Knots
LCM8: Army Landing craft
LDU: Low Dependency Unit
LEA: Land Engineering Agency
LF: Low Flying
LHD: Landing Helicopter Dock
LP: Landing Point
LPSV: Low Profile Survival Vest
LPSVE: Low Profile Survival Vest Ensemble
LPA: Landing Platform Amphibious
LPV: Life Preserver Vest
LSE: Life Support Equipment
LZ: Landing Zone
MAD: Military Aeronautical Distress
MO: Medical Officer
MRH 90: Multi Role Helicopter (replacement for Black Hawk)
MRP: Mission Risk Profiles
ND: Nose Down
Nm: Nautical Miles
NOE: Nap-of-Earth
NOTAM: Notice to Airmen
NVG: Night Vision Goggle
OA 82: Flight Authorisation Form
OAREG: Operational Airworthiness Regulation
OAA: Operational Airworthiness Authority
OAR: Operational Airworthiness Regulator
OC: Officer Commanding
OCL  Operational Contingency Loading
OGE  Out-of-Ground Effect
OIC  Officer in charge
OLOC  Operational level of capacity
OWO  Officer of the Watch
OPSO  Operations Officer
PAC  Procedural Air Controller
PAX  Passengers
PCRF  Primary Casualty Reception Facility
PEI  Pre-Embarkation Inspections
PPE  Personal protection equipment
QFI  Qualified Flying Instructor
RAAF  Royal Australian Airforce
RADALT  Radar Altimeter
RAEME  Royal Australian Electrical and Mechanical Engineers
RAN  Royal Australian Navy
RAS  Replenishment at Sea
RHIB  Rigid Hull Inflatable Boat
RMO  Regimental Medical Officer
RMP  Risk Management Plan
RODUM  Report on Defective or Unsatisfactory Materiel
RPM  Revolutions Per Minute
RPMR  Revolutions per minute - rotor
RUCC (Form AM 105)  Record of Unserviceabilities and Component Changes
SA  Situational Awareness
SAA  School of Army Aviation
SASR  Special Air Service Regiment
SAVO  Ship’s Aviation Officer
SF  Special Forces
SFI  Special Flying Instruction
SHOL  Ship’s Helicopter Operating limit
SI  Standing Instruction
SIGMET  Significant Meteorological Conditions warning forecast
<table>
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<tr>
<th>Acronym</th>
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<tr>
<td>SMEAC</td>
<td>Situation, Mission, Execution, Administration and Logistics, Command and Communications</td>
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AUSTRALIAN DEFENCE FORCE RANKS
(Relevant to this Report)

### Ranks of Naval Officers and Sailors
- **CAPT** - Captain
- **CMDR** - Commander (Naval Officer)
- **LEUT** - Lieutenant (Naval Officer)
- **CPO** - Chief Petty Officer (Senior Sailor)
- **PO** - Petty Officer (Senior Sailor)
- **LS** - Leading Seaman (Junior Sailor)
- **AB** - Able Seaman (Junior Sailor)

### Ranks of Army Officers and Soldiers
- **MAJGEN** - Major General
- **BRIG** - Brigadier
- **COL** - Colonel (Army Officer)
- **LTCOL** - Lieutenant Colonel
- **MAJ** - Major (Army Officer)
- **CAPT** - Captain
- **LT** - Lieutenant
- **WO1** - Warrant Officer 1<sup>st</sup> Class
- **WO2** - Warrant Officer 2<sup>nd</sup> Class
- **SSGT** - Staff Sergeant
- **SGT** - Sergeant (senior non-commissioned officer)
- **CPL** - Corporal (junior non-commissioned officer)
- **TPR** - Trooper
- **PTE** - Private

### Ranks of Air Force Officers and Ratings
- **GPCAPT** - Group Captain
- **WGCDR** - Wing Commander
- **SQNLDR** - Squadron Leader
- **FLTLT** - Flight Lieutenant
- **SGT** - Sergeant
- **CPL** - Corporal
- **LAC** - Leading Aircraftsman

### United States Army Ranks
- **CW5** - Chief Warrant Officer Class 5
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COL B Greenland  25 July
BRIG N Bartels  26 July
GPCAPT R Lee  26 July
SQNLDR C Morris  27 July
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MR G Gibbons  2 August
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Exhibits 279 - 296 were entered as such at the direction of the President.
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