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TRANSCRIPT OF PROCEEDINGS
TRANSCRIPT-IN-CONFIDENCE

INSPECTOR-GENERAL AUSTRALIAN DEFENCE FORCE INQUIRY INTO THE CRASH OF A MRH-90 TAIPAN HELICOPTER IN WATERS NEAR LINDEMAN ISLAND ON 28 JULY 2023

PUBLIC HEARING

THE HONOURABLE M McMURDO AC
AVM J IERVASI AM CSC

COL J STREIT, with FLTLT A ROSE, Counsel Assisting

LCDR M GRACIE, representing CAPT D Lyon
SQNLDR J GILES, representing LT M Nugent
MAJ H PERROTTET, representing CPL A Naggs
SQNLDR C THOMPSON, representing WO2 J P Laycock

TUESDAY, 27 FEBRUARY 2024

DAY ONE

TRANSCRIPT VERIFICATION

I hereby certify that the following transcript was made from the sound recording of the above stated case and is true and accurate

Signed	.....	**Date**	.....	(Chair)
Signed	.....	**Date**	.....	(Recorder)
Signed	Epiq Australia Pty Ltd	**Date**	11/03/24	(Transcription)

EXHIBIT LIST

Date: 27/02/24

Number **Description** **Page No**

WITNESS LIST

Date: 27/02/2024

Name Of Witness **Page No.**

ASSOCIATE: All rise. Inspector-General Australian Defence Force Inquiry into the crash of an MRH-90 Taipan helicopter in waters near Lindeman Island on 28 July 2023 is now in session.

MS McMURDO: Please be seated. I respectfully acknowledge the traditional owners of this land, the Jagera and Turrbal people, and their elders past and present. For tens of thousands of years before European contact, they met here at Kurilpa, by the Brisbane River, which they knew as Maiwar, to work out ways to do things better in their communities, just as we are doing today. It is our unique privilege as Australians to continue that ancient tradition as we hold this inquiry.

Under section 110P of The Defence Act 1903, the Inspector-General Australian Defence Force, James Morgan Gaynor, has appointed AVM Iervasi, COL Streit, FLTLT Rose, and me as Assistants IGADF, to carry out functions under section 110C of the Defence Act, namely to conduct an inquiry into the crash of an MRH-90 Taipan helicopter near Lindeman Island on 28 July 2023. FLTLT Rose will now read the direction we have been given as to the conduct of this inquiry.

FLTLT ROSE:

Directions to Assistants IGADF.

Inquiry into the crash of an MRH-90 Taipan helicopter in waters near Lindeman Island on 28 July 2023.

To the Honourable Margaret McMurdo AC, AVM Vincent (Joe) Iervasi AM CSC, and COL Jens Streit, Assistants Inspector-General Australian Defence Force.

The purpose of this inquiry is to examine the circumstances of the deaths of CAPT Danniel Lyon 8562322, LT Maxwell Nugent 8642096, WO2 Joseph Laycock 8240356, and CPL Alexander Naggs 8557409 in the crash of an Australian Army MRH-90 Taipan helicopter ("the aircraft") in waters near Lindeman Island off the Queensland coast on 28 July 2023 ("the incident") during Exercise TALISMAN SABRE 2023.

The Honourable Margaret McMurdo AC is to lead the inquiry, with help from AVM Joe Iervasi AM CSC. They will be further helped by COL Jens Streit of counsel.

Directions:

The inquiry is to obtain evidence and prepare a report addressing the following.

General:

(a) The date, time and place of the incident.

(b) The chronological sequence of the circumstances of the incident, including the circumstances of death of persons involved in the incident.

(c) The purpose of the flight during which the incident occurred.

(d) The identity and particulars of the occupants of the aircraft, and of any other person directly or indirectly involved in the lead-up to the occurrence and directly after the incident.

(e) Whether the occupants of the aircraft were on duty; and if so, the specific type of duty being performed at the time of the incident.

Pre-incident issues:

(f) The serviceability, configuration, modification status, and recent maintenance history of the aircraft.

(g) The qualifications, aircrew currency, experience, and medical category of each occupant of the aircraft to the extent that such matters are relevant to the incident.

(h) The details and adequacy of the authorisations associated with the mission and the relevant effect of limitations imposed by such authorisations.

(i) The adequacy of all written orders, instructions, procedures, and manuals governing the maintenance, operations, control of the aircraft, and the carriage of persons in the aircraft to the extent that they are relevant to the circumstances of the incident.

(j) The content and adequacy of pre-flight briefing materials

relevant to the mission during which the incident occurred.

(k) The extent to which there was compliance with the limitations, orders, briefings, and other matters described in subparagraphs (h), (i), and (j).

(l) The before-flight activities of the members directly involved in the incident, to the extent that those activities are relevant to the circumstances of the incident.

(m) The medical and psychological history of each occupant of the aircraft, to the extent that such matters are relevant to the circumstances of the incident.

<u>The incident</u>:

(n) The primary and contributory causal factors in the incident.

(o) The adequacy of all written orders, instructions, procedures and manuals governing the maintenance, operations, control of the aircraft, and the carriage of persons in the aircraft to the extent that they relevant to the circumstances of the incident.

(p) The extent to which there was compliance with the limitations, orders, briefings, and other matters described in subparagraphs (h), (i), and (j).

(q) The medical cause of death of CAPT Lyon, LT Nugent, WO2 Laycock, and CPL Naggs.

(r) The rescue operations and adequacy of the rescue procedures as may be relevant.

<u>Post-incident issues</u>:

(s) The performance and adequacy of post-incident procedures, including rescue, recovery, and casualty notification and reporting.

(t) Details of all ADF personnel and others proximately involved in the post-incident procedures and the extent of their involvement.

<u>Other issues</u>:

(u) Whether the incident was caused or partly caused by:

(i) An act, omission, neglect, carelessness or misconduct of any person.

(ii) The use of alcohol or drugs.

(iii) Non-compliance with orders, instructions, or safety procedures.

(iv) Inadequacy in the individual training of an ADF member or the collective training of ADF personnel as it relates directly to this incident.

(v) Any equipment limitation, misuse, malfunction, or failure.

(vi) Any weakness in relevant systems or methods of command or control.

(vii) Any other matter that you consider relevant.

<u>Findings and recommendations</u>:

(v) The report is to make findings, and may make recommendations arising from those findings, including:

(i) whether conduct of any person or the occurrence of an event in relation to the incident warrants further investigation by Service police, civilian police, or other authorities;

(ii) whether any immediate action is required to prevent recurrence of a similar incident;

(iii) whether actions should be taken to prevent the occurrence of a similar incident or reduce the probability of another incident occurring from the same causal factors, including remedial action in respect of any weaknesses or deficiencies (isolated or systemic), and Defence policies, practices, equipment, procedures and training.

Signed by Jim Gaynor CSC, the Inspector-General of the Australian Defence, on 31 October 2023.

MS McMURDO: I understand there are a number of applications for leave to appear. Who's going first? Yes.

LCDR GRACIE: (Inaudible.)

MS McMURDO: Certainly, you're welcome to, yes, use the lectern. Thank you. We'll have the set-up better when we don't have the media present in the courtroom. Thank you.

LCDR GRACIE: Thank you, ma'am. My name is LCDR Malcolm Gracie. I seek leave to appear, to represent the interests of the deceased member, CAPT Danniel Lyon, pursuant to my written application forwarded to counsel assisting on 21 February 2024.

MS McMURDO: Thank you. You don't want to be heard on this?

COL STREIT: No.

MS McMURDO: No. AVM Iervasi and I have discussed it. We give you leave to appear on behalf of CAPT Lyon throughout the inquiry, unless and until the inquiry otherwise directs.

LCDR GRACIE: If it pleases. Thank you, ma'am.

MS McMURDO: Yes. SQNLDR Giles, is it?

SQNLDR GILES: Ma'am, my name is SQNLDR Jonathan Giles, an Australian legal practitioner. I seek leave to appear before this inquiry. I make this application as I've been appointed by Defence Counsel Services to represent the reputational interests for LT Maxwell Nugent. I consider that LT Nugent's reputational interests may be adversely affected by matters being examined in this inquiry, thus make this application to seek leave to appear.

MS McMURDO: You don't want to be heard on this?

COL STREIT: No.

MS McMURDO: No. AVM Iervasi and I have discussed this. Again, leave to appear throughout the inquiry is given, and that leave will remain unless and until the inquiry orders otherwise. Thank you.

SQNLDR GILES: Thank you, ma'am.

MS McMURDO: MAJ Perrottet.

MAJ PERROTTET: Good morning, ma'am; my name is MAJ Helen Perrottet of Defence Counsel Services. I seek leave to appear before the inquiry on the basis that I have a real and sufficient interest in the matters before the inquiry. The extent of my interest is that I've been appointed by Defence Counsel Services to represent the reputational interests of CPL Alexander Naggs.

MS McMURDO: Yes. You don't need to be heard on this?

COL STREIT: No.

MS McMURDO: No. AVM Iervasi and I have discussed the matter, and again leave to appear throughout the inquiry is given unless and until the inquiry directs otherwise. Thank you, MAJ Perrottet.

MAJ PERROTTET: Thank you, ma'am.

MS McMURDO: And SQNLDR Thompson.

SQNLDR THOMPSON: Ma'am, I, SQNLDR Christopher Thompson, an Australian legal practitioner, seek leave to appear before this inquiry, representing the reputational interests of WO2 Phillip Laycock, as appointed by the Director of Defence Counsel Services.

MS McMURDO: Thank you. You don't need to be heard on this?

COL STREIT: No.

MS McMURDO: No. AVM Iervasi and I again have discussed the matter, and we give leave to appear throughout the inquiry, unless and until the inquiry directs otherwise. Thank you, SQNLDR Thompson.

SQNLDR THOMPSON: Thank you, ma'am.

MS McMURDO: As you heard from FLTLT Rose, this inquiry essentially concerns the deaths in service of CAPT Danniel Lyon, LT Maxwell Nugent, WO2 Joseph Laycock, and CPL Alexander Naggs. I will shortly ask you all to observe a minute of silence to honour their lives and their service. But first AVM Iervasi and I want to say a few words about this inquiry.

Importantly, this inquiry is independent of other ADF and Commonwealth, state or other agencies. Agencies like the Defence Flight Safety Bureau's Air Safety Investigation Team and the Queensland Coroner are also investigating the events of 28 July 2023, as they are required by law to do. This inquiry may take note of the evidence and reports produced to or by such agencies, but we will make our own independent findings based on the evidence that is placed before us. We're not bound by the laws of evidence, but this inquiry will be conducted applying the laws of procedural fairness.

This inaugural hearing is being held in Brisbane in large part because the witnesses we are hearing from today are based within driving distance of Brisbane. Some hearings, particularly those involving the witnesses involved in the events of 28 July 2023, are likely to be held in Sydney, closer to most of the deceased's families and ADF colleagues.

At the end of the inquiry process, once all relevant people and organisations have had the opportunity to make submissions about our potential findings, and as soon as practicable, AVM Iervasi and I will prepare a report for the Inspector-General ADF.

We are conscious of the dreadful effect the deaths of these four aircrew on 28 July 2023 have had on their families, friends and colleagues. This inquiry will strive to avoid exacerbating that pain. We will endeavour to conduct the inquiry in a trauma-informed way wherever possible, with the interests of family members of the deceased in mind. I sincerely ask the media to keep this approach in mind as they carry out their important responsibilities of publicly reporting on this inquiry.

Over the past few months, we have issued notices to produce relevant documents, both inside and outside the ADF. We have already obtained a large quantity of documents which we are reviewing. We expect to issue more notices to produce and obtain yet more documents to analyse as our investigation continues. We have also taken or obtained a number of witness statements, and will no doubt take many more.

Our webpage allows for anyone with relevant information to make a submission to the inquiry, entirely confidentially or anonymously if desired. I encourage those with relevant information to make a submission as soon as possible. Be assured your submission will be seriously considered, but do it immediately; time is of the essence. I warmly thank those who have already made submissions to the inquiry; they've been very helpful.

If you would prefer to contact us directly in person, information on how to do so is on our webpage, as is the direction read out by FLTLT Rose, a practice note setting out how the inquiry and its hearings will be conducted,

media guidelines, and useful information sheets.

Today's hearing is in public. We will endeavour to hold as many hearings as possible in public, but some hearings will be in private session, where this is necessary to protect sensitive, official or classified information, or matters of national security, or where fairness or the wellbeing of a witness requires it.

Public hearings like today will usually be livestreamed. The media have indicated that they may use some of today's footage in their reporting. Where there are national security, fairness or personnel welfare issues, the inquiry may direct that no-one is to record or transmit the livestream without express permission. It would be an offence to contravene such a direction. More information about this is on our practice note, available on the webpage.

A transcript of our hearings will be made for the assistance of the inquiry. If anyone wishes to obtain a copy of the transcript of a public hearing, they can apply to the inquiry. Again, details are on the webpage. We hope to publish transcripts of public hearings on our webpage once they've been prepared and checked for accuracy, national security, fairness, and personnel welfare issues. The checking process, as you might expect, may take some days or even weeks.

The inquiry team has not been idle over the past few months, since given our direction. In early December the inquiry team visited the Defence Flight Safety Bureau in Canberra for a briefing on the fatal crash with the Air Safety Investigation Team. We also inspected the recovered wreckage of the aircraft.

Later that month we visited the Army Aviation Training Centre in Oakey in Southern Queensland. So as to help us better understand the evidence we expect to receive in this inquiry, the AATC gave a helpful presentation about aspects of the training of MRH-90 pilots and the operation of MRH-90 simulators and night-vision devices worn by aircrew. We also inspected an MRH-90 Taipan aircraft of the type involved in the crash.

AVM Iervasi and I participated in an MRH-90 simulator conducting a sortie involving multiple aircraft flying in formation at night using night-vision devices. The inquiry's visit to the AATC has led to the testimony of the witnesses who will speak today about the training of MRH-90 pilots and aircrewmen.

Respectful and efficient communication lines have been established with the ADF. Pleasingly, the ADF has expressed their desire to do all they can

to best support this inquiry. We greatly appreciate that spirit of cooperation and look forward to it continuing throughout our work.

Through all the inquiry has done so far, I have been greatly assisted by my Co-Assistant Inspector-General ADF, recently retired AVM Iervasi. I know I will draw heavily on his wisdom, experience and knowledge as we continue and complete this inquiry together with our capable and talented team.

I now invite AVM Iervasi to address you.

AVM IERVASI: Thank you, Ms McMurdo. I've been appointed by virtue of my experience and expertise in aviation safety, airworthiness, operations and training. My career has predominantly been in the discipline of air combat operations, having flown fast jet aircraft, including the F/A-18 Classic Hornet and Tornado F3.

The nature of those operations encompassed flight at high and low altitude, in all weather conditions, both day and night, as part of large formations of aircraft, in a highly dynamic environment and with the use of night-vision and helmet-mounted systems.

I've held appointments in flying supervision and flight authorisation and have been intimately involved in the development, management and scheduling of aircrew training programs. I have commanded flying units, wings and groups and know the criticality of oversight and management of safety and airworthiness while maintaining operational capability.

But the nature of Defence aviation can be at times hazardous. I have had a few close calls myself where a significant incident was avoided by a matter of seconds or feet. I have lost close friends and colleagues in aviation accidents who were not so lucky.

I have experienced the impacts these deaths have on family, friends and colleagues. I have also witnessed the consequential organisational changes resulting from these accidents which have genuinely improved the way operations have been conducted.

But these were tough lessons to learn, which is the reason why the Australian Defence Force, and especially in aviation, is dependent upon commanders and leaders fostering an environment of openness, honesty and trust. When something happens, it is incumbent upon those involved to speak up and for those in command and leadership to listen and take action.

Sometimes it can be difficult to see the problem when you're immersed in

it. External audit and review is a key control to ensure any issues or gaps are identified and rectified. Everyone has a voice.

Together with Ms McMurdo, our duty here is to inquire into the deaths of CAPT Lyon, LT Nugent, WO2 Laycock and CPL Naggs, as outlined earlier in our specific directions. There will likely be challenging and difficult questions ahead. These are necessary to ensure we understand the circumstances leading to the accident and to inform us on measures required to prevent a similar occurrence. Ms McMurdo.

MS McMURDO: Thank you, Air Vice-Marshal. CAPT Lyon, LT Nugent, WO2 Laycock and CPL Naggs died on 28 July 2023 in the service of Australia. They are at the centre of this inquiry. Please remain seated and bow your heads for a minute's silence to remember and honour them. Thank you.

ONE-MINUTE SILENCE IN REMEMBRANCE

MS McMURDO: I now invite COL Streit to give an opening address before the first witness is called.

COL STREIT: May it please the inquiry, my name is Jens Streit. I'm a barrister in private practice in Queensland and an Army Reserve legal officer with the rank of colonel. I appear with my learned friend Alexandra Rose, a barrister in private practice in New South Wales and a Royal Australian Air Force Specialist Reserve legal officer with the rank of flight lieutenant.

At the time of the crash CAPT Lyon, LT Nugent, WO2 Laycock and CPL Naggs were all members of 6 Aviation Regiment, a unit forming part of Aviation Command within the Australian Army. Bushman 83 is the callsign of the MRH-90 Taipan aircraft they were flying in at night on 28 July 2023. At the heart of this inquiry is to find out what tragically happened to them and why.

In assisting the inquiry, FLTLT Rose and I will perform the function of counsel assisting. What this means is under the guidance of the inquiry we will issue notices for production of information from persons and organisations, we will identify, contact and obtain statements from prospective witnesses. Should a witness be represented by a lawyer, we will ask that lawyer to assist their client providing the inquiry a statement.

We will issue formal notices requiring witnesses to appear before the

inquiry and give evidence in both public and private hearings. During all hearings we will carefully and respectfully examine witnesses by asking questions about matters relevant to the inquiry's directions. Where it may be of assistance in understanding the evidence, we will use visual aids and diagrams when asking questions.

The inquiry's directions are comprehensive and set out the matters the inquiry is to examine. In essence, the inquiry will examine issues before the crash of Bushman 83, find out what happened at the time of the crash and what happened after the crash. The directions describe these broad areas as pre-incident issues, the incident, post-incident issues and other issues. The term "the incident" refers to the crash of Bushman 83 on 28 July 2023.

One of the important matters to examine early in the inquiry's hearings is the training provided by the ADF to trainee MRH-90 pilots and aircrewmen prior to 28 July 2023. With this in mind, evidence to be called today will commence the inquiry's examination of the training of MRH-90 pilots and aircrewmen at the Army Aviation Training Centre and at 5 Aviation Regiment during the period 2022 and 2023. The inquiry will examine training at 6 Aviation Regiment at a later hearing phase.

Today we propose to call three witnesses. They are LTCOL Tony Cameron, the Commanding Officer and chief instructor of the School of Army Aviation and a qualified MRH-90 pilot; CAPT Andrew Balaam, an MRH-90 pilot and qualified flying instructor currently posted to the School of Army Aviation but previously posted to 5 Aviation Regiment; and WO2 Karl Thomas, qualified aircrewman instructor on the MRH-90, currently posted to the School of Army Aviation but previously posted to 5 Aviation Regiment.

Before calling the first witness, and with the inquiry's permission, I will outline some matters leading up to the crash of Bushman 83 on 28 July 2023 which has been drawn from information provided to the inquiry as part of its information-gathering processes. I anticipate that all information to which I will refer in a moment will likely be the subject of evidence given by witnesses at a later stage during the inquiry's hearings.

On 24 July 2023, members of 6 Aviation Regiment flew from Holsworthy in Sydney to Proserpine Airport in Queensland to participate in Exercise TALISMAN SABRE 2023. Exercise TALISMAN SABRE is conducted every two years and is the largest combined training activity between the ADF and the US military.

During the period 25 to 28 July 2023, members of 6 Aviation Regiment

undertook preparation for a night mission that was to occur in the evening on 28 July 2023. In broad terms, the mission was to fly a sortie of four MRH-90 aircraft from Proserpine Airport to Lindeman Island to pick up ADF members engaged in a military exercise.

The sortie was to fly from Proserpine Airport to a holding point over water near Lindeman Island and wait for confirmation that the ADF members were ready to be collected. Once confirmation was received, the sortie would then move from the holding point and fly the short distance to Lindeman Island.

The mission involved four MRH-90 aircraft with callsigns Bushman 81, Bushman 82, Bushman 83 and Bushman 84. Each MRH-90 aircraft were crewed by two pilots and two aircrewmen from 6 Aviation Regiment.

The evidence is likely to show that mission planning included support to be provided by the crew of a US AC-130 aircraft which would be flying some distance above the sortie throughout the mission to assist with surveillance and weather information.

I anticipate the evidence will show that members of 6 Aviation Regiment worked until about midnight on 27 July 2023 preparing as a team for the mission the following evening, and that the majority of the unit slept in communal tents, on stretchers, at Proserpine Airport.

The aircrew involved in the mission on 28 July 2023 woke up at their own time that morning and then commenced duty at 1300 hours, or 1 pm. The evidence is likely to show that the aircrew then attended aviation orders, participated in a rehearsal of concept drill where they discussed the mission, the weather conditions and contingencies for any emergencies that might take place.

Decisions were made during the afternoon which resulted in CAPT Lyon being assigned as the aircraft captain of Bushman 83, LT Nugent was assigned as the co-pilot, WO2 Laycock was assigned as the senior aircrewman, and CPL Naggs was assigned as the junior aircrewman.

I anticipate the evidence will show that the aircrew continued preparing and planning for the mission during the afternoon and early evening, before getting into their aircraft and commencing pre-flight procedures.

At around 2200 hours, or 10 pm, the ADF members engaged in the military exercise on Lindeman Island radioed the aircrew to confirm that they were ready to be collected. This was the green light for the aircrew to start their rotors and refuel through the hot refuel point, which is refuelling aircraft

while the engine and rotors are running.

At this time the pilots of Bushman 81 discovered a fault with the radar altimeter in their aircraft which rendered it unserviceable. They quickly changed to the spare MRH-90 aircraft which had been assigned to the mission as a contingency in case one aircraft became unserviceable.

The evidence is likely to show that shortly afterwards the four aircraft in the sortie took off from Proserpine Airport and flew in a heavy left formation with Bushman 81 in the lead followed by Bushman 82, Bushman 83 and Bushman 84.

Information received by the inquiry does not, at this stage, identify who was the flying pilot of Bushman 83. Investigation into that issue is ongoing and will be the subject of evidence before the inquiry at a later hearing.

It is anticipated that the evidence will show that the four aircraft took off with their doors shut and that each of the aircrew were using night-vision devices to assist their vision. The evidence is likely to show that the sortie transited over water towards Lindeman Island and that they were supported by the crew of a US AC-130 aircraft during the mission with surveillance and weather information.

The inquiry will lead evidence about the weather conditions the sortie encountered during the flight at a later phase of the hearings. It is anticipated the evidence will show that decisions were made during the flight to alter the pre-flight planned route to Lindeman Island in order to deviate around certain weather conditions.

The evidence is also likely to show that as the sortie reached the holding point, they engaged in a holding pattern involving a series of coordinated left-hand turns while they waited for secondary confirmation that the ADF members on Lindeman Island were ready to be collected.

I anticipate evidence will reflect the aircraft in the sortie were approximately 200 feet, or approximately 61 metres, above sea level during the holding pattern.

I anticipate the evidence will show that shortly after entering the holding pattern Bushman 83 was observed to develop an increasing rate of climb, taking it to a height above the other aircraft in the sortie, before it was observed to suddenly pitch nose down and descend rapidly towards the water.

I anticipate the evidence is likely to show that the air mission commander,

who was in Bushman 84, called to Bushman 83 over the radio words to the effect, "83, pull up, pull up, pull up," before the aircrew of Bushman 84 witnessed Bushman 83 impact the water at high speed.

The inquiry will examine the search and rescue response at a later hearing. I anticipate the evidence will show that the air mission commander in Bushman 84 immediately commenced the search and rescue operation, directing his aircrew to look for survivors in the water. He also directed Bushman 81 and 82 to land at Lindeman Island to conserve fuel, and then later to refuel, before taking over the search and rescue operations at the incident site throughout the night.

The evidence is likely to show that both combat and civilian vessels and other aircraft were rapidly deployed to join the search. Tragically, no survivors were located. The search and rescue operation continued until the early hours of the morning of 28 July 2023. Recovery operations then commenced shortly after that.

On 29 July 2023, an Aviation Safety Investigation Team from the Defence Flight Safety Bureau was appointed to investigate the crash. It is anticipated their final report will be available later this year.

I earlier mentioned that there were three witnesses to be called today. The first is LTCOL Tony Cameron, the Commanding Officer and chief instructor of the School of Army Aviation at Oakey in Queensland. I anticipate that he will give evidence about how the Army conducts initial training for MRH-90 pilots. He is also likely to give evidence about how MRH-90 operates from a pilot's perspective.

The second witness is CAPT Andrew Balaam. He is a qualified flying instructor for the MRH-90 currently based at the School of Army Aviation. In 2022 and 2023, CAPT Balaam was posted to 5 Aviation Regiment in Townsville. I anticipate he will give evidence about the processes and procedures that 5 Aviation Regiment follow in respect of post-graduate training for MRH-90 pilots. He is also likely to give evidence about his experience flying MRH-90.

The third witness is WO2 Karl Thomas, a qualified aircrewman instructor at the School of Army Aviation. In 2022 to 2023, WO2 Thomas was posted to the 5th Aviation Regiment. I anticipate he will give evidence about the training the Army provides for aircrewman, both at the School of Army Aviation and in their subsequent units, focusing on the training at 5 Aviation Regiment. He is also likely to give evidence about his experiences flying in an MRH-90.

Thank you, Ms McMurdo, that concludes my address.

MS McMURDO: Yes, thank you, COL Streit. We'll have a short adjournment before we hear from the first witness. Would you adjourn, please.

HEARING ADJOURNED

HEARING RESUMED

MS McMURDO: Yes, COL Streit.

COL STREIT: Ms McMurdo, I call LTCOL Tony Cameron.

MS McMURDO: Yes, thank you. Does the lieutenant colonel take the oath or the affirmation?

COL STREIT: Oath, I understand.

<**LTCOL TONY CAMERON, Sworn**

<EXAMINATION-IN-CHIEF BY COL STREIT

MS McMURDO: Yes, COL Streit.

COL STREIT: Thank you, Ms McMurdo.

LTCOL Cameron, please state your full name, rank and current unit?

LTCOL CAMERON: It's LTCOL Tony Cameron. I am the CO, or commanding officer, and the chief instructor of the School of Army Aviation.

COL STREIT: Thank you. The spelling of your name is C-a-m-e-r-o-n; is that correct?

LTCOL CAMERON: That is correct.

COL STREIT: Prior to coming here today, did you receive certain

documents from the inquiry?

LTCOL CAMERON: I did, sir.

COL STREIT: Did they include a section 23 notice requiring your appearance today to give evidence?

LTCOL CAMERON: Yes.

COL STREIT: An extract of the inquiry directions?

LTCOL CAMERON: Yes.

COL STREIT: A copy of my instrument of appointment as an assistant IGADF?

LTCOL CAMERON: Yes, sir.

COL STREIT: A frequently asked questions guide for witnesses in IGADF inquiries?

LTCOL CAMERON: Yes.

COL STREIT: And a privacy notice for witnesses giving evidence?

LTCOL CAMERON: Yes.

COL STREIT: Thank you. Prior to your appearance here today, did you complete a statement for the purposes of your evidence here?

LTCOL CAMERON: I did.

COL STREIT: I'll show you a document. COL Cameron, just take your time and move through that document, then I'll ask you some questions. Does that document comprise your statement?

LTCOL CAMERON: It is.

COL STREIT: Perhaps if the document can be returned please to the witness? Your statement comprises 71 paragraphs; is that correct?

LTCOL CAMERON: Yes, sir.

COL STREIT: And it comprises 15 pages?

LTCOL CAMERON: Yes, sir.

COL STREIT: And you signed that statement on 20 February 2024; is that correct?

LTCOL CAMERON: I did.

COL STREIT: Are there any additions or amendments you wish to make to that statement?

LTCOL CAMERON: No, sir.

COL STREIT: Thank you. I tender that statement.

MS McMURDO: Exhibit 1. Thank you.

#EXHIBIT 1 - STATEMENT OF LTCOL TONY CAMERON SIGNED 20/02/24

COL STREIT: Thank you.

Perhaps if the statement can remain with you for the moment, LTCOL Cameron. We might be referring to it at a later stage. I just want to ask you some questions in relation to your background and qualifications in the period 2000 to 2022. So I understand you were appointed into the regular Army as a specialist service officer; is that correct?

LTCOL CAMERON: That's correct.

COL STREIT: And what's the difference between a specialist service officer and a general service officer in the Army?

LTCOL CAMERON: So back in 2000 a special service officer joined as a – because they have a specialist trade or are going into a specialist trade, and they will do an abbreviated course at the Royal Military College Duntroon rather than the general service officers, who back then would do 18 months or 12 months if they went through ADFA first.

COL STREIT: Thank you. Now, you completed officer training. You were then trained as a Black Hawk pilot; is that correct?

LTCOL CAMERON: Correct.

COL STREIT: And in 2002 you were a Black Hawk pilot at the 5th Aviation Regiment; is that correct?

LTCOL CAMERON: Correct, sir.

COL STREIT: In 2008, you became a qualified flying instructor on Black Hawk; is that correct?

LTCOL CAMERON: Yes.

COL STREIT: What is a qualified flying instructor?

LTCOL CAMERON: So a qualified flying instructor is a flying instructor that trains junior pilots, starting off with pilots that are not yet qualified on that aircraft type through to a curriculum to be trained and qualified. Those instructors are also used – start off generally at the School of Army Aviation where they train what will be known as ab initio pilots; i.e. the most junior pilots that are coming through the initial training pipeline.

Additionally, those instructors, once they get some experience as basic instruction, will also move into the units to be the flying instructors within the units. They are responsible for training and assessing the pilots of the unit as well, and there is also a progression through a category system of flying instructors from D CAT to A CAT, which I mentioned in my statement.

COL STREIT: In 2012, if I understand correctly, you posted to 6 Aviation Regiment as a Category B qualified flying instructor and regimental standards officer; is that right?

LTCOL CAMERON: That is right.

COL STREIT: You've given some evidence about what a qualified flying instructor is. In terms of the category system, can you please just explain what its purpose is?

LTCOL CAMERON: Yes. So the category system is a progression of both experience and qualifications that as you gain experience and qualifications in that role – in my case, being a flying instructor - you then are able to conduct a wider range of assessment and instruction of aircrew. So a D Category flying instructor, called QFI, is able to train on basic LMP sorties. However, that will be under supervision of more senior instructors. Once they gain some experience, generally through one or two of the basic Avn pilot learning management package courses, they will then conduct an assessment to be upgraded to C CAT QFI.

From a C Category QFI, they are able to train all the sorties within the learning management package and have less supervision than when they would be for a D CAT. Once they gain more experience, they will then go through a training pipeline to make them a B Category instructor or QFI. That allows them to do specific assessments; in particular, the instrument flying assessment and additional remediations, so when a pilot fails something or is required to be remediated on any flying sequences or certain sorties, they will – they are the more senior instructor that will be required to conduct tutorials, try and find out what is causing that lack of performance in the trainee and then because they're the more experienced instructors.

They can generally find that out because they have seen more things and conduct that remedial and hopefully rectify the performance deficiency. From B CAT instructor, once they get more experience, they will then go through another specific module of training to make them Category A QFIs, and they are then – it enables them to be an instructor of instructors. So whether it's a junior instructor on a flying instructor course or developing instructors through that category system, that's what the Category A QFIs or qualified flying instructors do.

COL STREIT: You also were the regimental standards officer at 6 Aviation Regiment in 2012. So can you just explain, what is the regimental standards officer?

LTCOL CAMERON: So the regimental standards officer has generally two roles. One is you are the senior qualified flying instructor of the regiment and you are responsible for the development and mentorship of the other flying instructors within the unit. Additionally, you are the CO's specialist for op airworthiness advice and assisting with the rules and regulations of the regiment and safety issues.

COL STREIT: In 2022, you posted to the position of SO1 Aviation Standards; is that correct?

LTCOL CAMERON: Say the date again, sorry?

COL STREIT: In 2022, you - - -

LTCOL CAMERON: Yes, in 2022. Correct.

COL STREIT: - - - posted to the position of SO1 Aviation Standards. So can you just explain what your role was as the SO1 Aviation Standards?

LTCOL CAMERON: So the role of SO1 Aviation Standards is you are – like, the regiment, the senior QFI is the standards officer. SO1 Standards is, for Army Aviation, the senior QFI. So as the lieutenant colonel QFI for Army Aviation within the Standards Branch, you will have a major or an SO2 standards officer for each aircraft type working, and that cell provides the assurance and oversight of the regiment or the 16 Brigade flying instructors as well as the aircrewmen instructors.

So there is also an aircrewmen senior aircrewmen standards warrant officer within that branch. The Standards Branch is in Headquarters Aviation Command and external and provides that oversight assurance, but also the assistance to the regiments in a sort of top-down cascading effect of checking as well as developing the instructors, and then from the instructors within the units it cascades down to checking and training the pilots as well.

COL STREIT: Just in relation to the structure of Aviation Command, at the top is Headquarters Aviation Command; is that correct?

LTCOL CAMERON: That's correct.

COL STREIT: Underneath Headquarters Aviation Command is 16 Aviation Brigade?

LTCOL CAMERON: Correct.

COL STREIT: And under 16 Aviation Brigade there are various units and training establishments that report to 16 Aviation Brigade; is that correct?

LTCOL CAMERON: The majority of it is correct. So you have – 16 Aviation Brigade currently has the three operational units, being 1 Aviation Regiment, 5 Aviation Regiment and 6 Aviation Regiment, and then directly under the Director-General Aviation or the Deputy Commander Aviation – same two roles, one person – is the commandant of the Aviation Training Centre out to the side. However, in the near future, that commander control relationship is going to change where the Army Aviation Training Centre will come under command of 16 Aviation Brigade.

COL STREIT: You also, in 2022, qualified as an MRH-90 pilot; is that right?

LTCOL CAMERON: Yes, sir.

COL STREIT: Where did you do that training?

LTCOL CAMERON: I did that training at Oakey, in the School of Army Aviation MRH Wing.

COL STREIT: And prior to that, the aircraft you had been trained on was a Black Hawk?

LTCOL CAMERON: Yes, sir.

COL STREIT: In January 2023, you were appointed to your current position as the Commanding Officer and Chief Instructor of the School of Army Aviation; is that right?

LTCOL CAMERON: Yes.

COL STREIT: Can you just explain the two roles? In other words, one role is the commanding officer and the other role is the chief instructor. Can you just explain the different requirements and duties for each role?

LTCOL CAMERON: Yes. So the commanding officer is a command appointment from the Chief of Army which provides authorities to administer and lead command of the school, including the headquarters and the various training wings that we have within the school. The chief instructor is a training appointment and more a technical position in that I am the chief instructor of the aviation specific learning management packages as well as how they're conducted and providing that training, governance, oversight and assurance.

COL STREIT: I'm just now going to turn to ask you some questions about the School of Army Aviation and its role.

AVM IERVASI: Sorry, Jens, before you proceed, I just have a couple of clarifying questions if I may.

LTCOL Cameron, welcome this morning and congratulations on your command appointment. There is no more challenging and important role in the Defence Force than unit level command, so very well done?

LTCOL CAMERON: Thanks, sir.

AVM IERVASI: May I just ask a couple of points of clarification. You explained you joined as a special service officer, and you explained the difference at the start. What is the difference between a special service officer and a general service officer from a career management perspective? Are there differences?

LTCOL CAMERON: So there are differences. However, as you progress through on-the-job training, as you progress through your career, you conduct the same career development courses as your general service officer peers and you will spend more time as a lieutenant, but then the same time as a captain generally as your GSO peers, but you continue through when you – and then you are generally streamed.

The special officers historically would go on to be the qualified test pilots or the QFIs within Army Aviation, where the general service officers would go on to be the commanders. That is a very general sort of statement because there's obviously people involved. People's lives change, and their priorities. People have ambitions to go certain pathways. So it's not in stone. However, because we step through the same career development courses and we go on through promotion, there is scope to switch from one pathway to the other as you progress through your career.

Hence, I was a regiment standards officer; however, I then got selected to be officer commanding and a senior instructor, to which I signed over to be a generalist at that point in my career and then was able to compete for staff college, et cetera.

AVM IERVASI: Yes, congratulations once again on your achievements there. So if I was to characterise it, therefore, in a more general sense, a general service officer is a careerist where a special service officer specialises and perhaps compromises career progression to specialise in a particular stream. Would that be correct?

LTCOL CAMERON: Yes, that's correct sir.

AVM IERVASI: Terrific. And as you've also said as a generalisation, essentially test pilots and qualified flying instructors are more generally drawn from SSOs compared to GSOs?

LTCOL CAMERON: Yes, correct sir. However, I am going to – I can't recall when it actually happened; probably about four or five years ago. We went through a capability review and a Defence Force Remuneration Tribunal, et cetera, where it was determined that we all go through RMC and we all become generalists, so the junior pilots that we're getting or the junior aviators that we're getting through the pipeline now are all generalists.

AVM IERVASI: We might get onto that later on in your statements there. So everyone's streamed now as a GSO?

LTCOL CAMERON: Yes.

AVM IERVASI: Thank you. I have another question. You spoke about the categorisation scheme for QFIs. Which organisation governs the award and qualification of QFI categories?

LTCOL CAMERON: As in governs? So the Standards Branch – or SIs, Standing Instructions Operations, specifies each category. Whether it's a QFI category, a pilot category, aircrewman category is all articulated in our standing instructions. Standards branch are the ones that provide that assurance in accordance with those SIs and above standards, SO1 Standards or his delegates are annually assessed by the Central Flying School as being the RAAF school as the lead flying standardisation organisation for RAAF on behalf of the Defence Airworthiness Authority.

AVM IERVASI: Just clarify my understanding therefore, initial award of a qualified flying instruction instructor happens through the School of Army Aviation?

LTCOL CAMERON: Through the School of Army Aviation or through 723 Squadron in Nowra where the helicopter aircrew training system is, which is the joint Navy and Army helicopter school. So there is one pathway there to become a helicopter flying instructor and additionally, we have our own learning management package where we can train people at the School of Army Aviation as well.

AVM IERVASI: Terrific, thank you. So two streams to qualify as a QFI. In terms of QFI categorisation, do each of the regiments manage QFI qualifications or QFI categorisation, or is QFI categorisation held centrally at the School of Army Aviation?

LTCOL CAMERON: Sir, the regiments standards officer will be responsible for the development through the category system and the supervision of those QFIs. However, the Standards Branch, every QFI categorisation or assessment that occurs annually, there is a requirement to notify SO1 Standards of that assessment and that SO1 Standards generally needs to sign off on who is conducting that assessment and the preferences for standards, being an external unit, to come in and conduct those assessments.

AVM IERVASI: So within 1, 5 and 6 Regiments, as an example, the regimental standards officer positions determine the categorisation for QFIs and it's the SO1 Standards that actually reviews the categorisation annually. What does that position actually do in terms of that review? Do they just take the paperwork and sign it or do they - - -

LTCOL CAMERON: No, sir. So SO1 Standards will – so within the Standards Branch there will be aircraft specific SO2s, so majors which are external from the unit. Where possible that major will go and do the assessment on the person, or there may be another person, a senior qualified flying instructor, that is awarded a FISO, flight instructor standardisation office. The FISOs reside in both the school, but predominantly in Standards Branch, and they should be going to do the annual QFI category assessment on the QFIs.

The standards officer within the unit may be a Category A QFI with the FISO, which enables them to do that assessment, but like I said, that needs to be agreed by SO1 Standards as the oversight authority for that. As people progress through the QFI category system, there is specific LMPs that – to get from C CAT to B CAT, and B CAT to A CAT, where they need to come to the school and do that category – to do that training under the School of Army Aviation and/or Standards as part of that, and generally the senior instructors of the School of Army Aviation will run the training, and then Standards will come in as that external person to conduct the assessment of the person at the end of the training.

AVM IERVASI: Great. Thank you, LTCOL Cameron. You did mention that those training qualification – the organisational structure has the school under DG Avn, Deputy Commander Aviation Command, and the operational units under 6th Aviation Brigade. From that perspective – noting that it is, though, pending change – from that perspective though as the current system, how does categorisation standardisation happen across those two separate organisations?

LTCOL CAMERON: So we all have to comply with SI AVN OPS, so the Standing Instruction Aviation Operations. Within those is the set of rules and regulations that we have to comply with. Then, on the side to that, each aircraft type has a Standardisation Manual, and that has the various chapters of the varying flying airmanship through to – chapter 25 is the manual for – is the chapter assessments, and that will articulate which – as we go and do various assessments, the sequences or the flying sequences, the knowledge assessment that needs to be conducted within each type of assessment, whether it's a day assessment, NVG, NVIS assessment, instrument flight assessment.

Each chapter within the STANMAN has generally how to do it, common errors, airmanship points for formation flying, for example, for circuit operations, roll on landings. There will be a chapter for each various flying activity, and then within – there will be an annex to that chapter which articulates the standards that are required to be met with – whether it's speed, height, airmanship, et cetera, that are required to be met as part of

that sequence, and that is the standards that we will find someone either competent, not yet competent, et cetera.

AVM IERVASI: Thank you. Ms McMurdo.

MS McMURDO: Could I just clarify something? You told AVM Iervasi about the Regiment's supervision of the qualification for the flying instructors. You talked about the external check that was done. So is that external check outside the Regiment but within Army, or outside Army? Could you just clarify that, please?

LTCOL CAMERON: Sorry, ma'am. So for the Regiment, the external check will be conducted by the standards officers, which – or should be conducted by the standards officers, or generally, which will either be from Headquarters Army Aviation Command; sometimes they can be senior instructors from the School of Army Aviation. However, there is who's checking the checkers? So the Standards Branch people within Aviation Command, they – there will be certain individuals who will be checked by the Central Flying School, which is a RAAF, senior RAAF instructor organisation. So depending on the level, it can be internal to Army Aviation, however Standards Branch, which is in Aviation Command, at the top of Army Aviation, do get assessed annually by the Central Flying School.

MS McMURDO: What level does that come in at, where you have the external RAAF supervision?

LTCOL CAMERON: At the Aviation Command Headquarters SO1, the Standards Branch.

MS McMURDO: Thank you.

AVM IERVASI: Thanks, COL Streit.

COL STREIT: COL Cameron, we were just about to move to talk about the School of Army Aviation. I propose to do that now. The School of Army Aviation, of which you're the commanding officer, that's a part of the Army Aviation Training Centre. Is that correct?

LTCOL CAMERON: Yes.

COL STREIT: What rank level is in charge of the Army Aviation Training Centre?

LTCOL CAMERON: That's a colonel. He's the commandant.

COL STREIT: What other units or organisations form part of the Army Aviation Training Centre?

LTCOL CAMERON: So the Army Aviation Training Centre has the headquarters, has the School of Army Aviation, and it has what's known as RAMS, RAEME Aircraft Maintenance School. There is also another three organisations within the Army Aviation Training Centre. One is called the Aviation Warfare and Evaluation Section, or AWES. They are an organisation that provides some assessment and oversight of collective training, and some of the more tactical side of the house. We also have the Army Aviation Testing and Evaluation Section, which is the qualified test pilot section, and then there's Workforce Training Branch, which is – they are the education specialists, learning management package specialists, as well as some of the employment category or industrial relation specialists within each trade.

COL STREIT: Two things: first, is there a Rotary Wing Aircraft Maintenance School?

LTCOL CAMERON: Yes. RAMS is, yes.

COL STREIT: What training, to the extent you know, does the Rotary Wing Aircraft Maintenance School undertake?

LTCOL CAMERON: So they undertake the technician training. So the maintainers, or the engineers, depending on which organisation you work for, the mechanics of the helicopters, they do basic training at RAAF Wagga in a joint environment, and then they move to RAMS, or the Rotary Wing Aircraft Maintenance School, to conduct their aircraft-specific technical training on how to fix – whether it's a CH-47, MRH or ARH, and soon to be Black Hawk.

COL STREIT: At the School of Army Aviation, obviously in the first half of 2023 they had MRH-90 Taipan aircraft. Who undertook the maintenance of those aircraft in your school?

LTCOL CAMERON: So that is a contracted maintenance solution by Airbus Australia Pacific.

COL STREIT: Is that a consistent approach across the whole of the MRH-90 fleet?

LTCOL CAMERON: No, that's not the case. So because training at the training centre is generally – well, we are located at Oakey and we run the

vast majority of our training out of Oakey, we have a contracted solution of civilian maintainers that look after our aircraft. However, the context of the operational units who may be required to deploy will have uniformed or military maintainers within their units to maintain their helicopters. They may have a small contracted – or they're likely to have a small contracted footprint to sort out maintenance out in their – conduct maintenance duties on – wherever that unit is located. However, the military maintainers will be the ones that generally deploy when the unit has to go somewhere.

COL STREIT: You mentioned earlier in your evidence the Army tested evaluation organisation. What's that?

LTCOL CAMERON: So they're the qualified test pilots of Army Aviation Command. So as we're bringing in new pieces of equipment, new aircraft, those aircraft are required to go through an operational testing and evaluation, and they're the specialists that run that testing and evaluation on the aircraft or the piece of equipment, et cetera.

COL STREIT: You mentioned a test pilot. How do you become a test pilot?

LTCOL CAMERON: So to become a test pilot you – there is schools in both the UK and the US where you go. It's a 12-month course over there, where you become - you qualify as a test pilot, and then you come back and you go straight back into what's known as AATS, the Army Aviation Test and Evaluation Section, and they will have both flight test engineers as well as qualified test pilots that are both within that organisation, and you'll generally stream, depending on your background, onto a specific aircraft type.

COL STREIT: So a test pilot undertakes a 12-month course either in the United States or in the United Kingdom; is that correct?

LTCOL CAMERON: Yes, and I think – this is not my lane; however, Canada may be another option that could be undertaken.

COL STREIT: Is the 12-month course aircraft-specific?

LTCOL CAMERON: No, it's not.

COL STREIT: Is there any particular qualification or selection process undertaken for somebody who wants to become a test pilot?

LTCOL CAMERON: I'm aware that they have conducted screening for that. People have to apply to go to become a test pilot, and they have run

screening programs in the past. What they currently do, I could not be sure.

COL STREIT: I'm just wondering – and please assist if you can – whether persons who are identified to become test pilots and then undertake that course overseas for 12 months, whether those persons are essentially, if not the best then one of the best pilots that Army Aviation has?

LTCOL CAMERON: It's hard to define what is the best in an aviator. What we're after, from my understanding of what we – when we try to identify qualified test pilots, is if they've got an engineering background and are very analytical. They don't have to be the best pilot, hands and feet or flying, et cetera; however, if they definitely have an engineering background, that is definitely one of the things to look at. However, SO1 Standards is the senior test pilot who will be able to inform greater information on that.

COL STREIT: If I can just return to the School of Army Aviation. What aircraft does the school teach trainee pilots on?

LTCOL CAMERON: So as of early last year we had MRH wing. We had ARH wing, or the armed reconnaissance helicopter wing. They were at Oakey. Additionally, we have a wing in Townsville for CH-47s, and we have a UH wing in Sydney for Black Hawk training at the moment.

COL STREIT: When you say "CH-47", that's a reference to the Chinook aircraft, is it?

LTCOL CAMERON: Yes. Correct, CH-47F Chinook.

COL STREIT: The UH-60M Black Hawk, is that the new Black Hawk that's being brought into service?

LTCOL CAMERON: That is.

COL STREIT: I'd just like to now turn to pilot training at the school, and specifically in relation to MRH-90 trainee pilots. Before we deal with what's conducted at your unit, can you just explain the preceding steps that a trainee want-to-be pilot has to undergo when they come into the Defence Force, before they're posted to the School of Army Aviation for MRH-90 pilot training?

LTCOL CAMERON: So they obviously go through a fairly significant screening and assessment program for both medical, aptitude and psychological. However, once they have been selected to be – whether it's an Army aviator or an ADF aviator, they will go through the No 1 Flying

Training School at East Sale where they will conduct basic fixed wing, or their basic flying training, on the PC-21 aircraft. That is a joint school with RAAF, Navy and Army.

From there, the Army pilots, once they graduate from 1 FTS as it's known, will go to the 723 Squadron, and the Helicopter Aircrew Training System at NAS, at the Naval Air Station Nowra, where they'll conduct their basic helicopter training on the EC-135 helicopter. Once they graduate from there, they get their provisional wings. Army pilots will get their provisional wings to where they then come to the School of Army Aviation to go onto the Army battlefield aviation platforms, being the ones that I've mentioned.

COL STREIT: So the initial training, there's a selection process to choose the best people to be pilots; is that right?

LTCOL CAMERON: Yes.

COL STREIT: There's ab initio training at a tri-service flight school with Air Force and Navy and Army trainee pilots?

LTCOL CAMERON: Yes.

COL STREIT: And then the training continuum comes to a fork in the road, and Navy and Air Force pilots go and do different training, and Army helicopter pilots go to Nowra; is that correct?

LTCOL CAMERON: That is correct. So Air Force and Navy pilots will go to the No 2 Flying Training School in Pearce, where they'll conduct more training on the PC-21. There are slight changes coming down range, that are going to occur in that training pipeline, but generally what has happened for the recent past is Army will not go to that school, they'll go straight to Nowra for their basic helicopter training. The reason for that is Army, once they get to the unit, we fly multi-crew operations in our helicopters, so people will generally go and be co-pilot, go into the unit and develop on the job.

However, Navy operate differently in their helicopters, as well as Air Force obviously are trying to get fast jet pilots, which only have one seat, so they're generally aimed at single-pilot operations. Likewise, Navy, when they graduate their pilots, they will fly single pilot as well. Where Army is different and we train people as co-pilots rather than single-pilot operations. So that's why our training pipeline is slightly different.

COL STREIT: Where does Navy do its helicopter training for its pilots?

LTCOL CAMERON: They do all their training – all naval aviation is at Naval Air Station Nowra. So they go through the same 723 Squadron; however, then they have to go to the MH-60R training squadron to go onto the Navy helicopter.

COL STREIT: Thank you.

AVM IERVASI: COL Streit, just a point of clarification on that, if I may.

So when Army candidates complete 1 FTS and go to 723 Squadron, do they stay on their own course? Is there a different learning management plan for Army aircrew at 723, or is it a common learning management program for Navy and Army? Are you aware?

LTCOL CAMERON: So they will generally stay together as an Army course. There is slight differences in the learning management packages that Army will do than Navy pilots will do, but a lot of the fundamentals are the same for flying a helicopter. However, there are differences in the Army and Navy LMPs.

AVM IERVASI: Therefore, are the course durations different at 723 Squadron between Army and Navy candidates?

LTCOL CAMERON: I'm not too sure, sir; I'd have to check. Yes, sorry.

AVM IERVASI: No, that's fine. But would it also be fair to say that at the start of 723 Squadron Navy candidates are fully qualified pilots and have more flying experience than Army candidates?

LTCOL CAMERON: Yes, definitely. Yes, sir, because they've been through 2 FTS flying fixed wing.

AVM IERVASI: Thank you.

COL STREIT: Just before we return to the School of Army Aviation, at the Joint Helicopter School Naval Air Station at Nowra, when trainee pilots conclude that course, what do they graduate as?

LTCOL CAMERON: So they graduate as EC-135 pilots. There's not much – they can get a category on the EC-135; however, there's not really much they can do. They then come to us as Category E pilots on their battlefield aviation type. That just means they're a trainee pilot on a new platform. So they get their provisional wings because they can technically still – they're now a qualified helicopter pilot. They can fly a helicopter by

day, in instrument meteorological conditions, as well as they learn how to fly on NVG, night-vision instrumentation, systems as well. So hence they get their wings as a basic helicopter pilot, essentially.

COL STREIT: When you use the word "provisional", does that mean that their wings are subject to some particular rule?

LTCOL CAMERON: Yes. So they get their provisional wings there; however, they need to qualify on an Army battlefield aviation platform for their wings to become substantive. So if at some stage during our School of Army Aviation training the trainee withdraws or is withdrawn from course, they will also have to – they will have their wings removed as well.

AVM IERVASI: COL Streit, just one more point of clarification on that.

So from a civilian equivalent, if you are aware, would it be fair to say that an Army pilot coming through 723 Squadron, at conclusion, has an equivalent of a restricted pilot's licence or a commercial pilot's licence?

LTCOL CAMERON: So it would be similar to a private or restricted pilot's licence. They are close to a commercial pilot's licence, but CASA will not recognise their commercial pilot's licence, from my understanding, until they complete their full Army training. So they're not quite as a commercial pilot's licence – commercial pilot just yet.

AVM IERVASI: But Navy candidates who start are recognised licensing-wise as commercial pilot's licence at the start of 723?

LTCOL CAMERON: They wouldn't – not commercial helicopter. They might be commercial aeroplane, but at the start of 723 they haven't learnt how to fly a helicopter yet, so they wouldn't be able to be recognised as a commercial helicopter pilot until they finished 723. What the CASA rules are for Navy pilots, I couldn't – I'm not too sure at what stage they recognise that.

AVM IERVASI: Thank you.

COL STREIT: Just now returning to the School of Army Aviation and commencement of training on MRH-90, there are a number of phases at the School of Army Aviation for MRH-90 training; is that right?

LTCOL CAMERON: Yes.

COL STREIT: Can you just give a broad overview of those phases, please?

LTCOL CAMERON: I can, sir. So similar to basic training methodologies, we start off with the simple and we move to the complex. So the initial – the primary – we have a primary phase as part of – it's the first phase, which is learning about the technical aspects of the aircraft, and then it's simulator-heavy because you're going through starting the aircraft up, shutting it down, and then we'll start in the circuit area, being to and from a runway in an airfield environment with – and then we introduce the basic emergencies in that phase as well so they're learning how to handle those emergencies.

Once they complete that phase, they then move onto the instrument phase where they're conducting exercises generally in cloud, flying from an airfield to another airfield or a point under the instrument meteorological conditions. Once they're at the completion of that phase, they'll do an instrument rating assessment, and then they'll move on to the area phase from there. That's where they start moving into the aircraft a lot more.

The area phase is away from the airfield environment and out doing what helicopters are designed to do: landing in what we call confined areas; holes in the trees; on top of ridge lines and mountains, et cetera, which we call pinnacles; conducting hoisting and hooking. And as you can imagine, we need aircrewmen for those activities, so that's the first interactions the trainees will generally get to working with aircrewmen. The area phase is initially done by day, and then after the area phase we'll then move to the night phase.

So they've learnt how to do all those helicopter sequences that I've mentioned previously. We'll then introduce the night-vision instrumentation systems, and they'll then go out and do the same things, except under the – using the night-vision systems. Once they finish the night phase, we then – they can fly by day and night operating the helicopter in those environments, and we then conduct the formation phase. That is, we start off by day, then we do formation by night, and once that's – to set the conditions for the mission phase.

So they can now operate the aircraft by day and night, as well as formation, and then we run what's called the regimental officer basic course, or the mission phase, where they do all that under a tactical scenario, and we introduce all the mission plan, et cetera. And generally that is the last part of their training at the School of Army Aviation where they will conduct their final handling assessment under a tactical scenario, operating with other aircraft in that tactical scenario, where the trainees will be required to plan, and then execute a mission, and then be assessed at that. They will then leave the School of Army Aviation as D Category pilots or aircrewmen, and move to the units where they will go through their progression - - -

COL STREIT: How long does - - -

LTCOL CAMERON: - - - in the unit.

COL STREIT: I'm sorry, I interrupted you.

LTCOL CAMERON: No, sorry.

COL STREIT: How long does the training take from start to finish?

LTCOL CAMERON: So it can take six months, or up to nine months, to get through the School of Army Aviation on an MRH-90. We could do it in six months if we went through and – but that would only allow them to fly with other MRH. What we try and do is sometimes we delay the course a little bit to align with the other aircraft types, in particular the armed reconnaissance helicopter. So they can do a combined – so they get to learn how to fly with the armed reconnaissance helicopter in some combined missions. Some very benign, combined missions, with the armed reconnaissance helicopters or other helicopter types. And CH-47, if we can align synchronised training programs, we also try and do that.

COL STREIT: I'm just going to ask you some questions now just in relation to each phase of the training. The instrument phase, I understand, is mostly on a simulator; is that correct?

LTCOL CAMERON: Yes, correct.

COL STREIT: What use does the School of Army Aviation make of a simulator?

LTCOL CAMERON: So the simulator, it's a full motion level D simulator. It's very good at doing a wide range of things, and in particular emergencies, instrument flying. However, there are training sequences which are conducted in the aircraft because the simulator isn't that good at doing them due to fidelity issues with the visuals or the movement and perception of how those things are done.

Especially, interacting with aircrewmen because a simulator is moving, there's no aircrewmen in the back, it's generally two pilots with an instructor, and things like basic emergencies and instrument flying are really good in a simulator as well as some basic mission scenarios where you can introduce threats of whether it's small arms fire or machine gun fire through to missiles, which you obviously can't replicate in the aircraft.

Additionally, emergencies: the basic emergencies are really good in the simulator because it shows you what the emergency looks like without having to degrade the aircraft systems in the aircraft, which obviously increases risk. You don't want to degrade aircraft systems in a live environment so there are certain things.

Instrument phase: with the automatic flight control system and the avionics, when you're navigating around the sky there is a database of – for example, Queensland – it's pretty much the whole of Australia – where with all those systems engaged, you're flying up at six to eight thousand feet conducting instrument approaches and the screens are all white because you're in cloud or it's dark, and so that's why the instrument phase is conducted for the vast majority in the simulator with simulated air traffic, or people playing air traffic control as well as being able to pull those emergencies.

However, the area phase, as you can imagine, where you're doing hoisting, hooking, trying to do those things, landing in trees, can be done in the simulator; however, where you need to interact with aircrewmen, that's where we move it to the live environment, being in the aircraft, out in the area, because trying to hover very accurately the visuals in the simulator, it can be done, it's just a little bit more difficult than in the simulator. But the big thing is, the aircrewmen in the simulator, we don't – there's no way to – it's not linked to an aircrewmen simulator at the same time.

COL STREIT: If you were to give just a broad summary of walking into a room and seeing the MRH-90 simulator, how would you describe it?

LTCOL CAMERON: -So it's a big building. There will be the main simulator itself which will be a large capsule that has a large dome front where the visual screens are for the projectors, and then within that dome is a MRH cockpit. There is a back portion where an instructor can sit and also interact with the simulator to move the aircraft around, introduce emergencies and talk on the intercom system or the radios, and that is a full-motion hydraulic jacks connected to the floor and there'll be a large drawbridge that will come up for when you're off motion. When it's not on motion, the drawbridge will come down so you can get in and out of the simulator. Two pilots will generally jump into the simulator, the drawbridge will come up and there will be what's called the offboard control station where there will be – we call them the IOS operators. I can't recall what IOS actually stands for, but they are the ones that control the simulator offboard to enable the training within the simulator.

COL STREIT: And to your knowledge, is there a simulator at 5 Avn Regiment for MRH-90 in the first half of last year?

LTCOL CAMERON: Yes, there is. There was, yes. And there's one at Oakey.

COL STREIT: Was there one at 6 Avn Regiment?

LTCOL CAMERON: No, there wasn't. 6 Avn Regiment would come to Oakey to use our simulator.

COL STREIT: Just in relation to the area phase, in your statement you noted:

> *There's low flying down to 16 metres or 50 feet above obstacles such as wires, trees or the ground.*

I'm just curious as to why it was 16 metres or 50 feet that was chosen for that level of training?

LTCOL CAMERON: That's generally a threat-based assessment. We don't want to fly too low. The armed reconnaissance helicopter, they do what's called map of the earth, and they will fly a little bit lower than 50 feet; however, that's because they are obviously doing their intelligence, surveillance and reconnaissance activities and bounding tactically. However, the lift platforms will generally fly from 50 feet to 100 feet and that's just for tactical considerations because they're generally flying from one point to another and that is the buffer that we give above obstacles to fly at.

COL STREIT: In relation to the night phase, there's low flying training, is that correct, in the night phase?

LTCOL CAMERON: Yes, correct.

COL STREIT: How low is low?

LTCOL CAMERON: Lift platforms we will generally fly around 100 feet above obstacles; however, we can fly down to 50 feet as required.

COL STREIT: In terms of the night phase, is there training undertaken for pilots' loss of horizon?

LTCOL CAMERON: So built into both the instrument phase and the night phase there is a recovery technique that we employ that – attitude, heading, power, air speed that we employ – if we do lose visual reference, that we conduct that recovery technique. On the night phase, it is trained and assessed.

COL STREIT: I just want to now turn to formation flying training. Could you just explain what the terms "heavy left" and "heavy right" are?

LTCOL CAMERON: So heavy left and heavy right, it will be where the two rear aircraft – heavy left will be where the two rear aircraft will be on the left-hand side. Dash 1 will be obviously the lead aircraft. Dash 2 will be on the right-hand side, and then 3 and 4 will be out to the left in their arcs of freedom. That is covered in the STANMAN. All the different formation types are covered in the STANMAN, Standardisation Manual.

COL STREIT: I might show you a document on screen, please?

LTCOL CAMERON: Yes, that's probably - - -

COL STREIT: Just describe what the screen is showing?

LTCOL CAMERON: Yes. That's the heavy left formation where I mentioned the lead aircraft is out to the front, the second aircraft is in what's known as echelon right or on the right side of the formation where the rear two aircraft, being dash 3 and dash 4, are off to the left-hand side.

COL STREIT: I'm not suggesting that's to scale, but are you able to say how close the aircraft would be to each other in flying in a heavy left formation as a standard practice?

LTCOL CAMERON: Depends what you're doing as a standard practice. As you can imagine, if you are entering a hold or you're manoeuvring at night-time, it can be hard to see. So often you'll close up to two rotor di so you can make sure that you can see the other aircraft. If you, what we call float or spread out, you're further away, it gives you more clearance from the other aircraft; however, it can be harder to see the other aircraft at night. In transit, if you're going a long way and you're just flying straight lines, you will generally spread out because you're not working hard in close maintaining that two rotor di.

However, as you start doing turns, entering a hold or approaching a target, you will need to close up so you can conduct your landing or whatever is needed. You can do holds spread out. You just need to use your – we call them manoeuvre positions. Because, as you can imagine, as that formation turns, the distance that the two aircraft out here on the left are – they're covering less ground. So to maintain their formation, they have to slow down a little bit to maintain their relative position to the other aircraft.

If they're doing a right turn, they're covering more ground. So they'll have

to speed up if they're out there. What we call is a manoeuvre position, so if 3 and 4, if they were doing a turn, 3 and 4 would slide in behind – not quite behind but close to the lead aircraft, so they were covering the same ground or the same distance across the earth, therefore reducing their requirement to speed up or slow down.

COL STREIT: Have you flown in a formation of heavy left with four aircraft?

LTCOL CAMERON: Many times.

COL STREIT: And when you're heavy left and you're turning left, what are the key things you need to be mindful of if you're flying any of the aircraft?

LTCOL CAMERON: So 2 is pretty easy because if you're close, you're close to the lead aircraft because you're all formating off the lead aircraft. If you're in 3 or 4, as soon as you do a left turn, you know you've either got to slow down and/or slide in a little bit so you can maintain your relative distance from the second and first aircraft.

COL STREIT: Because if you don't, is the risk that aircraft number 2 is going to come across your line of vision when you're in aircraft number 3?

LTCOL CAMERON: Not come across. What you'll do is – so if you did a left turn and you didn't slow down or didn't slide in, you will go forward of them and you don't want to get forward of your line because the pilots can only see forward and you need to maintain your visual separation with the other aircraft.

COL STREIT: In the heavy left formation we have on screen, is it easier to turn right?

LTCOL CAMERON: It could be considered easier because the other two aircraft are turning away from you, but you've still got to maintain your – you'd have to accelerate anyway or slide in. And then once you're at that relative speed, when they roll out of their right turn, you're then going to have to slow down anyway. So it's not really a – because you've induced the turn and then you've got to speed up, and then when they roll out of the turn, because you've sped up, you've then got to slow down. So there's these fine motor skills that we're dealing with. So it's turning away but then when they straighten out, you'll have to make an adjustment then anyway. It's not really whether it's left or right; it doesn't really come into it.

COL STREIT: In heavy left, turning left, does it mean that aircraft 3 and 4

have got more to look out for than if they were turning right?

LTCOL CAMERON: Yes. 3 and 4 are always the harder positions to fly.

COL STREIT: I tender that electronic document.

MS McMURDO: The heavy left formation diagram will be exhibit 2.

#EXHIBIT 2 - HEAVY LEFT FORMATION DIAGRAM

COL STREIT: Just returning now to the School of Army Aviation and the training for formation flying, how many aircraft are the trainee pilots taught to fly in formation?

LTCOL CAMERON: At the school, we generally have pairs. Due to some of the constraints at the school, whether it's aircraft type or aircrewmen, we generally only train two aircraft at a time.

COL STREIT: Is there any reason why you don't train for a sortie of four?

LTCOL CAMERON: Yes. It's because we don't have as many aircraft as the units, operational units. And also, the aircrewmen in the back – as part of our rules, especially for night vision, we need aircrewmen in the back to provide that situational awareness for the pilots as well, noting we're going into landing, into pads as well as not just flying around – landing and taking off to certain confined areas, so we need aircrewmen on board. And due to the school being also tasked with training aircrewmen, a lot of our aircrewmen are either training other aircrewmen and we don't have spare aircrewmen, so we're generally limited either by aircrewmen or aircraft in how many aircraft we can put up in a single formation. Every now and again, we can get up to three aircraft, especially when we've got three trainees because we'll try and do that; however, the nominal training will be two.

COL STREIT: Is it your understanding that training in a formation of up to four aircraft or more, that's something that's conducted at the unit 5 Avn or 6 Avn Regiment?

LTCOL CAMERON: Yes, correct.

COL STREIT: Just in relation - - -

AVM IERVASI: Sorry, COL Streit, are you staying on formation flying or

are you moving on at this point? May I ask a couple of questions on formation.

LTCOL Cameron, in relation to the heavy left formation as depicted now, and the description of that formation turning to the left, in relation to aircrafts 3 and 4, can you talk to me about which position in the cockpit would generally be flying from a pilot flying to a non-flying perspective in relation to visibility and lookout, or does it not matter?

LTCOL CAMERON: We are trained to fly from both seats, and generally you will be able to do that. However, as you can imagine, in dash 3, for example, being in the right-hand seat will be a lot easier to fly than in the left seat.

AVM IERVASI: And why is that exactly?

LTCOL CAMERON: Because your visibility of the other formation – of 1 and 2 is on your side and you don't have to look over the cockpit – the cockpit – the instrumentation panel, so you've got better visibility of the aircraft that you're formating off, essentially.

AVM IERVASI: In a heavy left formation in a left-hand turn – put yourself in the position of number 3 now as an example – when the turn commences to the left, how do you manoeuvre your aircraft to both stay in formation and stay visual?

LTCOL CAMERON: I would decelerate a small amount and I would move in on, I think the STANMAN has the arcs of freedom within there where you can move in and out but still maintain your no closer than two rotor di off the aircraft in front of you. I would decelerate a little bit and then move into that manoeuvre position which is closer to behind 1 but not quite behind 1.

AVM IERVASI: And would you remain co-altitude or would you need to manoeuvre vertically to remain - - -

LTCOL CAMERON: No, stay the same altitude.

AVM IERVASI: Is that independent of angle of bank?

LTCOL CAMERON: Yes.

AVM IERVASI: So good visibility, sitting in the right-hand seat, I can see over the edges, I'm turning left?

LTCOL CAMERON: Yes.

AVM IERVASI: Slide in, slow down, maintaining position?

LTCOL CAMERON: Yes, correct.

AVM IERVASI: Thank you.

LTCOL CAMERON: Obviously, high angle of banks are not ideal but if you're in the right seat, you still have pretty good visibility. And then, similar from the left seat, you might have to sit forward a little bit in your chair but you should be able to maintain visibility anyway.

AVM IERVASI: And when a formation starts its turn, are they usually communicated or are they uncommunicated?

LTCOL CAMERON: No.

AVM IERVASI: So does dash 1 call, "Turning left", or it just happens?

LTCOL CAMERON: You just do it because that's what you've planned and briefed. If there is a change to what's planned or briefed, they should communicate that, that they're going to be doing something that is different to what everybody thinks the formation is going to do. Generally, no. However, if they do something different, they'll communicate it generally.

AVM IERVASI: Formation distances, you've described the Standards Manual talks about a minimum distance of two rotor diameters. Physically, how far is that?

LTCOL CAMERON: Is it 116 feet? Two rotor dis. So we generally have – you'll have marks on the tarmac where you'll go and judge that every now and again before you go flying, just to zero your eye in. The STANMAN also provides a guide. So within your head-up display, there is the centre of display. There's a small cross which indicates where you're looking and there'll be a circle for where the other pilot is looking, so you know where your buddy in the cockpit is looking. That centre of display, there's a reference in the STANMAN for how big the aircraft is compared to that centre of display, which will give you a rough guide of how close you are compared to the other aircraft; whether it's two rotor dis, five rotor dis, 10 rotor di.

AVM IERVASI: So you’re depending on your training to train to be used to looking at the visual cues to say, "That looks like two rotor dis. That looks like about five rotor dis. That looks like about 10 rotor dis"?

LTCOL CAMERON: Yes, correct.

AVM IERVASI: Flying at two rotor dis, what considerations might you need to take with formation manoeuvre?

LTCOL CAMERON: Yes, so the flight lead – and whether the flight lead is flying themselves or the co-pilot, everything is at slow rate. You'll slowly build in because the concertina – you don't want to induce large angles of bank – or you can get to large angles of bank, but the rate that you get there needs to be very benign. So to assist, the people formating off you, as you can imagine, if you do large rates of turns, there is a reaction time and that reaction time builds in as you go back. So you'll often see a slow down and then 2 will slow down, 3 then slows down and it's that human reaction time can build up. So we do everything nice and at a slow rate to reduce those increases in amplitude of attitude changes as it goes down the formation.

AVM IERVASI: The reasons why you might choose to fly closer in a formation are dependent upon environmental factors and potentially mission factors; is that true?

LTCOL CAMERON: Yes, correct.

AVM IERVASI: The closer you fly, requires more care and diligence in terms of not only the flight lead's manoeuvre but also those formating to ensure they react in time to uncalled manoeuvres. Is that true?

LTCOL CAMERON: Yes.

AVM IERVASI: Therefore, if you're flying at the minimum stated distances, you need to be on your game to ensure that you can remain in position?

LTCOL CAMERON: Yes, definitely. Yes, it's a high workload activity.

AVM IERVASI: It's a high workload activity the closer you are and, in particular, in different environmental conditions, such as night and poor illumination?

LTCOL CAMERON: Correct, sir.

AVM IERVASI: Thank you.

COL STREIT: LTCOL Cameron, just in terms of the procedure and the phases, each trainee has to pass each phase; that is correct?

LTCOL CAMERON: Yes.

COL STREIT: And if a trainee doesn't pass a phase, what happens?

LTCOL CAMERON: If they fail the final assessment for each phase, they will then go onto that remedial package that I talked about, the CAT B QFIs we'll conduct, or higher. That will involve an assessment of the trainee's performance and then a developed plan to address the performance deficiency. Whether that's a ground tutorial and then flights either in the simulator or the aircraft, depending on what the deficiency is and then they will reassess again. And then there is an SOP which gives some guidelines for how that's conducted under the Aviation Training Centre's guidelines.

COL STREIT: At paragraph 22 of your statement, you note that at the end of the course trainee pilots will have completed 69 sorties; is that correct?

LTCOL CAMERON: Yes, 69 flying sorties. Correct, sir.

COL STREIT: And that would be broken into 61 aircraft hours and 55 simulator hours?

LTCOL CAMERON: Yes.

COL STREIT: Are simulator hours treated the same as actual aircraft flying hours?

LTCOL CAMERON: For the things that we use the simulators for, yes, they are. The simulator, it's high fidelity and represents the live environment for the things that we train in. So for aeronautical experience, we clarify them as the same.

COL STREIT: Is the choice to use a simulator for almost half the hours of the total number of hours for the course in a simulator, did that have anything to do with the lack of availability of actual MRH-90 aircraft?

LTCOL CAMERON: Not that I'm aware of. The learning management plan is built that way so we can maximise the training. And there is some flexibility built into the learning management package for aircraft versus simulator; however, that learning management package is built to provide the best training in the most efficient manner.

MS McMURDO: Is it more economical to use the simulator than - - -

LTCOL CAMERON: It is, ma'am.

COL STREIT: Just in relation to training for sorties at night, paragraph 25 of your statement, you say:

> *There's three and a half hours of simulator training in 26.5 hours of aircraft flying at night.*

Is that right?

LTCOL CAMERON: Yes, sir.

COL STREIT: The item of equipment that's used by pilots to provide night-vision assistance is called TopOwl?

LTCOL CAMERON: Yes, sir.

COL STREIT: Just tell me what TopOwl is?

LTCOL CAMERON: TopOwl is a night-vision instrumentation system that's built into the helmet. It has two light image intensifier tubes that are on the outboard of the helmet. They then project an image on the inside of the pilot's visor. Mixed in with that image is aircraft instrumentation. People have heard of HUD, head up display, which is aircraft information that's usually found on the cockpit instruments.

However, by projecting it with the image inside the visor, it means the pilots don't have to look inside to get the information that they need generally as they're flying around. That instrumentation is there by day. Just at night-time it's also mixed with the night-vision image. Additionally, there's also the forward-looking infrared camera which is on the front of the MRH-90.

There is a button that the pilots can press, depending on the conditions, where they can then project the FLIR image on the inside of the visor rather than the image intensifiers. However, generally people fly on the image intensifier tubes more than the FLIR. But there are some times where the FLIR is better or can assist the pilot.

COL STREIT: So paragraph 26 of your statement you identify:

> *At sometimes using TopOwl, objects appear closer than what they are.*

Can you just explain that, please?

LTCOL CAMERON: Yes. So it’s an illusion called hyperstereopsis. So

because the image intensifier tubes are out here, rather than flying on normal night-vision goggles, which are in front of your eyes, there is an illusion created, in particular when objects are close, within 30 metres, where they appear closer than they actually are. And we train to get over the hyperstereopsis because, as you can imagine, when you're close to obstacles, flying into those confined areas with trees, obstacles, whatever they are around, you're relying on the aircrewmen because they've got their night-vision goggles on. However, you train to get used to it and it's only really a factor for obstacles that are, like I said, within that 30 metres distance of the aircraft.

COL STREIT: With the TopOwl, you gave evidence that it does two things: it enables you to see in low illumination at night using a night-vision assistance - - -

LTCOL CAMERON: Yes.

COL STREIT: - - - but it also projects information onto the inside of your visor so you don't have to look down at the cockpit instruments, you can keep looking forward. You still get a level of information; is that correct?

LTCOL CAMERON: That is correct, yes.

COL STREIT: In terms of that symbology, what are the key features of that symbology that a pilot would see? For example, is there horizon?

LTCOL CAMERON: Yes. So there's everything from a horizon bar, you'll have your barometric altitude, your RADALT, which is your height above obstacles or the ground. There'll be a compass tape up the top with also where your point – where you've got a point that you're going to in the flight navigation system. That will be projected on there. There's all your attitude information mixed in with that artificial horizon as well. There's, yes, a fair bit of information.

COL STREIT: Depending on the movement of the aircraft, does any of the symbology change to another function? So, for example, does the horizon symbology change to another function depending on what the aircraft is doing at the time?

LTCOL CAMERON: Yes. So when you – you'll have a velocity vector come in. When you slow down below a certain speed, the velocity vector will come in. As far as the horizon, pretty sure the horizon – I didn't have that much experience on the MRH, but pretty sure the horizon was there throughout. It was that velocity vector that comes in, in addition to that.

COL STREIT: Just describe what a velocity vector is, please. How is that represented?

LTCOL CAMERON: Yes. So it looks like a little aircraft that – actually, the velocity vector will disappear and the hover modes will come in. But the velocity vector is an aircraft which projects where the aircraft will be in space in the future, at a certain time. So if you are climbing, it will move up relative to the horizon, and likewise if you're descending, as well as left and right. That will disappear at I think it's about 40 knots, from recollection.

COL STREIT: Is there any risk of confusion between the velocity vector and the horizon representation?

LTCOL CAMERON: Not that I'm aware of. Because we train and we train on the system the whole time. So not that I'm aware of. I've never heard of any instances of that.

COL STREIT: Are you aware of any issues with TopOwl since it's come into service?

LTCOL CAMERON: No, not that I'm aware of. Like any aircraft piece of equipment, there are malfunctions that occur from time to time.

COL STREIT: Yes?

LTCOL CAMERON: For example, from my limited MRH experience, I was flying, my co-pilot had an image intensifier tube fail at one stage. He announced it, he rectified it in very short order and we continued with the flight, and then I put in a – obviously a aviation safety record when we got back. There'll be a lot more experience out there that'll be able to – but not to my knowledge that there's any significant issues with the TopOwl other than that we don't train to overcome, anyway.

COL STREIT: Do you understand whether or not the TopOwl has gone through different iterations of software?

LTCOL CAMERON: Yes. So there was an upgrade. There's different upgrades occur. And there was an upgrade I'm going to say a couple of years ago, just before my time. But I've only trained on the one software.

COL STREIT: I'm just going to turn to - - -

MS McMURDO: COL Streit, I'm told that it might be useful just to have a short five-minute break for everybody's comfort. So we'll just have a

short five-minute break now.

HEARING ADJOURNED

HEARING RESUMED

MS McMURDO: Yes, COL Streit.

COL STREIT: Thank you, Ms McMurdo.

Colonel, I'd like to now turn to MRH-90 pilot training and response to emergencies.

AVM IERVASI: Sorry, COL Streit. Before we proceed on that, I do have a couple of questions for COL Cameron.

COL Cameron, you talked about hyperstereopsis?

LTCOL CAMERON: Yes.

AVM IERVASI: Where that becomes exacerbated is at 30 metres; is that correct?

LTCOL CAMERON: No, inside 30 metres.

AVM IERVASI: Inside 30 metres?

LTCOL CAMERON: It's just because your interpupillary distance, so - - -

AVM IERVASI: How does that actually look? So if an aircraft is transiting from 40 metres, 35 metres, 30 metres, does it all of a sudden get bigger or does it gradually get bigger?

LTCOL CAMERON: No, it gradually gets bigger. What we generally do is we put someone just outside of the – one of the aircrewmen will walk outside the outside of the disc and you sort of tell them, "How far away do you think that is?" And we call it "Big man, little man", so you can see how they look through the thing when they're probably just from here to the other side of the room. And then through the TopOwl, there'll be a little bit of a difference between what they look like. So that's how we show the trainees, "Hey, this is just an example of the hyperstereopsis." But it's mainly when we're in the hover, close to obstacles, is where it manifests.

Outside of 30 metres, it dissipates fairly quickly and everything looks – relative distance is very similar.

AVM IERVASI: So I've just had the benefit of reviewing the Standards Manual just to check what one rotor diameter is?

LTCOL CAMERON: Yes.

AVM IERVASI: And it's approximately 17 metres in the MRH-90. Therefore, two rotor diameters is 34 metres?

LTCOL CAMERON: Thirty-four metres, yes.

AVM IERVASI: So therefore, if you're maintaining station at two rotor diameters, noting for natural variation in movement as you're maintaining formation position, it would probably be reasonable to expect at some stages that an aircraft could get into as close as 30 metres at the point that hyperstereopsis becomes a factor?

LTCOL CAMERON: Well, you should be no closer than 34 metres. But like I said, we train before we even take off at the early stages, we show the trainees what two rotor di's looks like, so they get that image in their visor of what an aircraft looks like, backed up by the centre of display objective reference. And then once we're airborne, we then get further away and go, "This is what five rotor di's looks like," et cetera.

AVM IERVASI: Got it, thank you. But four metres is 12 feet; right?

LTCOL CAMERON: Yes.

AVM IERVASI: So it's about the distance from there to here?

LTCOL CAMERON: Yes.

AVM IERVASI: So when you're flying and being able to tell the difference in feet, particularly when you have limited experience, is probably going to be difficult. Would that be fair?

LTCOL CAMERON: Correct, sir, yes, it is, and it's subjective.

AVM IERVASI: I want to get back onto another question, but I'll probably hold that to the end, and that was the comment you made earlier about the course duration between either six or nine months. So I'll get back to you on that later as well. Thank you.

COL STREIT: Colonel, we were just about to move to MRH-90 pilot training and responses to emergencies. SI AVN OPS 3-108 details the requirements for airborne emergency training for qualified pilots; is that correct?

LTCOL CAMERON: Yes.

COL STREIT: That's a requirement under the Defence Aviation Safety Regulation?

LTCOL CAMERON: Yes.

COL STREIT: Emergency training is conducted in a simulator every six months; is that right?

LTCOL CAMERON: So as part of their annual category check, this is the minimum that they need to conduct. So as part of their annual category assessment, there will be an emergency and basic handling assessment as part of that in accordance with chapter 25 of the STANMAN. In addition – so they'll do emergency assessment and training as part of that. However, that's obviously an annual assessment.

Generally, around the six months, plus or minus, it's halfway in between, there is that simulator – we call it the simulated development sortie – that pilots will do, where that will be scenario-based, and the standing instruction has the minimum sequences that need to be conducted as part of sortie. But there is a little bit of – depending on how junior, what the training outcomes are of the Regiment, there is a little bit of scope on top of the minimum requirements to conduct the training.

COL STREIT: We'll come to the category annual assessment in a moment. But I just want to focus in on specified emergency training for qualified MRH-90 pilots. If I understand it correctly, and please tell me if I have this wrong, but there is a stipulated requirement for emergency training to be conducted every six months in a simulator. Is that correct?

LTCOL CAMERON: Not to my knowledge. The simulator – it's offset from their category assessment every six months. But I don't think it needs to be in the simulator every six months.

COL STREIT: Go to paragraph 27 of your statement, please?

LTCOL CAMERON: Yes.

COL STREIT: Fifth line down, second sentence reads:

An annual simulator development training sortie is to be conducted six-monthly and offset with the pilot's annual category assessment.

What do you mean by that sentence?

LTCOL CAMERON: Yes. So, sorry, that – yes, I can see how that is slightly incorrect, in that they do emergency training every six months. However, the annual simulator development sortie is offset from six months, plus or minus a few months, from their category assessment. So, sorry, they don't have to do it in the simulator every six months, they do emergency training, their category has to be in the aircraft and they'll do emergencies in the aircraft. However, in between, because obviously annually, at some stage throughout the year they, in addition to their category assessment, they also do a dedicated simulator development sortie which will involve a minimum set of emergencies. So, yes.

COL STREIT: So if I have this correct, please tell me. In a 12 month period, MRH-90 qualified pilots will do two iterations of emergency training. One is designated in a simulator; the second is part of their category assessment?

LTCOL CAMERON: Correct.

COL STREIT: In an aircraft?

LTCOL CAMERON: In an aircraft.

COL STREIT: So are you able to assist the Inquiry in understanding why emergency training is only conducted twice a year?

LTCOL CAMERON: That's the minimum standard, as in that's the minimum requirement. It can be conducted more often than that. However, in accordance with the current standards and rules and regulations, that's the minimum requirement. Very similar to the civilian cyclic training. So civilian organisations do a similar thing where they generally go through certain training iterations and requirements as well. Our rules and regulations stipulate that category assessment, and then no – and then that annual simulator development around the six-month mark. Which means every six months they're doing some sort of emergency training, as the minimum.

COL STREIT: Can I ask, based on your experience as a Black Hawk pilot, just cast your mind back to that stage of your career, was emergency training – the requirement for emergency training, was there a greater

amount of emergency training in any 12-month period for Black Hawk, or was it – your recollection is the same for MRH-90?

LTCOL CAMERON: So my experience in Black Hawk was we never actually were required to do that halfway point six-monthly simulator one. That came in, I'm going to say about 10 years ago, and it's the same for all the other platforms. So I can say, from my early days of Black Hawk, it's actually more emergency training. However, for the later stages of Black Hawk, it's pretty much the same, or is the same.

COL STREIT: Paragraph 29 of your statement you talk about:

> *MRH-90 course contains multiple emergency sorties, including NVD emergencies, no TopOwl symbology, as well as full NVIS failure.*

Is that correct?

LTCOL CAMERON: Yes.

COL STREIT: So with that training how many sorties are conducted to train pilots to deal with emergencies, when they're on course?

LTCOL CAMERON: So at the early stages of the phase there will be a focus on dealing with the emergencies. And then as we progress through the phases, through the phase, generally there'll be emergency consolidation thrown out into pretty much every sortie to keep the trainees recent on dealing with those emergencies. But there will be sortie – we have sortie outline or sortie run sheets which will standardise what emergencies are done at different stages, so we make sure that there's obviously a lot of emergencies or a lot of things that can go wrong at various stages and we try and make sure that we're covering off on the major ones and not doubling up or going from there. So there are sortie run sheets that we have to try and standardise that as well.

COL STREIT: Paragraph 29(i), you set out four dot points in relation to emergency training when flying in a formation; is that right?

LTCOL CAMERON: Yes.

COL STREIT: The last dot point is:

> *Inadvertent instrument meteorological conditions by visibility or in cloud recovery.*

What does that mean?

LTCOL CAMERON: So formation flying is a visual manoeuvre. If the weather deteriorates or visibility drops to a certain level, we have a recovery information. So both single aircraft and in formation, we have recovery procedures that we conduct to get away from the ground and climb up. And we, in formation, it's briefed in every formation orders of which way you've got to turn away from your other aircraft. And then what height that you will climb to to – once you're at height, you all don't want to be at the same height, so there will specific heights to separate you as well. So there's a single aircraft and a multi-aircraft Inadvertent IMC recovery procedure.

COL STREIT: In terms of avoiding mid-air collisions with another aircraft, is that part of the emergency training at the school for MRH-90 pilots?

LTCOL CAMERON: Yes. So when you're flying around in formation you just maintain your position. However, due to various reasons the formation may get separated from each other and you'll need to conduct what's called a rejoin, and that's where you obviously have to create a speed overmatch where you've got to go faster to catch up to the other aircraft, and then it becomes a judgment activity to rejoin the formation. We will put extra deconfliction measures in place, whether that's flight separation or going behind an aircraft, but then we also have a recovery procedure that if you do come in too fast and you misjudge it that there is a slight procedure to bug out - we call it a bug out - to move to the other side.

COL STREIT: Is there a standard practice that's taught as an initial response to avoid a mid-air collision when you're the rear aircraft and you're getting too close to the aircraft in front of you? In other words, is there a standard practice where you climb, where you descend, where you go left, where you go right?

LTCOL CAMERON: Well, so you will generally - if that's the case and you've got a significant closure rate, if it's during just normal formation – i.e. conducting a hold, et cetera – then if you've got a large closure rate, you're going to turn away from the formation and establish a distance away from the formation rather than going up or down. You could climb up if you were at low level, but that would – the situation would depend on what you do, but the general rule will be to turn away from the formation if you did get into that situation.

COL STREIT: Exhibit 2 on the screen, please. The heavy left.

MS McMURDO: Heavy left formation in the diagram, yes.

COL STREIT: So I'm just going to ask you a question. If I'm flying in that formation and I'm in the third aircraft in that heavy left formation, and for whatever reason the aircraft to my top and right slowed down unexpectedly, or I was moving too quick and I wanted to avoid a collision, what options do I have?

LTCOL CAMERON: So if it was the left turn, your option is to move down and behind 2 and bug out to the right, or turn left. Obviously, that'll create an issue for 4, but you've got to do what you've got to do.

COL STREIT: What about climbing?

LTCOL CAMERON: You can climb. However, what climbing does is, with that large coning in the front, you'll go up and you'll lose sight of the other two aircraft that are down low. That's why we try and maintain the same level, so - because obviously seeing through that large coning, if you climb it makes it very difficult to maintain visual separation with the preceding aircraft.

COL STREIT: If I'm too low to the deck – that is, 200 feet in a sortie – I can't go down, can I?

LTCOL CAMERON: No, you don't have much room to go down at all.

COL STREIT: So we're only talking about 60-odd metres, aren't we?

LTCOL CAMERON: Yes.

COL STREIT: Just in relation to how the aircraft reacts, if I want to climb suddenly or descend suddenly, is the rate of that action the same, or is climbing quicker than descending?

LTCOL CAMERON: It depends on your control inputs, because obviously gravity – you can probably descend quicker than you can climb. However, if you increased collective, which increases your rotor thrust, as well as a little bit of after cyclic, you will be able to climb pretty quickly as well. Like, you could climb and separate from the formation, but if you did a significant climb you could climb and get away from the formation. However, you'd probably be – depending on the cloud above, you'll then be essentially conducting that inadvertent IMC drill.

So you can climb, and climb at a great rate, to get away from the obstacles, but it'll be dependent if you're in a valley, what are the mountains that are around you or the terrain that's around you. If you're over water, it's obviously fairly straightforward but depending on how close things are to

you in the vicinity of where you are over water. However, like I mentioned, if you climb a little bit and you still want to maintain your position in that formation, that's when it can become difficult, because of the visibility associated with trying to look over the coning.

COL STREIT: The exhibit on screen identifies four helicopters travelling in a straight line. What if I'm the third aircraft in a heavy left formation turning left and I'm worried about getting too close to the aircraft in front because it's slowed down unexpectedly? What can I do?

LTCOL CAMERON: So that's where you use that manoeuvre position, so your arc – I don't know if we've got the STANMAN picture, but when the aircraft – that picture is a little bit misleading in that when dash 3 has to move, as they move in behind 1, they still need to have two rotor di from dash 2. So if dash 2 also came in and was pretty much behind 1, they still need – so it's not just moving across laterally that way, there is an arc that they need to use, because if 2 comes across they still need to have that two rotor di between them and 2. So you can sort of see where that – if I was flying 3 there, I would be back a little bit further than that because you've got to use that arc of freedom, as we call it, that's in the Standardisation Manual.

COL STREIT: Does anything change if I'm flying at night?

LTCOL CAMERON: No, same by day and night.

MS McMURDO: But does the whole thing become more difficult at night because of - - -

LTCOL CAMERON: Yes, definitely it's more difficult, but the procedures that we employ are no change.

COL STREIT: And the two rotor diameters with dash 3 in this diagram, that's relevant to dash 2?

LTCOL CAMERON: Yes.

COL STREIT: In a left turn, as described, you've talked about, in order to stay in position in dash 3, because you're on the inside of the circle, you'll slow down and try to collapse more to the 6 o'clock position in the turn?

LTCOL CAMERON: Yes, sort of the 6.30 to 7.

COL STREIT: What would dash 2 normally do in a left turn in order to stay at two rotor diameters?

LTCOL CAMERON: So dash 2 will, because they're fairly close to them, their - - -

COL STREIT: Well, they're no closer, right? They're still two rotor diameters?

LTCOL CAMERON: Yes, but it's closer to 1, but then because 3 needs to maintain – because if you superimpose, you've got two rotor dis between 1 and 2.

COL STREIT: Yes?

LTCOL CAMERON: But then out here where dash 3 is, there would be two rotor di's and then you'll have another rotor di for dash 2, and then there'll be another two rotor di's. So they're essentially five rotor di from 1, but then they can get no closer than two rotor di from dash 2, but the majority of the time that they're flying around they're about three to four rotor di from 2 because they're on the other side of the formation, and then they use those arcs to move in to manage their energy as they're flying in formation.

So if anything, because you can imagine they're five rotor di away from 1, the amount that they've got to accelerate or decelerate through turns is more than 2 has to do. So 2 can still stay there. Their rate of speed change will be a little bit less than 3, and that's why you'll often see 3 and 4 move into that manoeuvre position to manage their energy through turns.

COL STREIT: So let's talk about dash 2 now, not dash 3. In a left-hand turn, in order for dash 2 to retain two rotor diameters in a left-hand turn, noting that dash 2 is on the outside and subscribing a larger geometric path, dash 2 basically has two options to stay in position. One is to use power to speed up and remain on the outside. The second one is to collapse more into the 6 o'clock to be coincident with dash 1's turn circle as well. Would that be true?

LTCOL CAMERON: That's true, or a combination of both.

COL STREIT: Or a combination of both. So it's reasonable to suggest, in a left-hand turn, dash 2 also collapses more to the 6 o'clock position of dash 1. At the same time, on the inside of the turn, dash 3 and 4 are also trying to collapse more into the 6 o'clock to maintain position. So at that point the two rotor diameters distance that dash 3 needs to remain off dash 2 arguably could collapse quite quickly as dash 2 and 3 are both moving in towards the centre. Would that be true?

LTCOL CAMERON: Yes, correct, sir.

COL STREIT: At that point, dash 3 would need to take more drastic measures – well, drastic is the wrong word – would actually have to take more control measures to maintain two rotor diameters from 2?

LTCOL CAMERON: Yes, correct, sir.

COL STREIT: Increasing the workload, clearly, by doing so?

LTCOL CAMERON: Yes.

COL STREIT: I just want to turn, now, to paragraph 32 of your statement where you deal with night-vision device currency, qualification and proficiency:

> *At the time off the incident on 28 July 2023, night currency, as stated in SI, Standing Instruction Aviation Operations, required pilots to have performed three night aided and three night unaided landings in the previous three months, as well as a requirement to be instrument current.*

Could you just explain what you mean by that sentence? In other words, what does "pilots are required to perform three night aided and three night unaided landings"?

LTCOL CAMERON: Sorry, so three aided landings are with the use of a night-vision instrumentation system, so NVG landings or TopOwl landings, depending on your aircraft type. So you need to do three take-off and landings in that. Night unaided landings will be generally to a runway where we will not use those devices and we'll just fly normal approach, or take-off and landings, without the use of those devices, so unaided flight. And then instrument current is being able to fly under instrument meteorological conditions, so using the instruments and artificial horizon, et cetera.

COL STREIT: If I have this wrong please tell me. Do I understand your evidence in this way: that in order to maintain night-vision device currency for an MRH-90 pilot to fly at night, that pilot, in the previous three months before he or she goes on a mission, has to have performed three night aided and three unaided landings; is that correct?

LTCOL CAMERON: That is correct.

COL STREIT: Was there a change to that policy post the incident on 28 July 2023?

LTCOL CAMERON: Yes. So one thing that came in early last year was the Defence Aviation Safety Regulations put out some regulations regarding flying with night-vision devices, and as part of that was illumination as well, so different – there are different light levels. Obviously the image intensifier tubes, they enhance or amplify light, which provides the image that we're after that help us fly. At lower illumination levels, the image is not as good as in high illumination levels, but then there's also - sometimes it can be too much light, which flares out the different image intensifiers.

So those regulations came out and Aviation Command were required to – we were required to write some new rules to comply with the Defence Aviation Safety Regulations. That manifested in the Special Flying Instruction 09 of '23, which brought out certain rules.

Concurrently with that was obviously the incident of 28 July, and with that, with the rules that came out, there were some more restrictive night-vision currency, weather, and illumination requirements to go flying on night-vision equipment that came out from the MAO, Military Air Operator, accountable manager, being the commander of Aviation Command, put out more restrictive rules until the results of the accident investigation came out, and then those rules will be reviewed.

There's also an inquiry or investigation from some external senior leaders that are going into looking into best rules, best practice for night-vision rules and regulations across the various environments and conditions that we are required to operate in.

COL STREIT: After the incident on 28 July 2023, Aviation Command issued a special flying instruction to provide further restrictions for night flying in certain illumination levels and weather; is that correct?

LTCOL CAMERON: That is correct.

COL STREIT: If you don't know then say so, but was that a change brought in as a consequence of the incident on 28 July 2023?

LTCOL CAMERON: So the illumination levels were as a response to the new DASR regulation. The DASR regulation already articulated that we needed to specify weather as well, but we'd already been doing that. The commander – wider restrictions came in. There were also hours restrictions, or hours proficiency limits for extra hours for the pilots to have

flown, either in the aircraft or under night vision, which also came in as part of that SFI, as a result of a proactive measure until the investigation and contributing factors could be clarified, is my understanding, but I can't comment any more on the actual why and how they got to that.

COL STREIT: Just in terms of timeline for these instructions, to the DASR regulation changed in February 2023?

LTCOL CAMERON: That's my understanding, sir, yes.

COL STREIT: The accident occurred on 28 July 2023. There was an SFI 7 of '23 which was issued on 22 October for enhanced NVIS regulations. So October to February - what's that - eight months after the regs had been introduced that there was a record of implementing any change in accordance with the regs, and then subsequently SFI 9 of '23 was issued a couple of months later with full compliance with the regs. Is that your understanding?

LTCOL CAMERON: That's my understanding, sir.

COL STREIT: So there's a gap of some eight months before any instruction was issued relating to implementation of changes to NVIS flight restrictions as a consequence of the DASR regulation changes in February?

LTCOL CAMERON: Yes, correct, sir. That's my understanding.

COL STREIT: Was there any changes in any operating practice in knowledge of the NVIS restrictions that changed the regulation in February? Were there any changes at the School of Aviation - Army Aviation prior to SFI 7 of '23?

LTCOL CAMERON: Not that I'm aware of, sir.

COL STREIT: Just going to turn now to pilot qualifications and graduation from the School of Army Aviation. Pilots graduate from your school as CAT D MRH-90 pilots; is that right?

LTCOL CAMERON: That's correct.

COL STREIT: What happens next for those pilots?

LTCOL CAMERON: So those pilots, after they graduate they then are posted to one of the operational units where they join one of the squadrons and troops as air crew members, as D Category pilots or air crewmen.

COL STREIT: For MRH-90 pilots, that's a posting to 5 Aviation Regiment or 6 Aviation Regiment; is that correct?

LTCOL CAMERON: Correct, noting that MRH was being withdrawn from 5 Aviation Regiment in the second half, or come August of last year, of 2023. So pilots in the preceding 12 months were only getting posted to 6 Avn Regiment at that time, but for the years preceding they were going to 5 or 6 Avn Regiment.

COL STREIT: But for other iterations of pilot training prior to 28 July 2023, the normal sequence of events, MRH-90 pilot, nine months' training at your unit. Provided they graduate, the normal process is to be posted to 5th Aviation Regiment or 6th Aviation Regiment; is that correct?

LTCOL CAMERON: Yes, correct, sir.

COL STREIT: Was there any particular criteria as to how it was determined whether you were posted to 5 Aviation Regiment or 6th?

LTCOL CAMERON: Trainees put in their preference due to personal circumstances as well as career ambitions, and they're considered, and then that is decided by the Career Management Agency in conjunction with some recommendations from us about suitability for different units and, yes, so there's no real general rule for where people go. We try and find the best fits for each unit, noting that each unit does slightly different things.

COL STREIT: Just in relation to the ongoing training for MRH-90 pilots when they graduate from the School of Army Aviation, it's the case, isn't it, that the training for MRH-90 pilots is effectively in a process of training at the School of Army Aviation to CAT D? Is that correct?

LTCOL CAMERON: That's correct.

COL STREIT: And then posting to a unit – 5 Aviation Regiment or 6 Aviation Regiment - where you'll undergo unit training to further enhance your qualifications before you reach the point of being qualified to conduct missions?

LTCOL CAMERON: Yes. So a Category D pilot, in accordance with the standing instructions for pilot categorisation, is a co-pilot under development for that unit's mission. A few things need to occur, depending on the unit mission, for qualifications experience that they need to gain. Then they gain their Category C, which is a mission ready co-pilot, and the mission is in accordance with what the unit is required to do.

So for 6 Avn Regiment the mission ready co-pilot is the completion of the special operations qualification course, the co-pilot course, or the junior air crewman course, which means they are then qualified to conduct the 6 Avn mission. Then a Category B is a mission ready aircraft captain, so they would do a special operations course captain upgrade and concurrent, following that course, they would conduct a category assessment which would enable, or give them the qualification of Category B pilot, which is a mission ready captain.

COL STREIT: I just want to now turn to air crewman training. Air crewman training was conducted at the School of Army Aviation; is that right?

LTCOL CAMERON: Correct. For MRHs, yes.

COL STREIT: Was there training conducted by air crewmen before they arrive at the School of Army Aviation?

LTCOL CAMERON: So there is two pathways for air crewmen to train at the moment and previously. At the 723 Squadron, the Joint Helicopter School, there is a pathway for air crewmen to train on the EC135, and then they move to the School of Army Aviation to conduct their operational-type transition, onto the battlefield aviation aircraft.

However, about two years ago I ran a trial to put air crewman through on – all on the operational types, so they do all their basic air crewman training on the MRH, and that was – so they never went to 723. It was a very successful trial because it sped up the training time that it took to get an air crewman through the course and into the unit, because with the EC135 you can only train one at a time.

With the Mr Hazell, you can have two aircrewmen training. While one's in the right-hand seat being under instruction, their course buddy can be in the left-hand seat learning via osmosis, so they essentially get double the aircraft experience by training them through on an operational type, but then you also get the added benefit that you're not putting them through two courses by the one at Nowra on one type of helicopter and then through on their operational type at the end of their training. They've already qualified on the operational aircraft they're going to go on to anyway. So there's a couple of main reasons that was a successful trial.

COL STREIT: And the training that's conducted, that's about six to nine months, is it? That's the duration of the course they do?

LTCOL CAMERON: It is about six to nine months because there's various

courses that they will do, from induction course, then the rotary wing basic course, whether they go through Nowra and then synchronising when they start their MRH course. So there's a little bit of variance depending on lining up all those different courses that they need to do, and then at the end they've got to do a tactics course as well. So that's why there's a little bit of variance there.

COL STREIT: In terms of availability of MRH-90 aircraft at the School of Army Aviation to the period that you were there, were there any disruptions to training as a result of unavailability of aircraft?

LTCOL CAMERON: From my experience there were minor interruptions that occurred from time to time, but nothing major that I can recall that affected training during my period there.

COL STREIT: I just want to touch now on Army Aviation governance. So there's the Army training manual. What does it do?

LTCOL CAMERON: Yes. So the Army training manual is essentially the training framework that we operate within, how our training is designed, how it is – the learning management packages are built, and then how training is conducted and managed, right through to completion of courses and course administrative. So it is a training – the Army training manual provides that guidance on how to conduct training. That's not aviation specific, that is Army-wide training governance.

COL STREIT: Defence Aviation Safety Regulations, how are they brought in to provide guidance for training?

LTCOL CAMERON: So the training governance talks about how we conduct training. The Defence Aviation Safety Regulations provide the guidance to all the ADF flying organisations for how they need to conduct their operations. Each flying group or military air operator will have their own set of regulations to comply with the Defence Aviation Safety Regulations and it cascades down from there where we have our – there is numerous instruments that the Commander of Army Aviation Command has which complies with the regulations but also directs the Army Aviation organisation to conduct their operations, standing instructions.

Standing Instructions Aviation Operations is the predominant user one for the aircrew; however, there are some other instruments which, whether it's technical for how to conduct the maintenance, et cetera. There are numerous instruments that are under that but the predominant one we deal with from an operator point of view and a manager and supervisor point of view is that Standing Instructions Operations.

COL STREIT: All right. Thank you.

Ms McMurdo, I note the time.

MS McMURDO: Yes, I'm just conscious we're moving fairly slowly and I don't know how important it is to try and finish the witnesses today. We could do an extra 10 minutes now if that would help.

COL STREIT: Yes.

Can you turn to your experiences flying an MRH-90 helicopter. At paragraph 50 of your statement, you describe it as a technical aircraft and complex. What do you mean by that?

LTCOL CAMERON: It is a very modern state of the art digital helicopter. So there is fly by wire. By complex I mean there is a lot of systems to help you as a pilot within that aircraft and a lot of redundancy built into the aircraft, simple thing like I've mentioned before where it enables you, with the switch of a button, you can switch from night-vision device to forward-looking infrared on the inside of your visor. That obviously helps you. It's another tool in your toolbox to help you fly the aircraft. There is flight management systems. It's a full digital aircraft so that's what I meant by complex and technical.

COL STREIT: The aircraft can be flown in a couple of ways. So it can be flown by the pilot manually and can be flown using an auto pilot; is that correct?

LTCOL CAMERON: Yes. So just like a lot of modern aircraft these days, they come with auto pilots, automatic flight control systems that can assist you in various environments or varying flight sequences where the pilot can still fly the aircraft manually with varying degrees of using the automatic flight control systems within the helicopter.

COL STREIT: In terms of the key components of the aircraft in the cockpit, can you just explain what the cyclic is?

LTCOL CAMERON: Yes. So the cyclic is the control that we'll hold in our right hand that is between our knees, just like a fighter jet. What the cyclic does is if you imagine the rotor disc, when the rotors are spinning, they're a disc. If you move the cyclic forward, the disc will tilt forward and there's a lift vector coming out of the top of the disc and, therefore, there will be a small forward motion, so the helicopter will go forward. Likewise, if you move the cyclic to the right, the disc will turn to the right.

When you're in the hover, you've doing small movements to maintain your position, and when you're flying, you will push forward to speed up, pull back to slow down. Likewise, in the hover you're just maintaining your position forward and aft.

COL STREIT: What about the collective, what's that?

LTCOL CAMERON: So the collective, what it does is each rotor blade you pull up on the collective, it will simultaneously change the pitch of each of the rotor blades at the same time which, if you pull up, it forces more air down which increases the total rotor thrust of the aircraft. So by pulling up on the collective, you generally climb, and lowering the collective, you'll descend. However, obviously tilting the disc will change your lift vector of the rotor disc as well. So there's a few different factors at play.

COL STREIT: I'm just going to show you a document.

MS McMURDO: I think it's up on the screen, yes.

COL STREIT: Perhaps if you look on the screen. Is that a photograph – well, what is that photograph?

LTCOL CAMERON: That is a photograph of inside of an MRH-90.

COL STREIT: Can you just explain where the cyclic is?

LTCOL CAMERON: Sir, if you – I will point – that is the left-hand pilot cyclic and that is the right-hand pilot cyclic.

COL STREIT: So using a laser pointer there to indicate where the cyclic is, so there are two cyclics, one on the left and one on the right in the picture; is that correct?

LTCOL CAMERON: That's correct.

COL STREIT: Using the laser pointer, can you identify where the collective is in that picture?

LTCOL CAMERON: So the right-hand pilot's collective is there and you cannot see the left-hand pilot's collective; it's out of shot.

COL STREIT: There are five screens in the top centre of the page. What are those screens used for?

LTCOL CAMERON: So they're multifunctional displays, as they're called, or MFDs. Generally, we will have – as you can see, this one is set up with the flight instrumentation with the artificial horizon, et cetera. So the outboard ones, in normal operations both pilots will have that up in front of us. Then depending on what you're doing at a certain time, you will use the centre three multifunctional displays to put up anything from aircraft engine systems information, temperatures and pressures, mapping and other situational awareness tools.

COL STREIT: Thank you. I tender that photograph.

MS McMURDO: Exhibit 3.

#EXHIBIT 3 - PHOTOGRAPH OF MRH-90 COCKPIT

COL STREIT: Can you just tell me what the radio altimeter is?

LTCOL CAMERON: So the radio altimeter, or the RADALT as we call it, it's a device that gives us information for our height above the ground or above obstacles. Essentially, it's a reflection – it's a device that will reflect downwards and get a feeding back up and will give us an indication of how many feet we are above the ground.

COL STREIT: What about the barometric altimeter?

LTCOL CAMERON: The barometric altimeter gives us our height above sea level but it is based off atmospheric pressure. So as the pressure changes, our barometric altimeter will change.

COL STREIT: In terms of flying the aircraft using the auto flight control system, if I take off in an MRH-90 and I want to climb to 200 feet and then travel along in a straight line at a speed of 80 knots, what would I do? What do I need to do to engage the automatic flight control system to achieve that outcome?

LTCOL CAMERON: So this is where there's various ways to achieve what you want to do. You can fly it manually and there are what we call trims. So if you move the controls to a certain point, you will hold them and you release the trims, it will hold the controls in that space. There's then another level of what we call upper modes where you will select an air speed hold, a barometric hold or an RADALT hold and various ways of doing it, and you set the reference and you can fly, and the aircraft will maintain that altitude or speed as you direct the aircraft to do.

COL STREIT: So if I engage the automatic flight control system to fly the aircraft at a certain height at a certain speed, is it the case that I can literally remove my hands from the controls and the aircraft will continue along at the preprogrammed settings that I have inputted to the system?

LTCOL CAMERON: That is correct. However, that's where obviously when you're flying instruments and you're up high, you're away from things and pilots will generally – we call it couple up. You turn on all the automatic flight control systems and it will hold you at a certain height and a certain speed, et cetera. When you're down low, we will still use that to assist us and especially over low-contrast terrain like water, we will turn the RADALT hold on and it should hold us at 200 feet. However, there are different ways to change your predetermined reference height and reference speed, et cetera, with numerous controls, whether it's on the cyclic or on the collective or on the centre console.

COL STREIT: If I set the RADALT – if I arrange the automatic flight control system for the aircraft to be at 200-feet height, travelling a straight line at 80 knots, can I place my hands on the collective and the cyclic and force the aircraft to go down below the 200-feet setting?

LTCOL CAMERON: Yes, you can. So the automatic flight control system will hold it there but you can override it as a pilot. Additionally, you can engage those trims because the auto pilots control through different trim buttons and you can depress the trim buttons, move to your new height or whatever, release them and the aircraft will hold at that new reference height or reference speed.

COL STREIT: If I had the aircraft set through the automatic flight control system at 200 feet at 80 knots in a straight line and I put inputs into the collective and the cyclic to force the aircraft to go down to 100 feet, and then if I took my hands off the collective and the cyclic, what would the aircraft do?

LTCOL CAMERON: The aircraft would try and go back to those predetermined reference heights that the pilot set. However, depending on momentum, there's only so much energy you can get out of the engines. There are aerodynamics will play so it's not binary. There will be periods of oscillation as well as rates of change that can be achieved by both the aircraft and as well as flying manually.

COL STREIT: Is there a low altitude warning system in the MRH-90?

LTCOL CAMERON: Yes, there is.

COL STREIT: What's that set at in terms of a height?

LTCOL CAMERON: So the general rule will be to set it at 10 per cent below what your authorisation height is. So if you're not below 200 feet, you'd set it at 180 feet to give you that indication.

MS McMURDO: We might adjourn now. Is that a convenient time to adjourn?

COL STREIT: Yes, it is. Thank you.

MS McMURDO: Yes, all right. We'll adjourn now until – just a minute, is it too soon to come back at 12.45? I'm just conscious of the fact we're still on the first witness.

COL STREIT: Maybe 2 o'clock, Ms Murdo.

MS McMURDO: 2 o'clock, all right. Then we'll adjourn until 2 o'clock. Thank you.

HEARING ADJOURNED

HEARING RESUMED

MS McMURDO: Yes, COL Streit.

COL STREIT: Just prior to the adjournment for lunch, you were giving some evidence about your personal experience flying the MRH-90. I'd just like to return to that if I may. Do you still have your statement in front of you?

LTCOL CAMERON: Yes.

COL STREIT: Could you turn to paragraph 67, please. Paragraph 67 you identify three major night events of significance you're aware of involving MRH-90 which were investigated and recorded in Sentinel. First, what's Sentinel?

LTCOL CAMERON: Sentinel is the aviation safety recording database that we use to input and then track the investigation through to closing out the aviation safety report. So that's an Australian Defence Force database

system.

COL STREIT: In terms of authorisation for access to that system, can any MRH-90 pilot access Sentinel?

LTCOL CAMERON: Yes.

COL STREIT: You identify paragraph 67(a), (b) and (c), you describe it as three major night events of significance involving MRH-90. The first is a recovery from an unusual attitude during a simulated hoist training sequence at the Cape Cleveland Training Centre area in February 2020. Are you able to recall any details in relation to that matter?

LTCOL CAMERON: So from my recollection, it was a night-vision device, a night flight conducting a training winch or hoist in the vicinity of a cliff where the co-pilot had all the visual references. Obviously, hoisting against a cliff you've got hover references. The co-pilot has started to become unstable in the hover, so the captain took over to get the aircraft away from the obstacles and the cliff, and in the process he pressed some of the automatic functions.

However, some of those automatic functions rely on RADALTs, et cetera, and as they came off the cliff, the autopilot went from one RADALT setting to obviously a lot more because they'd come off the vicinity of the cliff, or the high ground. So the aircraft started to fly away and they went over water off away from the cliff and the aircraft captain had to conduct – got into an unusual attitude so he conducted that unusual attitude recovery technique that I have mentioned previously to get the aircraft safe and away and fly away. They went and landed and then discontinued the sortie after that.

COL STREIT: When you use the word "attitude" in the context of flying an aircraft, what do you mean?

LTCOL CAMERON: Attitude is the position of the aircraft in pitch which is nose up and down is pitch and roll is wings low, whether the wing left or right. So the attitude is a combination of both those. Obviously, when you're flying straight you want your wings level and your pitch will be about zero degrees pitch, but that can vary depending on numerous variables.

COL STREIT: In terms of training at the school, is there a process by which the person who is going to be the flying pilot is identified before a sortie occurs?

LTCOL CAMERON: It depends. At the school it will depend what you're

trying to achieve as part of each sortie. If the trainee is needing to learn certain things – i.e. flying the aircraft – then they will be obviously flying the aircraft for those sequences. There might be times when you want to teach them some of the non-flying pilot duties like doing checks or if a simulated emergency happens in the aircraft, you want to see that they are manipulating some of the buttons or engine controls, et cetera.

So depending on what you're trying to achieve, will dictate whether who is flying at the time. Now when you're doing things like hovering and landing the aircraft, you'll want the person that is closest to the obstacles with the best visual reference of those obstacles to be flying to just make it a more stable hover and achieve what you need to achieve.

COL STREIT: What is the taught practice at the school, or what was the taught practice at the school in relation to the second pilot in the aircraft taking over flying responsibilities?

LTCOL CAMERON: So as far as I'm aware, on Black Hawk there's a challenge and response. So the non-flying pilot, or anyone in the crew for that matter, will alert the entire crew, in particular the flying pilot who's in control of the aircraft, of what is wrong or what they're perceiving is a threat to the aircraft. Additionally, we call that non-technical skills or CRM, crew resource management, as it's been known as well. So the crew within the crew, they will identify that and then there's techniques to escalate voice pitch, et cetera, to alert people more to that.

COL STREIT: If you're not able to say then let me know, but is there a process that's taught for MRH-90 trainee pilots about what they need to say and do to take over flying of an aircraft from the flying pilot?

LTCOL CAMERON: So what we would say on Black Hawk, and I cannot confirm whether – I haven't seen it or I'm not too sure about the MRH-90 whether it was taught, but we will call "attitude, attitude" and then taking over. So if there's like two responses and you don't get the response from the flying pilot, a non-flying pilot will then attempt to take over or should take over.

COL STREIT: Again, if you're not able to say let me know, but is there training conducted at the school that teaches trainee pilots who become authorised to be the flying pilot for a sortie? So in other words, if they're given a task to do a sortie, whatever mission it might be, how is it determined who's the flying pilot of that aircraft. So who is going to take off in the aircraft, who is going to flying the aircraft; how does that work?

LTCOL CAMERON: That will be the aircraft captain. They may talk

about it beforehand in the pre-sortie brief of who will do which task. At the school we're focused on getting the trainees to learn so that will be done but generally in the pre-sortie brief and then during the sortie. The aircraft captain will have the final say but, generally, the aircraft captain, the co-pilots fly a lot and the aircraft captain administers the aircraft, does the checks, makes sure that the flight management system, et cetera, is – that is the case.

COL STREIT: So whoever is designated the aircraft captain, effectively has, my words, an oversight role of flying the aircraft?

LTCOL CAMERON: Yes.

COL STREIT: The flying pilot will literally be hands on the controls flying the aircraft?

LTCOL CAMERON: Yes, that's the general rule but the aircraft captain may choose because they're in command of the aircraft and ultimately responsible for it. They may choose to fly at certain times as well.

COL STREIT: Paragraph 67(b), which is the second major night event of significance you've identified, is a formation near-collision during Exercise VIGILANT SCIMITAR '20 in November 2020. Are you able to assist the inquiry about what that matter concerned?

LTCOL CAMERON: So that was 5 Aviation Regiment. That was on Exercise VIGILANT SCIMITAR where a 5th Aviation Regiment – it was a combined aircraft mission. From my recollection, there were CH-47s in the lead with MRH following them. The number 2 aircraft in the MRH packet formation lost situational awareness from the MRH it was formating off. They pulled away from the formation to increase that separation, but then lost situational awareness of where the whole formation was, and they subsequently went underneath the lead aircraft that they were supposedly formating off. So that was investigated.

COL STREIT: When you use the phrase "lose situational awareness", what do you mean?

LTCOL CAMERON: So they lost awareness of where they were at a particular point in time, in this case, in relation to the rest of the formation. So they either couldn't see them or didn't know where they were at that point in time.

COL STREIT: Do you recall – and again, if you don't, please say so – but do you recall was there any recommendations made as an outcome into that

matter to improve situational awareness flying at night?

LTCOL CAMERON: Formation proficiency. So we were more stringent. We were looking into increasing formation proficiency because one of the findings were that members of that crew hadn't conducted NVG formation for a particular point in time. That was probably the main one that I can recall and I, unfortunately, can't recall any of the other recommendations at this stage.

COL STREIT: Do you recall how many aircraft were in the sortie?

LTCOL CAMERON: There were two MRH and at least another two CH-47 Chinooks. From recollection, there might have been ARH, but I can't remember. That was in 2020, when I was not in Army Aviation at that time.

COL STREIT: So at least two MRH and at two CH-47 Chinooks?

LTCOL CAMERON: Yes.

COL STREIT: So a four-aircraft sortie?

LTCOL CAMERON: Yes, correct.

COL STREIT: Do you know what the night-vision device system is used by CH-47 Chinook pilots?

LTCOL CAMERON: So CH-47s use night-vision goggles with a monocle with heads-up display to give them that same aircraft information. So they're night-vision goggles not TopOwl.

COL STREIT: I see.

LTCOL CAMERON: It's only ARH, the Eurocopter aircraft, being ARH and MRH, have the TopOwl system.

COL STREIT: The last major night event you've identified at paragraph 67(c) is the ditching of an MRH-90 in the Jervis Bay caused by engine power loss in March 2023. Are you able to assist the inquiry understanding any more information about that matter?

LTCOL CAMERON: They were conducting an activity in Jervis Bay in the hover where during that serial one of the engines failed which created a loss of power resulting in the aircraft ditching or landing in the water.

COL STREIT: Can you fly the aircraft on one engine?

LTCOL CAMERON: You can fly the aircraft on one engine but there are certain parameters, whether it's weight, height, et cetera, as well as your air speed, because when the helicopter is either heavy or slow or low to the ground, there's not enough power in the remaining engine to keep the aircraft airborne.

COL STREIT: Does the MRH-90 have an emergency flotation system?

LTCOL CAMERON: It can be fitted with an emergency flotation system and although they aren't fitted at the school, my understanding is that, if not all, the unit aircraft have emergency flotation systems fitted.

COL STREIT: Can you describe how the flotation system works?

LTCOL CAMERON: So the flotation systems when they go over water, they will arm the system and then depending on – you can manually inflate the system if you know you're going to enter the water or there are water detection or water activation triggers which will activate the flotation system to inflate.

COL STREIT: Is the effect when that's activated – that is, the flotation system – is the effect to then float the aircraft on the surface of the water?

LTCOL CAMERON: Yes, correct.

COL STREIT: I just want to now turn to your knowledge of some members of the deceased aircrew.

AVM IERVASI: Just before you do, COL Streit.

COL STREIT: Yes.

AVM IERVASI: LTCOL Cameron, just referring back to paragraph 67 of those three incidents you refer to?

LTCOL CAMERON: Yes.

AVM IERVASI: In your recollection, what awareness was there across Aviation Command, the Brigade and the Regiments of those particular accidents; how was that communicated and what lessons were learnt and what changes took effect?

LTCOL CAMERON: So the one in 2020 in the vicinity of Cape Cleveland,

I wasn't in Army Aviation Command. I know people heard about it. I can't recall because I wasn't in the command about what happened at that time.

AVM IERVASI: Sure?

LTCOL CAMERON: The near miss though, that was investigated and took longer. So I was back in Aviation Command. Everybody that had been used in safety days, as an example, so people were very familiar with that incident. There was a distraction aspect to that, numerous findings, contributing factors, et cetera. So it was briefed as part of the investigation because it was a Class B event. There was a Military Air Operator Directive put out with findings and recommendations and action items for certain people to act on those lessons learnt.

AVM IERVASI: Are you aware of the timeline for the report and the directives? It's okay if you don't.

LTCOL CAMERON: Yes, I couldn't – it would be very easy to find, sir. Sorry, I don't have that on hand.

AVM IERVASI: So what I do understand is the incident of 11 November 2020 occurred. I believe it was 12 months later the Defence Flight Safety Bureau report was released. I believe it was then another six months for a MAO Implementing Directive to be released in June 2022. I believe that MAO Implementing Directive had a number of action items, as you've identified, for implementation by November/December 2022. I am also aware through the records that at the time of the accident on 28 July 2023, there was still 17 outstanding action items to be implemented. So just as a note in terms of how was that communicated at the unit level about progress of changes and what might be expected?

LTCOL CAMERON: From my point of view, obviously being in Aviation Command Headquarters, it was well known that we were getting after some of those action items. There was a lot of consultation with the units, but it was predominantly with the Command and the senior aviators of those units about enacting change in response to those action items, and then also what are the second and third order effects of any changes that may occur. So it was well known definitely at the senior levels across the units, the brigade and Aviation Command Headquarters, all those various action items and aspects. At the lower levels, I'm not aware, sir, I couldn't comment on that. But everyone was definitely aware of the incident and some of the lessons out of it.

AVM IERVASI: So was there general discussion about these incidents anyway as part of normal conversations that happened around the regiment

or at the squadron level?

LTCOL CAMERON: Yes, sir. So not being in the squadrons at that time, I can't comment whether there were. But there was definitely used as different case studies, whether it was on non-technical skill refresher courses from what I'm aware of safety days. Every six months, or twice a year, we have safety days where I'm presuming that they would use examples in case studies like that all the time. I can't recall if AAvnTC did or not, but I can't tell what the units did, because I haven't been to one of the unit's safety days. But they're definitely the forum where it's discussed, things like that are discussed.

AVM IERVASI: Thank you. With the 67(c), the ditching in March 2023, talk to me about the awareness of that event and, in particular, were there any measures or steps put in place throughout the MRH-90 community associated with that?

LTCOL CAMERON: Sir, that was briefed significantly across the MRH capability but the whole Aviation Command, as OEI accountability was also reinforced to the aircrew around the place. For the school and in our area, it didn't impact us from an OEI accountability point of view, OEI being one engine inoperative, because we flew in a manner that if we lost an engine, we could land safely. But like all helicopter operations, that's why helicopters sometimes have to hover low and they're exposed.

In CASA land it's called "with exposure", where if you lose an engine, unfortunately, you don't have the power on that remaining engine to fly away or land safely on occasion. So there was lots of discussion about managing the risk, whether it's (1) if you lose an engine or (2) what you're trying to do throughout the command. The actual incident itself was briefed by the commander and command teams throughout the command.

AVM IERVASI: Was the nature of the engine power loss, as an example, was the nature of that as an event more broadly known within the community that it's a possible occurrence?

LTCOL CAMERON: Yes. We know that an engine may fail, yes.

AVM IERVASI: Therefore, what measures do you put in place to respond to an emergency such as that; what training, what practices?

LTCOL CAMERON: Yes, sir. Yes, there could be training, trying to minimise either stay higher, that if you lose an engine you can fly away. However, that creates risk to the people you're either trying to get off the ground or out of the water but maintenance was a big factor of that, the

learnt lessons out of that. So how do we minimise risk of the engine failing from a maintenance point of view as well, so there was a few factors there.

AVM IERVASI: Thank you. So in such an emergency, in the emergency checklist are the actions in there adequate; are they correct? Are you confident in those actions being able to adequately respond to an emergency? Is there confidence in terms of the issued instructions, the flight manual for the MRH-90?

LTCOL CAMERON: Yes. So the engine failed. It's an emergency procedure. There is training. Obviously, we train a lot in the various flight profiles, whether it's in the hover, take off, before, during take-off, during landing, in flight, where we conduct engine failures all the time. So there was confidence in the system from what I was aware of, both in the checklist which is done in collaboration with Airbus through our system, as well as confidence in the training to handle emergencies.

AVM IERVASI: So in your view then, LTCOL Cameron, how confident are you that it was well known about what the strengths or otherwise of the platform were; do you have an assessment of that?

LTCOL CAMERON: Yes.

AVM IERVASI: What was your confidence that the aircraft was well known?

LTCOL CAMERON: That the aircraft was?

AVM IERVASI: Well known in terms of its operating parameters?

LTCOL CAMERON: Yes, so people still - - -

AVM IERVASI: Are you saying you're very confident?

LTCOL CAMERON: Yes, very confident. People were still confident in the aircraft. It had an engine failure. There are a lot of statistics from an engineering point of view on the rates of engine failures around the world for parts spinning and that are spinning very quickly, as you know, sir. We were inside the rates of that aircraft and in collaboration with Airbus there was still confidence in that aircraft going forward.

AVM IERVASI: One final question, what was the confidence in the MRH-90 aviation community in the aircraft itself? Were crew happy and confident to fly it? They felt that they had a safe and effective operating system? What is your view?

LTCOL CAMERON: Yes. So my view, sir, is it was definitely a safe platform to fly with a robust maintenance and airworthiness system, technical and operational airworthiness system around it. There were, like any aircraft type that you're trying to do multiple things with, i.e. a multi-role helicopter like the MRH. There are pros and cons to what an MRH may be able to achieve compared to another aircraft. But from the MRH community, they are very proud of their aircraft and what they were able to do with that aircraft.

AVM IERVASI: Without comparing an MRH-90, as an example, to a Black Hawk, but rather the MRH-90 in its design, what is your perspectives in terms of knowledge of the aircraft design and, therefore, being able to operate within its design. Was that well known or not well known?

LTCOL CAMERON: Yes, we operated it within what is was designed for. We had all the airworthiness instruments being the type certificate, et cetera, with all the subordinate publications and we were very confident that we were operating in accordance with its type design from my awareness.

AVM IERVASI: So any idiosyncrasies or any peculiarities with aircraft operation are well known and documented, and as part of the school they were trained and the students were aware?

LTCOL CAMERON: Yes, sir.

AVM IERVASI: Thank you.

MS McMURDO: I've just got a few questions. Could I take you to 51 of your statement, please, Lieutenant Colonel. There you talk about how the MRH-90 requires all aircrew, including pilots and aircrewmen, to work together. You talk about the limited visibility that the pilots have and how that can be compensated for by the aircrewmen and that they're critical in providing situational awareness.

So if, as we had on 28 July 2023, a flight in formation for four aircraft in less than ideal weather conditions, at night over water at about 200 feet – and assume they're travelling at 80 knots or below – if the rear doors/the doors which are at the rear were closed, that would significantly limit the capacity of the aircrewmen to provide situational awareness to the pilots, wouldn't it?

LTCOL CAMERON: Yes.

MS McMURDO: Then turning to paragraph 54, you say there at the end of

that paragraph:

> *Pilots may use the dials, i.e. use the autopilot, when at height and instrument flying, but usually hand fly, i.e. manually flying the aircraft, when low flying.*

So when they're on the instruments, manually flying, does that affect the low altitude warning system? Would that be off when they're manually flying?

LTCOL CAMERON: No, that's still – yes.

MS McMURDO: They can keep it on?

LTCOL CAMERON: Yes.

MS McMURDO: But they can override it?

LTCOL CAMERON: Yes, they can.

MS McMURDO: They can override it.

LTCOL CAMERON: But there's numerous parts to it. So there'll be an aural warning when you go through a certain – so you'll still hear that, and then there's even a collective safety function where, if you're getting close to the ground, it'll try to pull in power anyway. But that has its limits in itself. But to answer your question, you can override some of it, but some systems you can't.

MS McMURDO: "You can override some of it, but" - - -

LTCOL CAMERON: But some of them still happen, like the aural - - -

MS McMURDO: Can still happen?

LTCOL CAMERON: Get aural warnings and things like that.

MS McMURDO: So is there a directive that the low altitude warning system should always be on, or is that just left to the pilot to decide what to do in the circumstances?

LTCOL CAMERON: The low altitude warning, so that will come on when you go through a certain height.

MS McMURDO: It will come on automatically, no matter what?

LTCOL CAMERON: Yes, it'll come on automatically.

MS McMURDO: You can't override?

LTCOL CAMERON: Yes.

MS McMURDO: You can't turn off the warning system?

LTCOL CAMERON: No.

MS McMURDO: But you could turn off the system that actually corrects?

LTCOL CAMERON: Yes, correct.

MS McMURDO: Then in paragraph 55 you say:

> *If pilots are flying over water under 500 feet, the RADALT hold is required to be turned on.*

Is that mandatory?

LTCOL CAMERON: That's mandatory.

MS McMURDO: That's a mandatory directive?

LTCOL CAMERON: Yes. It will be turned on, but you can still affect it. So like I mentioned with the trim switches, so it can be on but you can disengage it by pressing a button or winding a dial.

MS McMURDO: At paragraph 59 you say:

> *Formation training requires trainees to be on the controls.*

That is, you mean off autopilot when you say "on the controls"?

LTCOL CAMERON: Yes. So there's levels of autopilot. So there'll be certain trims, but yes, they won't have altitude hold engaged or speed engaged generally because they're flying around and Oakey doesn't have any – Oakey's inland, so they're always flying over land. So, generally, it's minimal - - -

MS McMURDO: So when you say "on the controls for most of the sorties there to develop their fine motor skills", you're meaning they're flying manually, without autopilot?

LTCOL CAMERON: Yes, correct.

MS McMURDO: Are you able to say, do Army pilots have an attitude that real flying then is using the controls rather than autopilot?

LTCOL CAMERON: Not - - -

MS McMURDO: That is what shows and hones your real skills as a pilot rather than if you're on autopilot, it's almost like sitting back and letting everything happen for you?

LTCOL CAMERON: No, I wouldn't say there's a culture of that, at all. I think the culture is using the systems to the best of their ability to achieve the safe and efficient, reliable flight every time. So there's obviously – there's a lot going on, and those systems help you maintain the aircraft as safe as possible. So I don't think manually flying – yes, it's something we have to do, but there comes a stage where we also use the systems. And we reinforce during training that, "A member – the aircraft will do this to help you out and you should consider using that", et cetera. So, yes.

MS McMURDO: Then at paragraph 65 you talked about one safety event, which you reported, involving an image intensifier failing within the co-pilot's TopOwl system. Could you just tell me, how would that manifest for the pilot when that happened?

LTCOL CAMERON: So, essentially, he'll lose his night image in his screen and it'll just go black.

MS McMURDO: Just goes completely. Okay?

LTCOL CAMERON: And that happens on night-vision goggles as well. If there's an issue with the goggle themselves or the power supply to the goggles, they'll often just go black, and we have recovery procedures for that.

MS McMURDO: Thank you.

Thanks, COL Streit. That's all I have.

COL STREIT: LTCOL Cameron, I'm just going to turn to ask you some questions in relation to the deceased aircrew. At paragraph 68 of your statement, you say that you knew CAPT Danniel Lyon, and you delivered a ground lesson to him during the regimental officers' intermediate course but otherwise never flew with him. When you say you knew him and you

delivered a course, other than the course, did you have any other interaction with CAPT Lyon?

LTCOL CAMERON: No.

COL STREIT: In relation to paragraph 69, you say:

> *I knew LT Maxwell Nugent, but I did not fly with him or train with him at any stage.*

How did you know LT Nugent?

LTCOL CAMERON: Because I was at Oakey at the time that he was on course and graduating, and I knew of him just from – as he was finishing training, we were around the building together, but I had little interaction with him. And I got to go to his graduation.

COL STREIT: So you were the CO of the school at the time LT Nugent completed his MRH-90 training?

LTCOL CAMERON: No, he graduated the year before I was CO.

COL STREIT: At paragraph 70, you say you flew with WO2 Phil Laycock on many sorties throughout your career. Was that on Blackhawk?

LTCOL CAMERON: That was on Black Hawk, yes.

COL STREIT: Did you fly with him on MRH-90?

LTCOL CAMERON: No, I did not.

COL STREIT: Are you able to express an opinion about your observation professionally of WO2 Laycock if you've flown with him on many sorties?

LTCOL CAMERON: He was one of the, if not the most competent professional and relied-upon senior aircrewman that we had.

COL STREIT: Did you know CPL Alexander Naggs?

LTCOL CAMERON: No, I did not know CPL Naggs.

COL STREIT: Thank you.

Ms McMurdo, they're my questions.

MS McMURDO: Thank you. Now, there haven't been any applications to cross-examine, so I'm presuming no-one wants to cross-examine? No; all quiet.

LCDR GRACIE: Ma'am, if I may, I have raised with counsel assisting recently the wish to seek leave to cross-examine.

MS McMURDO: Would you like to go to the microphone, because otherwise what you say won't be recorded. Thank you.

LCDR GRACIE: Ma'am, I do seek leave to cross-examine. I wasn't fully aware of the detail of counsel assisting's questions to ascertain when I would want to form that view, but I do seek leave to cross-examine on some matters that are solely within the statement of the lieutenant colonel. I might be about five to seven minutes.

MS McMURDO: Okay. Do you want to be heard on this?

COL STREIT: No.

MS McMURDO: No. All right, we'll give you leave to cross-examine, LCDR Gracie.

LCDR GRACIE: Thank you, ma'am.

<CROSS-EXAMINATION BY LCDR GRACIE

LCDR GRACIE: Sir, could I just ask you to go back to para 67(b). And I may have missed it – I'm not sure – but I don't know whether or not you said whether that formation was on a night sortie or a day sortie?

LTCOL CAMERON: No, it was a night mission.

LCDR GRACIE: Night mission. Thank you. And any weather-related matters?

LTCOL CAMERON: Not that I'm aware of.

LCDR GRACIE: You mention that, on your understanding of matters, there was a loss of situational awareness and the aircraft pulled up, out of formation, or the loss of situational awareness was due to the fact that there was a loss of visual awareness as to where the aircraft was in the formation. Is that what happened?

LTCOL CAMERON: Yes. So I think they lost visual. They were further apart, they were spaced out, and I'm not too sure why, but they were – did lose visual with the aircraft, the lead MRH. At that stage, they did turn right, because they were in that right-hand side of the formation. Turned away, and then turned back towards the formation to try and find them, and it was at that stage that the formation had actually turned right, and they went underneath the formation.

LCDR GRACIE: Do you know if the aircraft doors were open, or the speed of the aircraft?

LTCOL CAMERON: I couldn't tell you that information, sorry.

LCDR GRACIE: Just in terms of situational awareness, you've identified in that particular scenario the situational awareness relative to other aircraft, but there's also situational awareness relative to the horizon line, isn't there?

LTCOL CAMERON: Yes, correct.

LCDR GRACIE: At night, if you're flying in formation, are you, as the pilot, focusing on obtaining your situational awareness from the horizon line on your screen, or visually on the horizon line, or relative to the aircraft in front?

LTCOL CAMERON: All of it. You'll be trying to maintain level with the other aircraft in the formation. What you will do is you'll – so you'll essentially put the top of their cabin on the horizon, so you're about the same level as them. But through your – the information in your heads-up display, you'll be using all that information to maintain your orientation, reference the horizon as well as the other aircraft.

LCDR GRACIE: If you have the rain squall off to the right and you can't visually observe the line of the horizon or the horizon line, and you've got the doors closed, so you've got limited assistance from the aircrew, you've got your screen on, are you able to see through the screen to the aircraft in front?

LTCOL CAMERON: Yes, definitely.

LCDR GRACIE: So you're not solely flying by the horizon line coming up on your screen?

LTCOL CAMERON: No. No, you're taking numerous - - -

LCDR GRACIE: Both?

LTCOL CAMERON: Yes. Numerous visual cues that you use to maintain both your aircraft attitude – which is obviously pitch up and down; the horizon will move up and down, and the artificial horizon in your heads-up display will move up and down in relation to your pitch as well. And then down to the fine details of you'll be able to – because you get used to the pitches of the aircraft you're formating off, whether you're on top of them – if you start drifting up, you'll obviously start looking down on top of the aircraft, or if you drift down, you'll be able to start to see underneath it, et cetera, because its attitude will generally be fairly stable. And then, when you're moving, you just get used to what the pitches look like.

LCDR GRACIE: Sir, I think you mentioned – it's not in your statement as far as I could see, but I think you mentioned that there was an infrared camera?

LTCOL CAMERON: Yes, correct.

LCDR GRACIE: In the nose?

LTCOL CAMERON: Yes. So there's a forward-looking infrared, or FLIR, camera on the nose of the aircraft which can provide situational awareness as well.

LCDR GRACIE: So, sorry to be a bit obtuse about this, but when you talk about this aircraft being very safe to fly, particularly in a visually-degraded environment, that's presumably because you have the technical factors, the built-in redundancies that you've talked about, and the modern systems that assist a pilot in maintaining that visual awareness?

LTCOL CAMERON: Yes, correct.

LCDR GRACIE: Again, I don't mean to be obtuse about this, but how is it, with all those systems and all those different references, that the pilot is still losing visual awareness in a formation flight? What could that?

LTCOL CAMERON: So all systems have limitations, and there are still humans in control of these systems, so there is human errors. Aviation – there's illusions. Vestibular system comes into play. So there are both system limitations of the aircraft itself, but humans have limitations as well in regards to their performance.

LCDR GRACIE: But where is the in-built redundancy assisting in that

situation where the human error comes in?

LTCOL CAMERON: -So that's where the training mitigates that risk as far as we can, insofar as reasonably practicable. So that's why it takes six to nine months to train just a basic pilot and you used to work your way through the qualifications, and then learning to use those systems within the aircraft itself, and then also the different crew coordination.

LCDR GRACIE: Is it more likely than not, that a pilot who loses that situational awareness information during a sortie is a less experienced pilot than a more experienced pilot?

LTCOL CAMERON: That could be a generalist comment. Inexperienced pilots do take time to gain – obviously the experience, but also exposure to the various environments that we operate in, and then also the fine motor skills to be able to respond to various flight regimes, et cetera. So it could be – definitely inexperience can play a part in that.

LCDR GRACIE: But does the more complex a system – and this is a complex operating system, you've said – does the more complex a system mean that sometimes it's more difficult to deal with those numerous inputs that a pilot has to factor in to their flying?

LTCOL CAMERON: So, yes, that's where I say it's complex. With experience and training comes being proficient with the aircraft, and being able to do certain actions in the aircraft to get the aircraft to do what you want it to do, to maintain safety and do whatever you want the aircraft to do. Like we talked about with reference to the maintaining with the RADALT hold on, there's various ways that you can change that – whether it's a button here, there's another button here, as well as winding dials – that you can change that reference altitude. So that human machine interface. Like I said, the systems have limitations, the human has limitations, but then that human machine interface and how us as the human enables that system to do what we want it to do also has limitations. Ergonomics is a well-known sort of aspect to this.

LCDR GRACIE: Just on that interface, could you just look at para 64 of your statement, where you deal with that, and you say:

> *On rare occasions I have encountered or been aware of human/machine interface issues.*

I take it that's not just MRH-90-related, is it?

LTCOL CAMERON: No, that's lots of modern aircraft.

LCDR GRACIE: All modern aircraft?

LTCOL CAMERON: Yes, lots of modern aircraft.

LCDR GRACIE: You go on to say that in certain circumstances:

> *It's usually pilot error (such as incorrect data entry into the flight management system, pilot situational awareness temporarily lost or incorrect).*

Do you describe that as pilot error?

LTCOL CAMERON: Sorry, which one?

LCDR GRACIE: In 64 you say:

> *It's usually pilot error -*

- and then you put in parenthesis -

> *- (such as incorrect data entry, pilot situational awareness temporarily lost or incorrect) - - -*

MS McMURDO: I think it's "temporarily lost" – pause – "or incorrect input until the control panels" - - -

LCDR GRACIE: Is ma'am's characterisation of that – and you're a brave person to say it's not, but is ma'am's characterisation of that correct?

LTCOL CAMERON: So, yes, where I sort of said "pilot error". For example, if we're putting in – as part of the flight management system, if we get some digits wrong, it will take us to the wrong place.

LCDR GRACIE: Yes?

LTCOL CAMERON: And that's where I sort of talk about the incorrect data entry.

LCDR GRACIE: But pilot situational awareness, where it says "temporarily lost", is that a common feature of flying, loss of situational awareness?

LTCOL CAMERON: There's levels of situational awareness. So saying it's common is very, very difficult. Because you can lose situational

awareness very momentarily and it could be inconsequential; or you could lose situational awareness and that's where we've got to work as a crew, use the aircraft and the systems, to regain that situational awareness as quickly as possible. So I can't really answer whether it's common because it's a pretty broad sort of question, sorry.

LCDR GRACIE: If you were – and you are a qualified flying instructor – if you were instructing and someone had lost situational awareness, would that be a matter to be correcting them on in their training?

LTCOL CAMERON: Yes, correct; we correct them all the time. So we watch them very closely, we let it play out, and then we will intervene at a certain time when we think learning is not occurring any longer, and then we'll get the aircraft in a safe, benign situation. We will then instruct them and remediate them on what we think was the root cause or a problem that got them into that situation, or why we think they lost situational awareness, and then we will redo the sequence, et cetera. Hopefully they can fly it then at the required standard or do what we need them to do with the aircraft.

LCDR GRACIE: So with the systems in place – the "modern systems" as you've called it – and the human factors – the aircrew observing, possibly the pilot having a visual on an aircraft in front or the horizon – a loss of situational awareness should not occur, if it's all working as it should?

LTCOL CAMERON: Correct. But there is significant variables with a complex situation that's moving very quickly, and we do everything we can to mitigate all the risks associated with that so that doesn't occur.

LCDR GRACIE: Because despite its complexities and its sophistication and built-in redundancy, you say in paragraph 51 that:

> *Aircrewmen are critical in providing situational awareness to the pilots.*

And by that, I take it you mean "visually", out the window or out the door?

LTCOL CAMERON: Yes, correct.

LCDR GRACIE: So you're still reliant, very heavily, on that human factor?

LTCOL CAMERON: (No audible reply).

LCDR GRACIE: Sorry, you nodded?

LTCOL CAMERON: Yes. Yes, that's correct.

LCDR GRACIE: If the doors are closed, that benefit that you have is greatly reduced, as you said to ma'am, I think, when ma'am asked you about the doors?

LTCOL CAMERON: So the aircrewmen provide situational awareness. And where I was talking about they are critical to providing situational awareness is when we're close to those obstacles in hovering, winching, et cetera, going in the vicinity of trees or buildings, et cetera. When we're flying in formation, they are still a part of the crew that provides situational awareness.

However, flying in formation, especially in 6 Avn and Army Aviation, one of the things that we do: weighing up the pros and cons. We generally transit somewhere with the doors closed, because of passenger comfort, depending on where people are sitting in the seats. Because, as you can imagine, the pilots are nice – fairly well protected in the front but, with those doors open, people – it's very windy, it can get cold, especially if it's raining.

So there's other risks that need to be managed when you – whether you have the doors open or closed. Additionally, you'll have the doors closed in transit because there will be airspeed limits associated with doors being open. So there's various things to consider, whether you've got the doors open or not, as people are trying to manage risk going forward.

LCDR GRACIE: Just looking, if you could, at exhibit 2, which is the heavy left formation. I don't know if it's possible to get it up? It is.

MS McMURDO: Yes, I think so.

LCDR GRACIE: Thank you.

If you look at aircraft 3. When you were describing the need for aircraft 3 to slow down on that heavy left to maintain that visual separation, you described with your hand?

LTCOL CAMERON: Mm.

LCDR GRACIE: You actually put your hand up at a 45-degree angle or so. Was that to indicate that the aircraft might want to pitch up to slow down?

LTCOL CAMERON: Yes. So that's how we slow down. We do induce a small – we call it "nose up" or "pitch up", which if we're going that way, as you can understand, you've got the lift vector coming out of the top of

the rotor; if you tilt it, there is now an aft portion of that lift vector, which will slow the aircraft down.

LCDR GRACIE: So there would be nothing particularly unusual in aircraft 3 – or 4 for that matter, but in this case just 3 – pitching up, to slow down on a heavy-left?

LTCOL CAMERON: No; correct. And that's where we were talking about you can slow down and keep staying out there in a turn, or you can slide in, or a combination of all of the above.

AVM IERVASI: Sorry, just as a point of clarification on that, I think we might be mixing metaphors here. When you're referring to pitching up, are you referring to changing the pitch attitude or are you talking about climbing?

LTCOL CAMERON: No. I'm talking about changing the attitude of the aircraft.

AVM IERVASI: Not about climbing?

LTCOL CAMERON: Not about climbing, no.

LCDR GRACIE: Yes.

Sorry, sir, I wasn't clear. But that's how I understand your evidence earlier?

LTCOL CAMERON: Yes.

LCDR GRACIE: And if aircraft 3 doesn't pitch up to slow down, aircraft 2 drops back; and if it drops back past that 3 o'clock position, the pilots have lost visibility of aircraft 2, haven't they?

LTCOL CAMERON: Well, it would be very difficult for the left pilot – if not impossible – for the left pilot to see dash 2, they would be reliant on the right pilot to be looking over their shoulder or sitting forward and maintaining visual separation with 2.

LCDR GRACIE: But the right pilot can only see up to 3 o'clock?

LTCOL CAMERON: If they sit forward in their seat, they can see a little bit aft as well.

LCDR GRACIE: Okay?

LTCOL CAMERON: Generally, if you're just sitting nice and comfortably, 99 per cent of the time you will not see past your 3 o'clock.

LCDR GRACIE: 3 o'clock. All right. Look, I've just got two more topics, ma'am. TopOwl symbology in para 63(d); can I just clarify something about this. You've mentioned the pilots' visors. Is that the HMSD?

LTCOL CAMERON: Yes, correct.

LCDR GRACIE: The helmet-mounted signal display?

LTCOL CAMERON: Yes, correct.

LCDR GRACIE: That's the visor?

LTCOL CAMERON: Yes.

LCDR GRACIE: And that would be used in daytime, without the TopOwl, I take it?

LTCOL CAMERON: No. The TopOwl is a whole system.

LCDR GRACIE: Is it?

LTCOL CAMERON: Yes.

LCDR GRACIE: Okay?

LTCOL CAMERON: So by daytime, we still will take out the image intensifiers, and we'll put in, we call them the day prisms, and it's still – we still have that information in front of us.

LCDR GRACIE: So just that point of difference between HMSD, the signal display and the TopOwl?

LTCOL CAMERON: Yes?

LCDR GRACIE: The TopOwl is the software, is it, that is utilised?

LTCOL CAMERON: The TopOwl is the whole system. So the helmet, the visor, et cetera. The HMSDs or the display module is the bit that clips on the front of the helmet; which the HMSD is that part of it.

LCDR GRACIE: And the image intensifier tubes - are they image intensifier tubes, IIT?

LTCOL CAMERON: Yes, correct, IITs.

LCDR GRACIE: They are fixed to the HMSD at night?

LTCOL CAMERON: Yes.

LCDR GRACIE: To give you the night vision?

LTCOL CAMERON: Yes.

LCDR GRACIE: So they're a further interface with the aircraft?

LTCOL CAMERON: Yes.

LCDR GRACIE: For that night vision?

LTCOL CAMERON: Yes, through the helmet.

LCDR GRACIE: I think you said that you've had an experience with that failing, and I think you said the system was rectified quickly, but do you mean rectified quickly "on board"?

LTCOL CAMERON: Yes. Inboard/on board.

LCDR GRACIE: Inboard? Yes, thank you. Sorry?

LTCOL CAMERON: Onboard. So, yes, airborne. So I flew – well, my co-pilot played around with it, and we sorted it out.

LCDR GRACIE: There was only one other matter, ma'am, and it will be brief. Sir asked you a question about whether you had a view about the aircrew community or the aviation community having confidence in the MRH-90, and your answer was to the effect, in your view "it's a safe platform to fly. It had robust safety and airworthiness systems, and the aviation community were very proud of their aircraft, and what they were able to do with it".

Can I just ask the question again in terms of confidence, and I'll preface it with this. There's been a lot of press, a lot of stigma, surrounding the 47 Taipans in the fleet. They've been grounded now. They've been disassembled. Did the stigma that developed over time with these aircraft lead to a loss of confidence in the aviation community about that aircraft?

LTCOL CAMERON: From the MRH-90 community, there was not a loss

of confidence in the safety of the aircraft. It had its issues with supply chains, maintenance, et cetera, which had the flow-on effects of being able to fly them consistently at certain times. However, through the operational airworthiness and technical airworthiness systems, we were able to – we would not take the – we would not go flying unless we were sure that we were managing the risk across everything that we do so far as reasonably practicable. So as far as confidence in the aircraft as a safe flying platform, I'm not aware of anyone not having confidence in that.

LCDR GRACIE: Yet in para 67, where you've mentioned the three major night events of significance, the first being February 2020, just prior to that in 2019 the entire 47 Taipan fleet was grounded, wasn't it?

LTCOL CAMERON: I'm trying to remember when that was. It was grounded. There was numerous – where it wasn't flying at numerous periods. Like I said, during 2020 I was not in Aviation Command so I can't recall at what stage the aircraft was not flying or was - there was investigations or maintenance issues being conducted at certain times; so, sorry, I can't comment on that.

LCDR GRACIE: This may jog your memory. There was $37 bil for having to get civilian aircraft to replace the Taipans that weren't able to operate. Do you remember civilian aircraft being utilised for a long period in 2019?

LTCOL CAMERON: Yes. So in 2019, yes, when the tail rotor incident occurred and they – like we said, there was an issue found with the aircraft and they did not fly until Aviation Command or the airworthiness system was sure that the aircraft were airworthy and we put them back in. Hence, they did not fly until we were able to confirm everything that was required before they were permitted to fly again.

LCDR GRACIE: Just one final thing because you did touch on this about your awareness generally was perhaps not as focussed as it was in 2022 when you became qualified as an MRH-90 pilot. You also qualified as a flying instructor, a QFI. Is that on the MRH-90?

LTCOL CAMERON: I did qualify as an MRH instructor, but that was – I got the qualification, and then because I was in a staff role, I never actually instructed. But I did achieve the qualification by going through the flying instructor standardisation course.

LCDR GRACIE: I'm not one to belittle your achievements and your other attributes, sir, but if you qualify to fly an aircraft in one year, in 12 months, and you also qualified to be an instructor, that seems to me to be a very short compass of training in terms of qualification and then being able to

instruct. Is that a fair comment?

LTCOL CAMERON: So it actually took a little bit less than 12 months, but being an instructor on the aircraft was more about – it was as much about my position as an SO1 Standards because I was a senior, very senior, Black Hawk instructor, so I was using those – it doesn't matter what platform you're on – core platform, agnostic instructional skills – as part of my qualified instructor's course, my standardisation course that I did on MRH, that gave me a significant amount of more flying time and exposure on the aircraft, and then I qualified as an instructor. But, like I said, I never actually did any instruction on it.

LCDR GRACIE: So as a qualified pilot, are you then a D CAT?

LTCOL CAMERON: No. Because I was already a qualified experienced Black Hawk pilot, I came across as a C CAT pilot. So I was a mission ready co-pilot in accordance with our unit training and assessment plan.

LCDR GRACIE: So a C CAT pilot. And in terms of instructor, would that be a D CAT?

LTCOL CAMERON: No, I was an A CAT instructor because I was an instructor of instructors, but I didn't use it.

LCDR GRACIE: So you were an A CAT instructor on the MRH-90?

LTCOL CAMERON: Yes.

LCDR GRACIE: But a C CAT pilot?

LTCOL CAMERON: Correct.

LCDR GRACIE: Is that because most of the instruction is done on the simulator?

LTCOL CAMERON: No. No, that's because the A CAT instructor – as a senior instructor, I was an A CAT Black Hawk instructor, and that instructor of instructors' skills of how to develop instructors, I was the SO1's aviation standard. So I was the senior instructor of all of Army. So I'd achieved A CAT instructor because it was more about being able to develop and assess other instructors, not MRH-specific.

LCDR GRACIE: Thank you for that. That explanation helps. So how many hours do you have in an MRH-90, sir, roughly?

LTCOL CAMERON: I would say 150, including simulator. 150, including simulator.

LCDR GRACIE: Fifty?

LTCOL CAMERON: 150.

LCDR GRACIE: 150?

LTCOL CAMERON: But that would be a rough guess.

LCDR GRACIE: And how many of that in the simulator? Half, or not?

LTCOL CAMERON: Probably a third.

LCDR GRACIE: A third. Thank you. Just so I don't put it unfairly, are you comfortable saying 100 hours on the controls?

LTCOL CAMERON: Can I get back to you and I'll give you an exact number?

LCDR GRACIE: You can let counsel assisting know?

LTCOL CAMERON: Yes, I can let you know.

LCDR GRACIE: But just in ball park terms, 100 hours on controls?

LTCOL CAMERON: Yes approximately 100 hours.

LCDR GRACIE: Thank you. Nothing further. Thank you, sir.

MS McMURDO: Anything arising from you, Joe?

AVM IERVASI: LTCOL Cameron, I just want to take you back to one of your initial statements about training and the length of the course for pilots and aircrewmen. You mentioned at the start that the course duration could be six months or nine months for pilots?

LTCOL CAMERON: Yes.

AVM IERVASI: Can you explain the differences why that would be?

LTCOL CAMERON: Yes. So if we went and had a perfect run, and went from go to whoa, it would be six months. But then there's enablers where we can have delays in training, as well as when the trainees fail they've got

to go through the remediation process, so that can delay them a little bit more.

For the MRH pilots, to line them up on a combined regimental officer's basic course, the MRH trainees would finish quicker than the ARH trainees, so we would get them through their night phase and get them, like I said, D category pilot, and then we would pause them and they would fly aircrewmen training sorties as a co-pilot. Get a little bit more experience to wait until they could do the regimental officer's basic course with their ARH counterparts, and that break could be generally about four to six weeks.

So that's why, depending on delays, it can be anywhere from six months, if they went straight through and we didn't align them with the ARH pilots, through to potentially delaying them a little bit so they get that better training outcome with other aircraft.

AVM IERVASI: Just to clarify it in my mind then, is there a different qualification standard to students as they come out, or do they all come out with the same?

LTCOL CAMERON: They are all assessed in accordance with the same final handling assessment, which is - - -

AVM IERVASI: However, there may have been a gap in their training as the other companion course was catching up?

LTCOL CAMERON: The other aircraft type course, yes.

AVM IERVASI: And how many hours typically in that four to six-week period with the aircrew, how many hours might they obtain whilst they're waiting to realign?

LTCOL CAMERON: While they're paused, we maintain their currency. They - depending on what flying is going on. It can be a little bit more. But generally we'll try and fly them – and one – or twice a week, sometimes three times a week, and if we can't get them in the aircraft because there's not an aircrewman course on, that's where we'll keep them proficient at the level we need them to go into the regimental officer's basic course by flying in the simulator, or we'll put an aircraft sortie on with them to keep them at that proficiency before they go into that training.

AVM IERVASI: Is there a minimum requirement for course, meaning that some students might leave course but with some additional training not completed, albeit being qualified?

LTCOL CAMERON: Sorry, say that again, sir, about the minimums?

AVM IERVASI: So are there elements of the course that meet a minimum requirement to be awarded the qualification that are less than the total LMP training serials? Can someone leave course qualified, but with fewer sorties than someone else?

LTCOL CAMERON: They can for - because it's competency-based training, so if someone has got recent – got other experiences, we can combine sorties to make things more efficient if they're achieving the required standard. However, the general rule for IET, initial employment trainees, is that they will conduct each sortie within the LMP because that's what's been deemed that they need to be to graduate at the required standard.

AVM IERVASI: One final point, if I may. Following on from counsel's question there about situational awareness, can you talk to me about the relationship between cockpit workload and situational awareness?

LTCOL CAMERON: Yes. Humans have - - -

AVM IERVASI: Generally speaking, if you have a high workload, what is your situational awareness?

LTCOL CAMERON: Yes. If you have a high workload, you can lose situational awareness more quickly, and – yes.

AVM IERVASI: What mitigating steps might you have for reducing cockpit workload?

LTCOL CAMERON: You can use the aircraft systems. You can slow things down so you can regain that situational awareness, or you can remove yourself from the dynamic environment.

AVM IERVASI: And is there a difference between individual situational awareness and crew situational awareness?

LTCOL CAMERON: Yes. Yes, so obviously individuals have their own mental model, but then, as a crew, we've got to communicate amongst ourselves for where we all think the aircraft is in relation to various environments or where it is in time and space. So yes, sir.

AVM IERVASI: Therefore, if I may extend, it's critically dependent upon communication in terms of the crew, so every crew individual is aware of

where their situational awareness is, so collectively the crew awareness is raised. Is that a fair statement?

LTCOL CAMERON: Yes, sir.

AVM IERVASI: Thank you.

MS McMURDO: Are there any other applications to cross-examine?

SQNLDR THOMPSON: Yes, ma'am.

MS McMURDO: Yes. All right, then. Thank you. How long did you intend to be?

SQNLDR THOMPSON: I will be no more than five minutes. My questions are very directed toward WO2 Laycock.

MS McMURDO: Yes.

<**CROSS-EXAMINATION BY SQNLDR THOMPSON**

SQNLDR THOMPSON: Sir, in paragraph 70 of your statement you stated that you flew many sorties with WO2 Laycock throughout your career. Are you able to put any sort of figure on how many, or you could do it in any way that would be easier for you – in hours, or between a time period of months or years, or different exercises? Is there any way you can give us something, some sort of figure?

LTCOL CAMERON: So we were probably in a similar flying unit for approximately nine years where we – if we weren't in the same aircraft, we were probably in the same formation at 50 per cent of that time.

SQNLDR THOMPSON: During that time that you flew together, was that in different environments, such as day and night flying?

LTCOL CAMERON: In all different environments.

SQNLDR THOMPSON: Was it during training exercises?

LTCOL CAMERON: Yes.

SQNLDR THOMPSON: And was it during exercises such as TALISMAN SABRE and similar?

LTCOL CAMERON: Similar exercises. I never flew with Phil on a TALISMAN SABRE, but exercises of a similar nature, yes, I did fly with WO2 Laycock.

SQNLDR THOMPSON: Without providing any further detail than a yes or no, but did you also fly with him under an operational deployment?

LTCOL CAMERON: Yes.

SQNLDR THOMPSON: And that was a high-pressure environment?

LTCOL CAMERON: Yes.

SQNLDR THOMPSON: I'm terribly sorry, I missed your answer when my learned friend, counsel assisting, asked for your opinion or evaluation. I have a fan just behind me and I can't hear everything. What is your opinion or evaluation of WO2 Laycock in his professional abilities?

LTCOL CAMERON: Yes. So WO2 Laycock, as I said, was if not the best, one of the best, and most professional and relied upon senior aircrewmen that we had in Army Aviation.

SQNLDR THOMPSON: Thank you. I have no further questions, ma'am.

MS McMURDO: All right, thank you.

I gather then that there are no further applications to cross-examine? No? Thank you. Anything in re-examination, Mr Streit?

COL STREIT: Ma'am, if I may. Something I overlooked earlier.

<**RE-EXAMINATION BY COL STREIT**

COL STREIT: I just wanted to ask you a question about culture and attitudes within Army Aviation. To your observation since you qualified on MRH-90 was the MRH-90 aircraft supported by Army pilots as a preferred aircraft of choice, compared to the old Black Hawk?

LTCOL CAMERON: Within Army Aviation there were different camps in regards to MRH versus Black Hawk. I could generalise, but there were definitely some of the older people did have an affinity with Black Hawk. Some of the newer generation that didn't know Black Hawk, also they

favoured MRH. Like I said, both platforms have their pros and cons when you're trying to do a wide variety of roles that Army Aviation and the lift platforms, or the utility platforms, are required to do. So they both have their pros and cons, but as far as a culture of whether one platform was preferred by the other, there was mixed opinions throughout the community.

COL STREIT: From your personal experience flying the old Black Hawk before MRH-90 came in, and then the MRH-90, which aircraft do you regard as being easier to fly?

LTCOL CAMERON: I have all my experience on the old Black Hawk, and for that reason – and it was essentially an analog helicopter, so I found that easier to fly than the MRH-90, but I didn't have the experience on MRH-90 that I had. What I will say is that as far as a battlefield helicopter, the Black Hawk did have some advantages in that regards for being easier to fly in some of the roles that we were required to do.

COL STREIT: Thank you. Thank you, Ms McMurdo.

MS McMURDO: Well, you've had a very long day, Lieutenant Colonel. Thank you very much for your assistance, it's greatly appreciated. We don't expect we'll need you further, but if we do need you further, in that unlikely event we'll make sure we give you plenty of notice?

LTCOL CAMERON: All right. Thanks, ma'am.

MS McMURDO: Thank you very much. You're free to go, thank you.

<WITNESS WITHDREW

MS McMURDO: We'll have a short 10-minute break at this point before we call our next witness, who is going to be? The next witness is?

COL STREIT: CAPT Andrew Balaam.

HEARING ADJOURNED

HEARING RESUMED

MS McMURDO: Just to let everybody know that we will sit until 5 o'clock this evening, but not beyond. Yes, COL Streit.

COL STREIT: Thank you, Mrs McMurdo. I call CAPT Andrew Balaam.

<**CAPT ANDREW BALAAM, Sworn**

<EXAMINATION-IN-CHIEF BY COL STREIT

COL STREIT: CAPT Balaam, could you please state your full name, rank and current unit?

CAPT BALAAM: My name is CAPT Andrew Balaam. I'm currently a QFI at the School of Army Aviation at the Army Aviation Training Centre at Oakey.

COL STREIT: Balaam is spelt B-a-l-a-a-m; is that correct?

CAPT BALAAM: That's correct, sir.

COL STREIT: Before you came here today you received some documentation from the inquiry, is that correct?

CAPT BALAAM: Yes.

COL STREIT: Did you receive a section 23 notice requiring your appearance today?

CAPT BALAAM: Yes, I did.

COL STREIT: Did you receive an extract of the inquiry's directions?

CAPT BALAAM: I did.

COL STREIT: Did you receive a copy of my appointment as an assistant IGADF?

CAPT BALAAM: Yes, I did.

COL STREIT: Did you receive a copy of a frequently asked questions guide for witnesses in IGADF inquiries?

CAPT BALAAM: I did.

COL STREIT: Did you receive a privacy notice for witnesses giving evidence?

CAPT BALAAM: Yes, I did.

COL STREIT: Prior to your appearance here today, did you complete a statement for your evidence?

CAPT BALAAM: I did.

COL STREIT: I'll show you a document. Just take a moment, CAPT Balaam, to view that document I have given you and then I'll ask you some questions. Is that a copy of your statement?

CAPT BALAAM: It is indeed.

COL STREIT: Is it 13 pages?

CAPT BALAAM: Yes, it is.

COL STREIT: Is it 79 paragraphs?

CAPT BALAAM: It is indeed.

COL STREIT: Did you sign that statement on 16 February 2024?

CAPT BALAAM: I did.

COL STREIT: Are there any additions or amendments or changes you wish to make to your statement?

CAPT BALAAM: No, I'm happy with the statement as it stands.

COL STREIT: I tender that statement.

MS McMURDO: Exhibit 4.

#EXHIBIT 4 - STATEMENT OF CAPT ANDREW BALAAM SIGNED 16/02/24

COL STREIT: Just keep that statement in front of you for now,

CAPT Balaam. I'm just going to ask you some questions in relation to your background and qualifications. First, you were initially in the British Army, is that correct?

CAPT BALAAM: I was in the British Armed Forces, having served with the Royal Air Force and the British Army.

COL STREIT: You flew different aircraft in the British Armed Forces, is that right?

CAPT BALAAM: I did. I flew the Gazelle, the Wessex, the Lynx and the Merlin Mk3 before transferring to the Australian Army.

COL STREIT: Are they all helicopters?

CAPT BALAAM: Yes, they are.

COL STREIT: You were appointed, or commissioned, rather, into the Australian Army in 2004; is that correct?

CAPT BALAAM: That is correct.

COL STREIT: You subsequently learned to fly – or were taught to fly Black Hawk?

CAPT BALAAM: That is correct, yes.

COL STREIT: You were later trained on the MRH-90 in 2009 in France; is that right?

CAPT BALAAM: Correct. I was on the first MRH-90 course that was run, and that was in 2009.

COL STREIT: In terms of your selection to undertake that training, was that a process that you volunteered for or was it simply because the Australian Army was transitioning to MRH-90?

CAPT BALAAM: Australian Army was transitioning to MRH-90 at the time and I was actually awaiting for a CH-47 Chinook course. But I was available and the offer was made and I elected to undertake the MRH stream.

COL STREIT: How long was the course in France?

CAPT BALAAM: The course itself was about six weeks, mainly simulator.

And then we came back to Australia and did a ground school, the first ground school, at Townsville.

COL STREIT: Who ran the course in France?

CAPT BALAAM: It was run by the original equipment manufacturer, Airbus Helicopters. And they had a training facility in Marignane, just outside Marseilles.

COL STREIT: Were there other Army officers attending that training?

CAPT BALAAM: Yes, there were four of us. There were two naval officers and there were two Army officers, myself being one of them. And we were overseen by an Army qualified flying instructor who oversaw the training being conducted and delivered by the French.

COL STREIT: So does that – if I understood your evidence correctly, does that mean you were effectively one of two Army officers – one of the first two Army officers trained in MRH-90?

CAPT BALAAM: Correct. There were a couple of QFIs that went before us, but we were the first course, standard course, if you like.

COL STREIT: In 2016 you went to the Army Aviation Training Centre and completed Qualified Flying Instructor's Course on MRH-90; is that right?

CAPT BALAAM: That is correct, yes.

COL STREIT: How long was that course, can you recall?

CAPT BALAAM: It was about six months, just shy.

COL STREIT: When you graduated from that course, what qualification did you have?

CAPT BALAAM: I was a Category D qualified flying instructor, and then I went back to A Squadron essentially a QFI on probation. And I was mentored by an A Category QFI.

COL STREIT: Between the period 2009 to 2023 you've predominantly flown MRH-90; is that correct?

CAPT BALAAM: Correct, that's the only aircraft I flew during that period.

COL STREIT: Paragraph 16 you identify your hours as being 2347 flight hours and 801 simulator hours; is that right?

CAPT BALAAM: That is correct, yes.

COL STREIT: I just want to - - -

AVM IERVASI: Sorry, just to confirm, that was paragraph 14, not paragraph 16.

COL STREIT: Yes.

So at paragraph 14 you say you have over 7043 total flying hours on aircraft and in simulators; is that right?

CAPT BALAAM: That's right.

COL STREIT: Does that involve Black Hawk aircraft as well?

CAPT BALAAM: I did fly the Black Hawk briefly between 2005 and 2007 when I was posted to 171 Squadron, in the special ops role.

COL STREIT: So you have 2347 flight hours in MRH-90?

CAPT BALAAM: Correct.

COL STREIT: And 801 flight hours in the MRH-90 simulator?

CAPT BALAAM: Correct.

COL STREIT: You're presently a Category A pilot and a Category B qualified flying instructor?

CAPT BALAAM: Yes.

COL STREIT: I just now want to ask you some questions about governance of Army Aviation.

AVM IERVASI: Just if I may, COL Streit.

So, CAPT Balaam, were you commissioned under a GSO or SSO framework?

CAPT BALAAM: I was commissioned under the SSO scheme. I subsequently transferred to the PSO school as specialist aircrew. So I'm

currently a PSO under the specialist aircrew scheme.

AVM IERVASI: What does that actually stand for?

CAPT BALAAM: Prescribed service officer, and then the OAS – the acronym escapes me at the moment – but essentially specialist aircrew.

AVM IERVASI: Thank you.

COL STREIT: I'd just like to ask you some questions in relation to governance of Army Aviation. So in 2022/2023 you were posted to 5 Aviation Regiment as a qualified flying instructor on MRH-90; is that right?

CAPT BALAAM: Correct.

COL STREIT: Just in relation to the governance framework that applied to you, can you just explain that framework and how it impacted your day-to-day activity at 5 Aviation Regiment?

CAPT BALAAM: Yes. We were regulated by Aviation Command Standing Instructions, or SIs as we called them. And they were augmented by Special Flying Instructions. Also we looked to the MRH-90 operator manual, essentially the flight manual or aircrew manual, and the Standardisation Manual. And those documents were sponsored by Aviation Command. As we were part of 16 Brigade, 16 Brigade also issued their own SIs and SFIs where required. And then the Regiment itself, 5 Aviation Regiment, issued its own SIs and SFIs as required. And we were regulated by that entire framework.

COL STREIT: Now, SIs is standing instruction?

CAPT BALAAM: That is correct, sir.

COL STREIT: SFI is?

CAPT BALAAM: Special Flying Instruction.

COL STREIT: In relation to 5 Aviation Regiment, those standing instructions, were they issued – are they issued by the commanding officer or somebody else?

CAPT BALAAM: They are issued by the commanding officer as required.

COL STREIT: I just now would like to turn to postgraduate pilot training

at 5 Aviation Regiment. So we've had some evidence before the inquiry that ab initio training is conducted at the School of Army Aviation for trainee MRH-90 pilots and they graduate with a Category D on the MRH-90. They're then posted to 5 Aviation Regiment or 6 Aviation Regiment as that process existed in 2022/2023.

Can you just explain your understanding of the role that you had in 5 Aviation Regiment as part of the continuation of MRH-90 pilot training?

CAPT BALAAM: The junior pilots are posted to us as Category D, as you said, and then the QFI's responsibility for pilots, and the QAI-qualified aircrewman instructor's responsibility for aircrewmen, is to develop those junior aircrew through a training continuum. So trainee continuum - - -

MS McMURDO: CAPT Balaam, could you just pull that microphone a bit closer to you? I'm just having some trouble hearing you?

CAPT BALAAM: Sorry.

MS McMURDO: Thank you.

CAPT BALAAM: There's a training continuum, known as the Unit Training and Assessment Program, or UTAP. And then our job is to basically take those junior aircrew through that UTAP to grow them from Category D aircrew all the way through to Category A aircrew, being the pinnacle qualification.

COL STREIT: In a standard 12-month period of training for an MRH-90 pilot at 5 Aviation Regiment, newly graduated from the School of Army Aviation, in that 12-month period if they're starting as a Category D pilot, where are they likely to end up at the end of the year?

CAPT BALAAM: Typically in a standard year it would take about six months to progress that junior pilot through to Category C. At that stage a Category C enables them to act as a combat co-pilot. Within the UTAP there's a variety of different modules, six modules, and they're broken down further into events. And as you progress through the continuum you collect a variety of events. And once you've achieved a certain standard, you may be awarded a mission qualification. That mission qualification then moves you further down the continuum to an assessment point where you'll be assessed a pilot category for an upgrade to the next stage. In this case it will be Category C. Typically it would take about six months.

COL STREIT: In terms of the UTAP, which is the unit training program, who sets the UTAP? So who determines the parameters and the structure

of that training program?

CAPT BALAAM: The UTAP itself was written by the regiment standards officer, the senior QFI in the Regiment who had responsibility for both types, both CH-47 and MRH-90. And that was written on behalf of the CO, and the CO signed it off as his own. And it was actually a 5 Aviation SI 1-106.

COL STREIT: Did you have any input in your role as the Regiment qualified flying instructor for MRH-90 on the contents of the unit training program?

CAPT BALAAM: I was the A Squadron QFI, subordinate to the regiment standards officer or the senior QFI. But we were heavily involved in developing and designing that and it went through a variety of iterations before we actually published it.

COL STREIT: What information do you use or you have at your disposal to provide input into that unit training program?

CAPT BALAAM: Essentially we get Chief of the Defence Force directives come down through the chain of command through Avn Command to the brigade. The brigade then issues an operational order, and then that gets distilled down further by the individual units into training directives et cetera. So that gives us essentially what we are training for and what our roles and missions are likely to be in the event of a conflict. And then we use that to then shape the UTAP to ensure that our aircrew are suitably trained to meet those directed tasks.

COL STREIT: So is this a fair summary then of the purpose of the UTAP? One is to provide a training continuum for MRH-90 pilots to progress from Category D to Category C, you would agree with that?

CAPT BALAAM: Agreed. And beyond, all the way through to Category A.

COL STREIT: Yes. And a second purpose is to provide that training that's necessary to the 5 Aviation Regiment pilots to discharge whatever role the unit has or the tasks the unit is given?

CAPT BALAAM: That would be a fair summary.

COL STREIT: Just in relation to utilising TopOwl. Just explain what TopOwl is, please?

CAPT BALAAM: TopOwl was the helmet-mounted sighting and display system that we used on the MRH-90. And indeed it's also used on the ARH helicopter as well.

COL STREIT: In 2022/2023 when you were the QFI MRH-90 at 5 Aviation Regiment, do you recall whether there was specific training given to the MRH-90 pilots in relation to the use of TopOwl?

CAPT BALAAM: The TopOwl training was conducted at the School of Army Aviation when the trainees went through their MRH-90 operational type transition. So the idiosyncrasies of the TopOwl was actually taught at the school. And then by the time the trainees got to us at the Regiment they were pretty familiar with the system and it was taken that they were comfortable with it, and then we just continued training.

COL STREIT: In terms of your role as the squadron QFI, can you just explain what your responsibilities were in assessing MRH-90 pilots?

CAPT BALAAM: In addition to my role as a trainer, basically bringing on the junior pilots and mentoring them and teaching them new techniques or adapting existing skills in context, we also conducted assessments. As part of a pilot category, there were two elements. There's a mission assessment and a flying skills assessment, and my job was to conduct the flying skills assessment along with my other QFIs for the trainee pilots when they came up for their pilot category.

COL STREIT: When you say "other QFIs", how many QFIs were there at 5 Aviation Regiment in the period I've mentioned?

CAPT BALAAM: On MRH we ebbed and flowed. At one stage I was the single QFI. But in the 22/23 period there two MRH QFIs on A Squadron, and there was a third MRH QFI, the regiment STANDO. But as I said, he also had responsibilities for CH-47 and MRH as well. But we could call upon him to assist us where required.

COL STREIT: Is there a hierarchy in QFIs – sorry, I'll start again. Is the hierarchy in QFIs determined by whatever category that you have?

CAPT BALAAM: Yes. Essentially we had a very similar category to the pilot category. D being the lowest, essentially on probation, and then you work your way through up to A Category QFI. The regiment standards officer typically was an A Category QFI, and the squadron QFIs tended to be B Category QFIs. And then the other squadron QFI initially was a C Category QFI, and then he upgraded to B Category. So at A Squadron in '22 we had two B Category QFIs.

COL STREIT: To your observation in 2022/2023, did the School of Army Aviation have any further influence or input into training at 5 Aviation Regiment?

CAPT BALAAM: We liaised closely with them. On occasions we were required to conduct additional training. If new equipment came in or new processes or procedures were introduced, normally there was a training implementation plan produced and we were then acting as the school's agents to deliver that at the regiment level.

Additionally, for some qualifications, outwith of the 5 Aviation UTAP that were applicable to the broader capability, learning management plans were produced by the Army Aviation Training Centre and then exported to us where, yet again, the QFIs act as its agents and we deliver that training. Things like high density altitude training in Papua New Guinea, deck landing qualifications.

COL STREIT: Just in relation to Aviation Training Centre, I'll just refer to what I'll call exported courses, is that process where the Aviation Training Centre prepares courses and then provides those courses to be utilised by 5 Aviation Regiment, is that an ad hoc process - - -

CAPT BALAAM: No, it's - - -

COL STREIT: - - - to do with a particular issue, or is it something that's part of the training continuum?

CAPT BALAAM: It's part of that training continuum. For those large qualifications that are applicable across the capability, they will produce a learning management plan. They will control the content, they will control the syllabus, and then we are just essentially delivering that on behalf of the Aviation Training Centre. It's exported to the CO of the unit and the CO of the unit will sign off completion of that training.

COL STREIT: I'm going to turn now to pilot emergency training.

AVM IERVASI: Just before you move on, thank you, COL Streit.

CAPT Balaam, thanks for your attendance today. I have a couple of questions related to postgraduate training. First and foremost, first tour pilots coming onto 5 Aviation Regiment, typically how long would they spend at 5 Aviation as it – what would be a normal first tour length?

CAPT BALAAM: Probably about two to three years. More likely three

years in the modern era. So essentially we could get them through D CAT and probably through to B CAT. But D Category normally took about six months and then another two years on top of that to get them to B Category.

AVM IERVASI: So what happens to them after three years?

CAPT BALAAM: They could remain on the unit and then just continue. Or they may get posted somewhere, to QFI training or maybe even a different type. Although that tended to be the exception rather than the norm.

AVM IERVASI: So was there a difference in terms of first tour duration dependent on whether the individual was a GSO or an SSO?

CAPT BALAAM: I couldn't comment on that. It didn't – from my experience, I couldn't tell.

AVM IERVASI: You note in terms of pilot graduate training that it takes about three-and-a-half years to qualify as a Category A pilot. That's at paragraph 33. So given the nature of a first tour, it's unlikely someone's going to attain an A Category in their first tour?

CAPT BALAAM: Correct.

AVM IERVASI: In your experience at 5 Aviation Regiment, at the completion of a first tour, what category did most aircrew attain: C Category or B Category?

CAPT BALAAM: Probably C Category, knocking on the door at B Category.

AVM IERVASI: With C Category aircrew then concluding after their first tour, how is eligibility selected for postgraduate qualification, like QFI course? So would a C Category MRH-90 pilot be panelled for a QFI course?

CAPT BALAAM: Potentially yes. But in reality you needed to be a command instrument-rated pilot, a command NVG-rated pilot, which is essentially a B Category. So B Category was the preferred entry point. It'd be highly unusual for a C Category pilot to be sent down the QFI stream that early.

AVM IERVASI: In your time managing or overseeing the Unit Training and Assessment Plans in your capacity as a QFI, how have you seen

progression in the last few years?

CAPT BALAAM: It took longer than the UTAP prescribed, and that was just purely by dint of resources. We had a number of groundings on the MRH. So we just did what we could with the resources available and then we just delayed and the category system took that little bit longer.

AVM IERVASI: So in your view, what drives the tempo at 5 Aviation Regiment? Is it the development of aircrew? Is it achievement of an operational outcome? Is it something else? What's the primary tempo driver?

CAPT BALAAM: It was a mix of both. We tried where possible as the QFIs and the training cadre to have a line, an aircraft assigned to us so we could continue developing. But obviously the operational demands came in, and that was a balance that the CO and the chain of command were trying to balance, making sure that we continued to develop our people. But at the same token, we could actually fulfil the assigned task that we were given.

AVM IERVASI: You mentioned at one stage that you were the single QFI in the Regiment?

CAPT BALAAM: That is correct, yes.

AVM IERVASI: What was the general health of the aviation categories at that time? So how many other B Category aircrew were there when you were the sole QFI?

CAPT BALAAM: I couldn't put my finger on it, I don't have that level of detail to hand. But we continued training as best we could with the resources we had.

AVM IERVASI: So what did that mean if you've got – how do you work up a training program? Is there a minimum crewing ratio between categories to train and develop? Can two C Category pilots fly and train together? Can a C and D Category pilot train together? What does the B Category pilot fit in?

CAPT BALAAM: The D Categories traditionally flew with the senior pilots, where we could we'd pair them up with B Category pilots. But when a task came in or a training mission was prepared, it was up to the chain of command, the operations office, the troop commanders and indeed the QFIs themselves, to look at the task and then decide who was best suited to do that task, based on their experience and also their progression along the training continuum.

AVM IERVASI: So for normal progression and a healthy unit, that would assume that there are sufficient B Category pilots to both oversee and train D Category and oversee and develop C Category. Would that be a - - -

CAPT BALAAM: That is fair. I mean, the B Category pilot acted as a mentor. Whilst they didn't have any formal training qualifications, they mentored the junior pilots through a variety of the UTAP events. Indeed, some of our UTAP events enabled them to do that, which took the load off the qualified flying instructors. But for the top end flying skills, that was the domain of the flying instructors.

AVM IERVASI: One other question before I hand over. You mentioned troop commanders as being mission specialists, the QFIs being the flying skills specialists. So troop commanders with the regiments in the respective squadrons, what type of category may they be? Are they generally GSOs versus SSOs? Can you give me a general description of the dynamic between a troop commander and as a mission specialist, and a QFI?

CAPT BALAAM: A QFI, we're essentially looking at the flying skill side. And the troop commander, by dint of them being a GSO, looking at the tactics, the mission.

AVM IERVASI: Sorry, do you mean the troop commanders were only GSOs?

CAPT BALAAM: Typically, yes. Although there were - - -

AVM IERVASI: In terms of design and – or mission sets and flight authorisation, who might be a flight authoriser? Is that troop commanders, is it the QFIs? How does a flight authoriser - - -

CAPT BALAAM: It depended on the sortie or the sequence that you're about to undertake. If it was more training flying skills-related, it would be the domain of the QFI. If it was more tactical task-focused, it would be the domain of the troop commander or the squadron OC.

AVM IERVASI: What was typically the dynamic between troop commanders and QFIs?

CAPT BALAAM: It was very synergistic. We used to support one another. Training programs were developed with them, they knew their people. We understood the training system and we worked together to develop their people as best we could within the resources we had along that training continuum.

AVM IERVASI: No tension at all between QFIs wanting to do it one way and troop commanders wanting to do it another way?

CAPT BALAAM: No, not really. I don't recall in my time any conflicts. There was obviously prioritisation that we would have to work through and there was no conflict really. We were all aiming for the same end state.

MS McMURDO: Could I just ask you to clarify one very small point? In paragraph 33 you said:

> *After about three-and-a-half years, pilots can qualify as a Category A pilot.*

Is that three-and-a-half years after becoming a Category B type pilot or three-and-a-half years after entering 5 Aviation Regiment?

CAPT BALAAM: Theoretically three-and-a-half years after entering the Regiment.

AVM IERVASI: Have you ever seen that theory hold water?

CAPT BALAAM: No.

AVM IERVASI: What typically would it take to get to an A Category?

CAPT BALAAM: You're probably looking around about four-and-a-half to five years. This would be in a perfect world where we weren't called away on tasks. For example, we spent a lot of time doing Defence aid to the civil community, which detracted from our sort of warfighting skills and our training. So it just took longer. We didn't dilute it; we just delayed it and we got to it when we could.

AVM IERVASI: So maintain the standard and the quality were the primary driver?

CAPT BALAAM: Absolutely, yes. That was non-negotiable.

AVM IERVASI: Thank you.

MS McMURDO: Yes, COL Streit.

COL STREIT: Thank you, Ms McMurdo.

I just want to ask you some questions about use of an MRH-90 simulator at

5 Aviation Regiment. You address it at paragraph 37 of your statement. So in your time there, was an MRH-90 simulator at 5 Aviation Regiment; is that correct?

CAPT BALAAM: Correct.

COL STREIT: There was no MRH-90 simulator at 6 Aviation Regiment?

CAPT BALAAM: No.

COL STREIT: In your time, 2022 to 2023, do you recall any pilots from 6 Aviation Regiment attending 5 Avn to use the simulator?

CAPT BALAAM: They had access to both the Townville simulator as well as the Oakey simulator and, really, it depended on the schedules of the simulator where they could fit in and yes, they were regular visitors to Townsville along with 808 Squadron from the Royal Australian Navy who were also flying the MRH at the time.

COL STREIT: Sorry, so in the period 2022-23, do you have an independent recollection of 6 Aviation Regiment pilots coming to Townsville to use the simulator?

CAPT BALAAM: I know they definitely use it. I couldn't tell you exactly if they were there during that period. I'd have to go back and I'll take that one on notice.

COL STREIT: That's okay. Are there records kept of who uses the simulator, time and date and sortie?

CAPT BALAAM: Yes. In Townsville, they were kept by the Thales subcontractor and they tracked the utilisation rate and the rate of effort because obviously they were contracted to provide us a certain number of hours. There was also a calendar where each of the units block-booked their sim time. Additionally, there was a daily log for the hours you flew on that simulator, so they could be tracked going back to that log as well as back to the simulator calendar.

COL STREIT: So there may perhaps be records then - - -

CAPT BALAAM: There may well be.

COL STREIT: - - - at 5 Aviation Regiment as to who has used the simulator and when?

CAPT BALAAM: Whether those records are still available I don't know because the simulator in Townsville is now closed and I don't know what's happened to them.

COL STREIT: We'll make inquiries.

AVM IERVASI: My apologies. Are they not captured through PEX?

CAPT BALAAM: You could do a PEX trawl and interrogate PEX and you should be able to find it because, off the top of my head, the simulator in Oakey was logged as "Simulator 101" and the simulator in Townsville was logged as "Simulator 102". So if you looked at the registration number of the aircraft flown, the simulator, you should be able to track that using PEX.

COL STREIT: Thank you. I'd just like now to talk about pilot and emergency training at 5 Aviation Regiment. At paragraph 39 of your statement you refer to annual simulator development training. That was something that occurred or was required to occur every six months, is that right?

CAPT BALAAM: The annual simulator development training was mandated in standing instructions and that was to occur every year. However, every year you also did a pilot categorisation for flying skills where you also did emergency training. So the way it was organised is you would do your pilot category with an emergency aspect to it and then six months later, give or take a month or so, you would then do your annual simulator development training. So essentially you'll be flying with a QFI every six months, one being an assessment and one being a developmental sortie, doing emergency training and that was all legislated for in SIs.

COL STREIT: I appreciate the special flying instructions dictated the minimum requirements. Effectively what you've given evidence about is in any 12-month period you're doing two required assessments of emergency training; is that right?

CAPT BALAAM: As a minimum, yes. With that, you could also do an instrument-rating assessment, which was also due every year, obviously in the instrument mode of flight, but emergencies were part of that assessment. And then in addition to that, you would also do training development sorties that may be relevant to a future activity. So, for example, when we embarked upon the ship, we used to go and do maritime-based emergency training. It wasn't mandated anywhere, but it was just good practice to prepare our people for that kind of operation.

COL STREIT: Do you recall when you were the QFI at 5 Aviation

Regiment in relation to the unit training program whether the unit training program provided for emergency training in addition to the minimum requirement in the special flying instruction?

CAPT BALAAM: Yes, it did. Embedded within the modules that I spoke about earlier, the events within those modules required the QFIs to take trainee pilots through a variety of emergencies. For example, in the command module, the developmental pathway for Command MBD, there were a number of sorties which involved emergencies.

AVM IERVASI: Sorry, just a clarification in terms of sim usage as well, if I may. I am aware – just correct me if I'm wrong, or clarify for me who can authorise a sim mission?

CAPT BALAAM: It depended on the type of mission. If it was mission-related, it would be the troop commander or the OC. If it was a training-related sequence, it would probably be the QFI. I was awarded powers of self-authorisation. If it was an assessment, I would normally defer to the regiment standards officer as the QFI next in line above me.

AVM IERVASI: So the sim would only be utilised in a deliberate authorised fashion? There was no opportunity for crew to just jump into the sim of their own volition?

CAPT BALAAM: They could do that, but it obviously had to go through the troop commander and it had to be programmed into the squadron schedule, but then it was like any other sortie, be it aircraft or sim; it was planned and authorised in accordance with standing instructions. So, for example, if the crews saw there was a gap in the simulator program, they could approach the troop commander to request sim time and as long as it was a properly authorised instruction, it normally went ahead.

AVM IERVASI: And as an authorised mission, in the instructor operator console, who was providing the oversight for the conduct of that mission training?

CAPT BALAAM: We, as QFIs. I can talk to the training sorties that I did. We would normally construct a training sortie. A lot of them were scripted. For example, the annual simulator development sorties we did were scripted. We had sort of pace notes and a running sheet on what particular theme we were deciding to explore. We would then take that precis to the IOS operator, and they were Thales' technicians.

We would then get them to set up the sortie as per the running sheet and then conduct the list of emergencies or tasks or scenarios that we wanted to

play out. We traditionally could talk to the IOS operator via discreet means if we wanted to initiate something, free something or introduce a new variable to achieve a training outcome.

AVM IERVASI: So as the sole QFI at 5 Aviation Regiment for a period of time in 2022 - - -

CAPT BALAAM: In '22, there were three of us. It was probably around 2019 I was the only squadron QFI.

AVM IERVASI: Squadron QFI. As the only squadron QFI, therefore, what workload was on you then to be able to provide the oversight and the authorisation for sim usage and what happens if you take a day off?

CAPT BALAAM: We still had the troop commanders and the chain of command. They were still responsible for looking after their people and essentially managing the training program at the troop level. If they wanted specialist input from a QFI, by negotiation we'd work through that and come up with a pragmatic plan. If needed, we'd just delay an assessment until I was back.

AVM IERVASI: Thanks.

COL STREIT: You gave some evidence earlier that part of the unit training program incorporated emergency training for MRH-90 pilots; is that correct?

CAPT BALAAM: That is correct, yes.

COL STREIT: Do you recall what was the reason as to why it was considered necessary to incorporate that emergency training in the unit training program?

CAPT BALAAM: During - when you look at the individual modules that we were asked to deliver, emergency training is something we do all the time to simulate battle damage and also to prepare our crews essentially to go to war. So in all of the scenarios we did, we always inevitably used some form of emergency training to help develop the crews because, you know, that was the worst-case scenario, and the simulator itself allowed us to do that safely and efficiently.

COL STREIT: Are you able to assist the inquiry to understand – and if you can't, please say so – but for the inquiry to understand why in any 12-month period there are really only two required emergency training courses that were necessary, that were stipulated in orders?

CAPT BALAAM: That was the minimum that we were mandated to undertake.

COL STREIT: Yes. I'm just asking you whether you were aware or whether you'd been told by your chain of command as to why that was the minimum and it wasn't something that occurred every month or every two months or every three months?

CAPT BALAAM: I don't recall any discussions.

AVM IERVASI: Sorry, CAPT Balaam. Was the minimum one or was the minimum two?

CAPT BALAAM: You had to do a flying skills assessment every year, which required you to do emergency training and that was mandated in chapter 25 of the MRH-90 Standards Manual, and then in addition to that you had to do an annual simulated developmental training sortie with a QFI, so they were the two mandated emergency training.

In addition to that, every year you'd do an instrument assessment, which also involved emergency training, but in the instrument mode of flight, and then in addition to that, as the opportunities arose for simulator training, as a result of UTAP events emergency training was also mandated, but they were embedded in the event instructions for each of the individual events we had to undertake.

AVM IERVASI: So in your professional flying career and your lengthy experience as a qualified flying instructor, what is best use practice for a simulator, particularly with crew category?

CAPT BALAAM: It's the flying skills and emergency training and the contingency training for battle damage and the like. It's an ideal facility to actually test that and indeed, most times when you went into the sim you were practicing emergencies. Even though it wasn't mandated, most crews would go and conduct the training that we needed to be done and then possibly at the end they would conduct relevant emergencies to that mode of flight.

AVM IERVASI: That was the crew's choice to do that, or that was actually structured?

CAPT BALAAM: Yes. No, that was the crew's choice.

AVM IERVASI: Thank you.

COL STREIT: Could you just explain, at paragraph 43 of your statement you talk about a maritime environmental qualification. What's that qualification?

CAPT BALAAM: That was a part of our preparedness module. A Squadron had a role as an amphibious squadron to conduct ship to objective manoeuvre and as a result of that, we regularly embarked upon Royal Australian Navy vessels. A requirement for embarked Army aircraft by the Royal Australian Navy was to hold a maritime environment qualification, so we had to prove that we had done a minimum amount of training, we had a deck landing qualification and a number of other additional qualifications so we could embark. So whilst it was mandated by the Royal Australian Navy, we took that and made it a 5 Aviation unit mission qualification and there was a local process for that in our UTAP.

COL STREIT: I'm just going to turn now to flying a MRH-90 helicopter. How would you describe the MRH-90?

CAPT BALAAM: It was a very modern, highly capable helicopter, 5th generation.

COL STREIT: And in terms of its complexity?

CAPT BALAAM: It was a highly complex machine. It had a lot of equipment on board to make your life easy. It was easy to fly, but it was a challenge to operate by dint of all the subsystems.

COL STREIT: When you say “it's easy to fly but a challenge”, could you just perhaps explain that a little more?

CAPT BALAAM: The amount of information that was presented to the pilot, the amount of subsystems that you had available to you to help you; you had a weather radar, you had a forward-looking infrared, you had four secure multimode radios, you had a secure HF radio, you had a digital moving map display. There was a lot of equipment there that you had to master in addition to just flying the aircraft. So the aircraft was actually quite easy to fly but to operate it and become proficient in all of those subsystems was quite challenging and that's why it took six months to get a trainee pilot through the School of Army Aviation.

COL STREIT: Just explain the concept "crew resource management" as it applies to MRH-90?

CAPT BALAAM: Crew resource management is how we interact with one

another. It's something that's inculcated from day one in pilot training and how we work together as a crew so we can maximise the individual skills, that synergistic approach, that one plus one equals three type of philosophy so we can get the best out of the crew, we can all complement and support one another.

COL STREIT: The MRH-90 has two seats for both pilots. Can it be flown with a single pilot?

CAPT BALAAM: I understand the original equipment manufacturer says it can be flown with one pilot. We never did it that. We always flew two pilots up front or a pilot QFI and then a trainee. Now, by exception, you could fly it with one pilot, but that would require a CO's auth and I don't recall in my time it ever being done.

COL STREIT: In terms of who gets to fly the aircraft out of the two pilots, what training at – or what was the standard operating procedure at 5 Aviation Regiment that – out of an aircrew with the two pilots, that determined who was going to be the flying pilot?

CAPT BALAAM: We trained our pilots to be ambidextrous. They could fly from the left or the right-hand seat. Typically the flying pilot sat in the right-hand seat and the non-flying pilot sat in the left-hand seat, just by dint of the cockpit design. There were some more controls on the left-hand side, you could get into the digital map display, there was a cursor ball and a couple of additional buttons on the left-hand side. The flying pilot could be the aircraft captain or the co-pilot. Traditionally on 5 Aviation Regiment the aircraft captain would sit in the left and the co-pilot would sit in the right.

COL STREIT: In terms of dealing with other aircraft, in terms of engaging with other aircraft, would the other aircraft care who was the flying pilot?

CAPT BALAAM: No, not really, and it really depended on the mission and what you were going to do, where you put the flying pilot. Same-same during the sortie, if the flying pilot needed a break, or for whatever reason, you could change roles, and there was a very formal handover-takeover process. Just because you were sat in one particular seat, didn't mean you weren't going to fly the aircraft, and it really was situation-dependent.

COL STREIT: You mentioned the formal handover and takeover. Can you just explain, from a 5 Avn perspective when you were there, how that worked?

CAPT BALAAM: That's actually laid down in the MRH-90

Standardisation Manual. It's the same for any Army aircraft. It's in chapter 2 in Airmanship and it's inculcated from day one. If I was the non-flying pilot and I had another pilot flying, I would say, "Taking over." The flying pilot would say, "Handing over," and then I would say, "I have control." So there's that three-way process as to who actually has got the controls and then at that final, "I have control," that is the executive to relinquish the controls and then the pilot who requested has got it.

COL STREIT: And is that on an internal cockpit communication - - -

CAPT BALAAM: Yes, that's right.

COL STREIT: - - - or would the aircrewmen be - - -

CAPT BALAAM: It's on an ICS and the whole crew, front and rear, would be listening to that, so there would be no doubt who was actually in control of the aircraft.

COL STREIT: The communication that - - -

AVM IERVASI: Sorry, just to clarify if I may. We are talking about the flying pilot and non-flying pilot. What's the relationship between aircraft captain and co-pilot in terms of authority for flying, pilot and non-flying pilot and taking over?

CAPT BALAAM: The aircraft captain is ultimately responsible. The aircraft captain could either be the non-flying pilot or the flying pilot but the aircraft captain, regardless of whether they're flying or not, has ultimate responsibility, so their word goes.

AVM IERVASI: So if the aircraft captain were the flying pilot and the co-pilot being the non-flying pilot, what circumstances might arise where the co-pilot, as the non-flying pilot, may take over?

CAPT BALAAM: We had a module. In fact, it was an event, intervention training, where we taught our people as part of our crew resource management to intervene if that non-flying pilot co-pilot as you suggested was not happy or felt endangered or felt the aircraft captain was out of their depth. We taught them a methodology not dissimilar to that handover-changeover. It was another three-way exchange.

So, for example, if the co-pilot thought the aircraft captain was going too fast on an approach, they would go, "Speed", to try and elicit a response. If nothing happened, the co-pilot would then use a second challenge, this time a bit more forceful, "Speed. Slow your approach." And then if nothing

happened, the co-pilot was then empowered to take over or call for a go around.

AVM IERVASI: How was that approach received within the Regiment, and was that approach consistent across the Command?

CAPT BALAAM: Yes, it was pretty standard across the Command and, as I say, it was a UTAP event that we undertook very early on in the - sorry, yes, the D to C progression. Not only did it make co-pilots - give them the confidence to be able to intervene, but also gave them the skills when they grew into aircraft captains to intervene as well.

AVM IERVASI: So just confirm for me, that particularly discipline was part of the 5 Aviation Regiment UTAP?

CAPT BALAAM: Yes, it was. Yes. And there was an event in the D to C category continuum that was undertaken in the simulator and there was also a – I think there was a PowerPoint presentation in the ground package.

AVM IERVASI: Did you view that as a fundamental crew resource management skill?

CAPT BALAAM: Yes.

AVM IERVASI: As a fundamental crew resource management skill, did you see its applicability across the Command in the other regiments?

CAPT BALAAM: Yes. I mean, it's a transferable skill; it's not unique to 5 Aviation Regiment and it could be utilised elsewhere. I can't comment on whether it was or not.

AVM IERVASI: That's, I guess, where I'm coming to. With that arguable best practice recognised, how was best practice shared across the regiments and through to the Command as a recommendation for a training sequence that might be better employed standardised across the Command? Is there a process for that?

CAPT BALAAM: Yes, there would be. The regiment standards officers were in regular consultation with Aviation Branch standards officers and they would have discussions and I recall that particular CRM event was introduced by a regiment's standards officer at the time and then he went on to be part of Aviation Branch or Aviation Command standards, so I would imagine that was discussed at that level.

AVM IERVASI: But only ever introduced through a UTAP?

CAPT BALAAM: I can only talk to what I knew at 5 Aviation Regiment. It was in our UTAP. As I say, I don't know what went on in the others. I would imagine it happened there as well, but I can't - - -

AVM IERVASI: And what factors would contribute to that procedure or practice actually working?

CAPT BALAAM: We practiced it in the simulator. We had a number of scenarios and then when we did emergency training, we practiced it as well as like a CRM emergency, a human factors emergency. And then when we did the – in our UTAP when we had the – in the command module when we were developing people to be command NVD pilots, there was an event which involved intervention at low level on NVD and that was designed into that event and that was in the event guide.

AVM IERVASI: It's not an uncommon practice, particularly in civilian aviation as well. One of the factors that impede that is cockpit gradient as well. Can you talk to were there discussions about cockpit gradient, about the willingness of an aircraft captain to relinquish control under that procedure?

CAPT BALAAM: That was inculcated from day one in our flying training that, you know, this was the process and to trust the other person. It's all about trust. You know, you're working together as a crew trying to achieve a common aim. If the other pilot genuinely believed that there was an issue, they had more situational awareness, you were trained to trust that person to do the right thing and they wouldn't be doing it unless they truly believed there was an issue. I think the days of those arrogant captains are well gone and it's not something I encountered in Army Aviation. We understood one another and so never had to - - -

AVM IERVASI: So you believe in your time, particularly in 5 Aviation Regiment, irrespective of rank or position within the cockpit, that trust was there and confidence was there to enable intervention if required?

CAPT BALAAM: I believe it was. I believe it was. I was not made aware or I didn't see anything that would tell me otherwise.

AVM IERVASI: Thank you.

COL STREIT: I'm just going to ask you some questions now about flying the MRH-90. So there's - the MRH-90 as we understand it can be flown in a couple of ways. The first is hands on using the cyclic and collective and the second is using the auto flight control system. Would you accept that?

CAPT BALAAM: Yes.

COL STREIT: Now just in relation to the auto flight control system and the training at 5 Aviation Regiment, was there a distinction drawn in relation to training of MRH-90 pilots flying at low level than flying at a higher level? So in other words, flying at a low level you'd either use hands on flying or the automatic flight control system, while flying at a higher level you'd be hands-on or automatic flight control system?

CAPT BALAAM: We were mandated by the operator manual. There were certain parameters that we had to adhere to that were laid out in the operator manual. There were min usage heights for certain modes. But essentially when you were terrain flying at low level sort of below 500 feet you tended to be hands-on flying and you were getting involved. You may have used some of the automatic flight control system upper modes to assist, but you were essentially hands-on flying.

COL STREIT: So low level is 500 feet and below?

CAPT BALAAM: Correct.

COL STREIT: Is that stipulated somewhere? If you can't recall - - -

CAPT BALAAM: I can't recall. It's something that, you know, is inculcated into us from day one in flying training.

COL STREIT: You gave some evidence about when you fly low level it's effectively hands on the controls. Why is that?

CAPT BALAAM: So you can respond rapidly and appropriately to any challenges or changes that may occur. There would be a lag if you were using the automatic flight control system and it may be not appropriate to use some of the modes because they would not give you the response you required in a timely fashion.

COL STREIT: The aircraft would not be able to respond quickly if you got yourself into trouble at a low level if you were - - -

CAPT BALAAM: The aircraft would respond very quickly. It had a lot of control power if you got involved. It's just that some of the autopilot modes were quite slow and deliberately so. So it was more trim modes so you could beep and roll the trim up, but it would take a period of time to do it, so you tended to sort of fly hands-on at low level.

COL STREIT: What's the greatest risk to a pilot flying low level?

CAPT BALAAM: A CFIT, controlled flight into terrain.

COL STREIT: I'm sorry?

CAPT BALAAM: Controlled flight into terrain, or CFIT as it's called. Basically hitting the ground. It's a very challenging environment, particularly at night.

COL STREIT: And is that because when you are at low level there's not a lot of time to react to something?

CAPT BALAAM: Correct.

COL STREIT: Because the aircraft is moving at a particular speed?

CAPT BALAAM: And you just haven't got the space nor the time available to effect a decent response.

AVM IERVASI: With that workload, flying low altitude, talk us through that. What's the workload in the cockpit to manually fly at low altitude?

CAPT BALAAM: You're working quite hard. You're looking ahead for obstacles and obstructions. We are mandated to fly below a not-below height, so we'll have an above highest obstacle clearance to give us a margin of safety in peacetime. Typically that would be about 50 feet. So we would fly above the highest obstacle at 50 feet. So if you've got 50-foot trees, you'd be sort of 100 foot above the ground. Things happen very fast there, so you're looking ahead. You're picking features. The cockpit would be sterile, so there'd be no superfluous chit-chat. Anything that goes on in that cockpit between the pilots, and indeed the crewmen in the rear, pertains to the actual task in hand because you don't need distractions at that point in time and space.

AVM IERVASI: What would the crew contribute in a low flying section to ensure the continued safe operation of the aircraft?

CAPT BALAAM: At low level you'd be essentially assigned – and this is detailed in the Standardisation Manual – particular arcs to look up obstacles. Overlapping arcs at the front from essentially the 12 through to the 3 for the right-hand flying pilot, and from the 12 through to the 9 for the non-flying pilot on the left. The crewmen would be augmenting that where they could, looking forward. The pilot would be eyes out. Indeed, both pilots should be eyes out. A minimum of one set of eyes out at all times.

If one of the pilots decided – particularly the non-flying pilot – decided to go into change a radio, to change a navigation, they would call, "Eyes in", and then essentially where the crewmen could – for example, if it was the left-hand pilot, the crewmen would then transfer their arc to cover the pilot's arc as best they could. Same-same, the flying pilot would also move their arc to the left to cover the non-flying pilot whilst they're eyes in. Once the non-flying pilot had done what they had to do, would call, "Eyes out," and then people will revert back to their individual arcs.

AVM IERVASI: Would it be fair to characterise flight at low altitude, in particular if the choice is made to fly manually, that in order to reduce cockpit workload and maintain the high situational awareness, crew resource management support is crucial?

CAPT BALAAM: Absolutely, it's critical.

AVM IERVASI: Therefore, you need all the crew active in that sequence of flight?

CAPT BALAAM: Yes, everybody should be getting involved and playing their role to support the team carry out that task.

COL STREIT: I just want to show you a document. Perhaps if I could have it brought up on the screen. Are you familiar with that document?

CAPT BALAAM: Yes. I am. It's the frontispiece to the MRH-90 Operator Manual.

COL STREIT: Is that a document you provided the inquiry?

CAPT BALAAM: Yes, I did. When you asked about the dimensions and size of the aircraft.

COL STREIT: You will see at the top it says the figure "19560". Is that a reference to the length of the aircraft?

CAPT BALAAM: Yes, that is correct. So it's 19.56 metres.

COL STREIT: In terms of when flying the aircraft, and in terms of judging distance, have you ever heard the expression, "One fuselage, two fuselage"?

CAPT BALAAM: No. I have heard it, but it's not something that was common in 5 Aviation Regiment. We tended to use rotor diameters as our spacing for formation. So not the 19.56, but the 16.3 rotor diameter, and

that was the metric we used to judge or gauge distance when flying in formation.

COL STREIT: Thank you. I tender that.

MS McMURDO: Exhibit 5.

#EXHIBIT 5 - DRAWING OF THE DIMENSIONS OF MRH-90

COL STREIT: I just want to ask you some questions about formation flying. In terms of formation flying at 5 Aviation Regiment when you were there, how many aircraft were pilots trained on to engage in formation flying?

CAPT BALAAM: The way we built our formations in 5 Aviation Regiment, we worked as fighting pairs, a lead and a wing. And then we bolted those fighting pairs together into four ships, six ships, or eight ships. So the basic building block for formation was an element, a section, or a fighting pair.

COL STREIT: Do you recall – or how regularly would pilots be trained in flying in a sortie of four aircraft?

CAPT BALAAM: When we did the big events, we tended to do that, but typically we flew around in pairs to practice our formation.

I'm just going to show you exhibit 2, please.

AVM IERVASI: Just before we move on to that, was the formation size built into your UTAP for categorisation?

CAPT BALAAM: Yes. Some of the sorties we were required to do four-ship formations, or in fact it said three or more, I think was the actual terminology we used in the UTAP. Just to add that additional complexity and size.

AVM IERVASI: So if you are a C Category, it's three or more. If you're a B Category, it's?

CAPT BALAAM: For the formations that we did for the C Category, we tended to work as pairs. But then as you progressed up the progression, you tended to do the larger formations, three plus. But not only within MRH; we also flew mixed formations with the CH-47s, and typically we'd end up

with a mixed formation: two MRH, two CH-47s. And then if we were working in conjunction with 1 Aviation Regiment, we normally had a pair of Tigers escorting us. So dependent on the mission, dependent on the task, you could see potentially eight aircraft in formation together. But they were always built in pairs. That was the building block, and then we went forwards from that point.

AVM IERVASI: Thank you.

COL STREIT: Just in relation to exhibit 2, which is on the screen, would you accept from me that that's a representation of a heavy left formation for helicopters?

CAPT BALAAM: Correct. Straight out of the MRH-90 Standardisation Manual.

COL STREIT: In relation to moving in that formation, and if the lead aircraft was to execute a left-hand turn, and you were in aircraft 3, what are the things you need to be mindful of in going along in the same turn and following the formation?

CAPT BALAAM: You need to make sure that you've got enough space between yourself and number 1, so 2 has full arc of freedom, so they could move essentially left or right, as required. So essentially instead of, say, you were flying no closer than three rotor di's you would have to have essentially a six rotor di gap, such that 2 had the freedom of manoeuvre that they would need.

COL STREIT: And is executing a left-hand turn in a heavy left formation easier or harder than executing a right-hand turn when in a heavy left formation?

CAPT BALAAM: I would say it's actually easier. A right-hand turn would be hard because if 2, in their current position, were basically on the inside of the turn – and it's not an easy place to be.

COL STREIT: Just in relation to your personal experience flying an MRH-90, at paragraph 69 of your statement you indicate you enjoy flying the MRH-90. I just want to ask you in relation to TopOwl, which is addressed at paragraph 72 of your statement and onwards, you give some evidence in relation to an effect that sometimes TopOwl can have. In other words, that objects might appear closer, is that correct, than what they are?

CAPT BALAAM: Correct. It's a phenomenon known as hyperstereopsis. It's unique to that configuration.

COL STREIT: Could you just explain is that something that occurs just as a matter of using TopOwl, or is it something that occurs irregularly?

CAPT BALAAM: No. It's a function of using TopOwl because of – particularly at night. It's not something that happens by day. At night, because the position of the image intensifiers are on the side of the head as opposed to in front of the eyes, so effectively what happens is the interpupillary distance that the brain uses to process where you are in space has been altered. So it's an altered plane of reference because the distance between, essentially, the images has changed. As a result, on NVGs you end up with this phenomenon known as hyperstereopsis.

Essentially, under traditional NVGs with them in front of the eyes, you could be at 10 foot. On HMSD with image intensifiers, due to hyperstereopsis, you could be at 10 foot but you would look like you were at five foot. So it was on the side of safety. You were always higher than you were perceived to be. Same/same, if you were in a confined area 20 foot off the trees, if you were on conventional NVGs it would look like 20 foot, but under HMSD with hyperstereopsis it would look like 10 foot.

So yet again, on the side of safety. It took about 10 to 15 hours to adapt to this new world from the old and this conventional NVG image, and that was done at the School of Army Aviation as part of the MRH OTT. Once you were comfortable after that 10 to 15-hour period, you learned what 10 and what five foot looked like in the hyperstereopsis world.

COL STREIT: What time period would elapse in order for that training to deteriorate; that is, your training to train your brain to interpret what it's seeing in a different way than what is actually being revealed? I appreciate that the School of Army Aviation received that training, but if you then don't use TopOwl for a period of time, does that skill degrade?

CAPT BALAAM: Your flying skills are always perishable, but we are mandated to maintain a certain amount of NVG hours, a certain number of landings every three-month period. The idea being is that you could experience that phenomena and maintain a familiarity with that TopOwl world. But once it's learned, it's a bit like riding a bike. Once you understand and know what it looks like, it then becomes familiar. But you need to keep recent at it, and that's where our currency came into it. So three landings every three months; although, we try to do more than that.

COL STREIT: I just want to talk about loss of situational awareness in relation to a pilot. Have you ever lost situational awareness flying an aircraft – any aircraft?

CAPT BALAAM: As a human, you're vulnerable to all sorts of visual illusions. A human is not designed to fly, it's designed to stand up straight in a 1G world with no acceleration. As a pilot, you're subjected to G accelerations and decelerations, so it plays havoc with your vestibular system, that ability to perceive where you are in space.

Obviously in a day, sort of cloudless day, you can see and then you augment that inner ear vestibular system with what you can see, and you formulate where you are. In cloud, you suffer from a phenomena of leans because of that, and you are taught as part of your training when you feel like you're in a banked turn, is just to trust your instruments.

So, yes, I've had the leans before, but we are trained to overcome them. Not to believe your inner ear, and the frailty of the human body, but to actually trust your instruments. That's why they're there, and to focus on those to get you out of trouble. So yes, I've had the leans, but followed through with my training, and it worked.

COL STREIT: I just want to ask you now a little bit more about TopOwl. I understand you participated in a training study for TopOwl in 2020; is that correct?

CAPT BALAAM: Yes.

COL STREIT: What was your involvement in that training study?

CAPT BALAAM: At the time, the HMSD symbology didn't have certain features that were desirable. For example, the version 4 symbol set at the time never had a GPS distance to run. It didn't have a ground speed all the time, and the pitch ladder didn't have five-degree increments on it. So when you're flying an approach to a point in space, to be able to sort of decelerate, do a linear deceleration vertically and horizontally, you need that information to help you do a controlled arrival.

Version 4 didn't have that, so they were looking around at other options – other symbol sets that could work. And the Germans had a version 5.10, as they called it, symbol set. So we looked at this German 5.10 symbol set to see whether it would be suitable, and indeed it did provide you with a GPS distance to go. It did indeed provide you with a better pitch ladder so you could gauge your deceleration, and it also had a ground speed for all of the time. So it was definitely an advantage.

COL STREIT: I just want to now ask you some questions about the deceased aircrewmen. You knew captain - - -

MS McMURDO: Perhaps just before you get onto that, could I just clarify a few things from my perspective. Taking you back to paragraph 54 of your statement, please, Captain, you mentioned there that the aircrewmen are responsible to the captain for anything that occurs, and generally they're the pilots' eyes and ears in the rear of the aircraft to help them avoid obstacles. That must be harder for them to be the eyes and ears of the aircraft if the doors are closed?

CAPT BALAAM: It would make their life more difficult. They did have a window, but obviously their field of view would have been restricted, and it was really up to the aircraft captain and the crew to decide whether those doors were opened or closed, and circumstances would dictate.

MS McMURDO: At paragraph 59 you talk about how you can fly hands-on or automatic mode, and it's an important part of the training, of course, to train the pilots to fly hands-off. So is there a tendency for MRH-90 pilots to prefer to fly hands-on, manually, in that they use their skills more and they feel as though they're real pilots, more than if it's on autopilot when it's a very sophisticated machine that really doesn't require a lot of input from the pilot?

CAPT BALAAM: No. We tend to use the automatic flight control system, the upper modes and its basic modes, to best suit what we're doing on the day. They have an inordinate number of sub-functions that could support what we were doing, and it really depended on what we were doing. And, you know, we were not proud. We would let the autopilot do what it could do best, and sometimes it could do things better than we could. And it also offloaded us and gave us spare capacity to focus on other things because hands-on flying is quite labour intensive, and there's other things we have to get on and do as part of the mission.

MS McMURDO: So it's pretty tiring as well?

CAPT BALAAM: Yes. It's very fatiguing, so the autopilot helped reduce that fatigue. Now, what you could do is you could enact or couple-up certain features to help you, depending on what you were doing. You know, for example, you may decide the speed hold would work if you were trying to do the time on target navigation, because it's all about maintaining that speed, and that was easier to do instead of doing it manually because you tended to drift, and the autopilot was better at that. If you were flying over low contrast terrain you would always have the RADALT, the radar altimeter, holding because it was probably better at assessing your height above a monochrome surface than you were.

MS McMURDO: Is that part of the training, that that's mandatory to keep the RADALT engaged?

CAPT BALAAM: Yes. That is legislated, particularly for flight over water, and that's legislated in our Standard Instructions, that you had to have the AFCS upper modes in, particularly RADALT hold, over water below 500 feet.

MS McMURDO: And that means that if the RADALT hold had been on in this case and everything was working properly, it should have automatically come up before it crashed?

CAPT BALAAM: If it was set correctly.

MS McMURDO: If it was set correctly?

CAPT BALAAM: I mean, I don't know what happened on the night of the incident.

MS McMURDO: No, we don't know yet?

CAPT BALAAM: I don't know what holds they had in, but if you were flying at 200 foot above the water and you had the RADALT holding - - -

MS McMURDO: As you should have, if you were flying at that height?

CAPT BALAAM: It's mandated in SIs that one should have the RADALT hold in. Also in 5 Avn SIs - I can't talk to any other units - we also had to have an oral warning as well. So the RADALT had another function where you had an audio alarm which you could set, and typically we set that at 10 per cent below the height. So for 200 foot over the water we'd set 180. If that went off, that was - you had to do something. You had to get involved and get back to 200 feet, because that was the minimum approved height.

MS McMURDO: But it is possible to manually override those safety features?

CAPT BALAAM: Yes. So you could have the - - -

MS McMURDO: But if you did that it would be contrary to the manual. The Standard Instructions?

CAPT BALAAM: The operator manual says you can temporarily disengage those upper modes to achieve an outcome, but the emphasis on temporarily. So, for example, if you were flying along and you wanted just

to lower to avoid a cloud or something, you could sort of disengage the RADALT hold to dip below that cloud, and then re-engage it, and then it would recapture the 200 foot. Now, if you were flying along with that upper mode fitted, holding 200 foot, I could move the controls and essentially override it. I could also disengage it. I could also then re-engage it at a new height as well.

MS McMURDO: Paragraph 64, you say in the second sentence:

> *You can couple the AFCS to a RADALT height hold, which will hold the aircraft at a pre-described height.*

The guidelines as to when you should or you must do that?

CAPT BALAAM: Yes. As I say, that's in Standard Instructions. Below 500 feet you should have the RADALT hold engaged to essentially give you that protection from CFIT.

MS McMURDO: But it's always if an emergency situation/something crops up, then you can override it?

CAPT BALAAM: Yes, you can override it.

MS McMURDO: So if the pilot felt there was an emergency situation, and it was in fact a false emergency situation because of some optical illusion through the night vision and the poor visibility, the less than perfect visibility, then it's possible the pilot might wrongly override it?

CAPT BALAAM: That could be possible, yes.

MS McMURDO: Then finally, at paragraph 74 you say that there is a different configuration of NVDs between pilot and aircrewmen. A pilot will experience hyperstereopsis, which is not experienced by an aircrewman because they're wearing conventional aviator night-vision imaging systems. So that's another reason why best practice is to involve the aircrewmen in a situation like this where you're flying low over water, at night, with less than perfect weather conditions.

It's important then to engage the aircrewmen. Especially important to engage the aircrewmen, preferably with the doors open, because they've got this different type of night vision, so therefore if the pilots, or one of the pilots, have some sort of optical illusion, or the hyperstereopsis, then you've got the crewmen with a different night vision hopefully not getting that experience, who can use their eyes to guide the situation?

CAPT BALAAM: Hyperstereopsis really was only really noticeable within the - - -

MS McMURDO: Very close?

CAPT BALAAM: Close, within about 30 metres.

MS McMURDO: Then there's the horizon issue as well, isn't there?

CAPT BALAAM: The horizon, yes, would be obvious to the pilots without hyperstereopsis. Hyperstereopsis was really just in the hover within that 30-metre range.

MS McMURDO: But, still, with the Night Owl (sic), there can be that horizon issue, the false horizon issue, that the aircrewmen at the back with the different night vision wouldn't experience?

CAPT BALAAM: No matter what NVG you are on, you can suffer from false horizons. It's one of the known visual illusions on NVG, and that's just a function of the physics. But, yes, having as many people looking out – and indeed it actually states in the formation chapter and the imaging chapter of the Standardisation Manual that the crewmen should get involved, particularly in formation, to assist the pilot and provide you with that additional information.

MS McMURDO: So what I'm saying really though is statistically it's less likely that everyone is going to have the same horizon problem at the same moment, isn't it?

CAPT BALAAM: That depends on the individual, but highly unlikely, I would imagine.

MS McMURDO: Yes, all right. Thank you.

COL STREIT: If I may, thanks, Ms McMurdo.

Can I take you back to TopOwl, please, CAPT Balaam. Were you aware of Senate Estimates' testimony a week or so ago?

CAPT BALAAM: I was aware that something happened. Anecdotally I was aware of the content, but I haven't seen it myself, no.

COL STREIT: So the discussion there was in relation to the flight instrumentation symbology, particularly attitude reference, looking straight ahead, and how it differs when you look particularly in extremes left and

right. Can you just talk us through what that is?

CAPT BALAAM: Right. As I said, we had version 4, and we were looking for solutions to essentially patch some of the weaknesses of version 4 symbols. So version 5.10 came along, and it gave us what we wanted. One of the issues with 5.10 – you get nothing for free in this world – was when you looked straight ahead and you put in an angle of bank, so 30 degrees, what you saw was what you got. If you turned your head through 90 to 120 degrees either side, that angle of bank washed out. So if you were holding 30 degrees angle of bank, the angle of bank displayed in your symbols would be about 23, 25 degrees.

MS McMURDO: I hate to interrupt, but I know we can't livestream or record beyond 5 o'clock, and that gives us two and a half minutes to conclude, so we might have to continue this at the next hearing, I'm afraid. The timing is very imperfect, I know, but I'm afraid these things are beyond our control. We'll have to adjourn shortly, and conclude today's hearing here.

I'm sorry, CAPT Balaam, but we're not able to finish with you tonight. We'd very much like to, but there are so many factors involved over which we don't really have absolute control.

So that in fact concludes today's hearing. We anticipate that the next hearing will be held in Brisbane in late April or early May, probably for a two-week period, which should make days like this, where we've got to leave a witness midstream in answering an important question, unlikely to happen. The precise details, once available, will be published on the webpage. Could I again encourage everyone with relevant information to make a submission through the webpage. We cannot consider what we do not know. Please adjourn.

<WITNESS WITHDREW

MATTER ADJOURNED UNTIL
A DATE TO BE FIXED