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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 INQUIRY

THE HONOURABLE M McMURDO AC
AVM G HARLAND AM CSC DSM

COL J STREIT, with FLTLT A ROSE and MAJ L CHAPMAN, Counsel Assisting

LCDR M GRACIE, representing CAPT D Lyon
SQNLDR J GILES, representing LT M Nugent
MAJ H PEROTTET, with LCDR M TYSON, representing CPL A Naggs
SQNLDR C THOMPSON, representing WO2 J P Laycock
COL N GABBEDY, representing MAJGEN Jobson
SQNLDR M NICOLSON, representing D10
MS K MUSGROVE, representing the Commonwealth
MR S MEEHAN SC, representing Thales Group Australia
MR G O'MAHONEY, representing Airbus Australia Pacific Limited

1000, THURSDAY, 8 AUGUST 2024

DAY 15

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**	17/08/24	(Transcription)

EXHIBIT LIST

Date: 08/08/2024

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

WITNESS LIST

Date: 08/08/2024

Name Of Witness **Page No.**

MS McMURDO: Yes, COL Streit.

COL STREIT: Thank you. Good morning, Ms McMurdo and AVM Harland. I just briefly wanted to indicate a slight change in the order of witnesses today. Obviously we have LTCOL Reinhardt, who will conclude his evidence today. And MAJ Chapman will shortly continue the evidence-in-chief. Following that, the changes, there's Mr David Edwards will then be called, followed by AIRCDRE Joseph Medved, and then followed by GPCAPT Chris Pouncey. I'm hopeful of finishing all those three gentlemen's evidence today. But if not, GPCAPT Pouncey will spill into tomorrow, and we'll finish his evidence then.

MS McMURDO: Thank you very much, COL Streit.

COL STREIT: Thank you.

MS McMURDO: Yes. MAJ Chapman.

LCDR GRACIE: Just before we do commence, I was going to wait until the witness's evidence was concluded, but since he's not in the witness box, could I just raise this? It's come to my attention that the families were afforded a briefing, my understanding is – and I stand to be corrected – that it was by MAJGEN Jobson, in relation to the contents of the interim DFSB report prepared, I think, within about six weeks or so of the accident last year.

There is a perception that if evidence is to be released to people outside of this Inquiry, there is a theoretical possibility that it may be seen to be interfering in the due process of this Inquiry. Now, each of those people who were briefed on this report were witnesses in this Inquiry. The interim report will no doubt be a document that comes before the Inquiry. MAJGEN Jobson is represented in this Inquiry.

It seems to me that if there was to be any disclosure of evidence that's relevant to this Inquiry, then it should have been done through Counsel Assisting and it should also include Counsel representing. It seems anomalous that the families have been briefed on matters that are to be evidence in this Inquiry by a witness in this Inquiry, and yet, not disclosed to Counsel Assisting or Counsel representing.

I raised this yesterday with Counsel Assisting and my understanding is that they were not involved in this. But it seems rather anomalous that we have this situation outside of the Inquiry where evidence is being disclosed, for whatever purpose, but it seems to be untoward and maybe anomalous that we have this.

MS McMURDO: What are you asking for?

LCDR GRACIE: I'm asking, as some Counsel representing have already asked Counsel Assisting, if Counsel representing could be provided with a copy of that interim report?

MS McMURDO: I don't think Counsel Assisting for this Inquiry actually has the power to do that because it's the DFSB report. But could I say a couple of things? Firstly, it's already evidence in the Inquiry, and when – some of the family gave evidence that they had a briefing about the interim six-week report before the Inquiry started, so there's nothing new there.

LCDR GRACIE: Yes. But it then presented a problem because I was contacted yesterday – and I won't go into the details of it – but there was a concern on behalf of Army that something I had said might be misrepresented because it would convey the contents of that interim report. So it seems that we've got this report out there and - - -

MS McMURDO: A further report you're talking about there, not the initial six-week report?

LCDR GRACIE: No, I think it's the initial six-week report.

MS McMURDO: No, it's not.

LCDR GRACIE: It's not?

MS McMURDO: No.

LCDR GRACIE: You see, I don't know anything about it. All I know is that - - -

MS McMURDO: No. Well, it's difficult because it's a DFSB report, and the Inquiry – DFSB reports are in another world to this Inquiry.

LCDR GRACIE: Though, I do understand Counsel Assisting have it.

MS McMURDO: And there are reasons for that. So I think we'll just note what you've said and perhaps at some point the Commonwealth might wish to make a response to that later today or at some future time. Would you let me know later in this sitting, perhaps – later today or tomorrow would be good – to that request?

LCDR GRACIE: Thank you, ma'am. I didn't realise there was another report. I'm flying a bit blind here, for want of a better term.

MS McMURDO: Yes.

LCDR GRACIE: Thank you.

MS McMURDO: Well, I'm not in a position to say very much more. You are really making a request on your behalf, but which you would like to see extended to Counsel representing who?

LCDR GRACIE: Counsel representing the four.

MS McMURDO: The interests of the deceased.

LCDR GRACIE: Yes.

MS McMURDO: I understand that.

LCDR GRACIE: Thank you, ma'am.

MS McMURDO: Yes, COL Streit?

COL STREIT: May I assist the Inquiry in this regard: I think it's important to recall that the Defence Flight Safety Bureau is conducting its own independent investigation. The Appointing Officer for that investigation is in fact MAJGEN Jobson. If my learned friend wishes to request information in relation to what may have been said by the General to a person in relation to the Defence Flight Safety Bureau investigation, then that is a request that should be made directly to the Defence Flight Safety Bureau, or MAJGEN Jobson in his capacity as the Appointing Officer for that investigation. That would be the start point.

MS McMURDO: Well, that's useful. You might take that up, Lieutenant Commander. But you have raised it and so I will invite the Commonwealth, and COL Gabbedy on behalf of - - -

LCDR GRACIE: MAJGEN Jobson.

MS McMURDO: Thank you. I haven't really come to terms yet with the hierarchical ranking system.

LCDR GRACIE: I haven't either, ma'am, and I've been doing this a while. I just know I'm not at the top.

MS McMURDO: I'm not in it at all, so there you are. COL Gabbedy might also wish to make a statement about the position later in the hearings, or not. I'll leave it – wait and see.

LCDR GRACIE: Thank you, ma'am. I had had a discussion with - - -

MS McMURDO: There's really nothing more I can do.

LCDR GRACIE: I had a discussion with COL Gabbedy, too. Thank you, ma'am.

MS McMURDO: Thank you. Could we have the witness back in the witness box, please? And MAJ Chapman will continue with the witness's evidence.

<LTCOL BRENDAN JOHN REINHARDT, on former affirmation

<EXAMINATION-IN-CHIEF BY MAJ CHAPMAN, continued

MAJ CHAPMAN: Ma'am, can I first ask for the witness, LTCOL Reinhardt, to be provided a copy of Exhibit 41? And that's his statement.

MS McMURDO: Yes, his statement.

MAJ CHAPMAN: Sir, I'd like to pick up again on where we left your evidence yesterday. You recall that you gave some evidence shortly before the adjournment for the day that AATES had conducted or concluded that unacceptable ambiguity in the presentation of attitude information on the HMSD could lead to controlled flight into terrain? Do you recall that evidence?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: The expression "controlled flight into terrain" is an expression used in Aviation to describe a catastrophic event which includes loss of life?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: LTCOL Reinhardt, in making that statement as you did in the report, you were seeking, were you not, to make clear to the

Aviation chain of command that the Flight Test Organisation could not support the release into Service of the upgrade out of concerns for safety?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: That concern, as was developed in your report, was raised in your report in June 2019?

LTCOL REINHARDT: Approximately. I could check the date, but that sounds about right.

MAJ CHAPMAN: Which is the date of the report.

LTCOL REINHARDT: Yes, that was the first report I wrote.

MAJ CHAPMAN: Yes. And having raised that concern, that was some approximately four years prior to the accident on 28 July 2023?

LTCOL REINHARDT: Okay, yes.

MAJ CHAPMAN: You came to that view, the risk of CFIT, on the basis that AATES had identified an error in the symbology when the pilot was looking off axis. Is that correct?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And that in your experience any incorrect or misleading indicators in the symbology, especially as concerning aircraft attitude, represent a significant risk to the safe operation of the aircraft?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: And could I just pause there and ask you to describe to the Chair, and perhaps less so to the Air Vice-Marshal, the term "attitude" in this context?

LTCOL REINHARDT: So attitude is a generic term that would be used to describe how the aircraft is orientated in space. Attitude can be broken down into a number of components: pitch, which is the aircraft nose up or nose down; it can be described in roll; turning to the right, turning to the left. Helicopters, to another extent, could have out of balance with the yaw, and things like that.

Primarily, we're talking about displaying to the pilot the pitch and roll of his aircraft, and that is important in a degraded visual environment

because he can't easily see that by looking at the real world. In a nice, bright day, where there's a good visual horizon, he can judge the aircraft's attitude by just looking out the window and seeing where the horizon cuts through the instrument combings.

In degraded visual environments, which can occur by day, in dust or things like that, but predominately here we're talking about night where we're using image intensification devices and, you know, possibly FLIR to pilot the aircraft. Both those systems never present a perfect picture of the outside world as you would expect by day.

So you need extra cues to help you judge the aircraft attitude. On very dark nights there may be no horizon. Similarly, in a steep valley, the horizon that you think you see, the top of the ridge lines, may not actually be what the actual horizon is. And if you misjudge the horizon, the aircraft can get too steep, or too – in climb or descent and, you know, that can lead to loss of control of the aircraft or you can just misjudge the attitude and end up with CFIT.

MAJ CHAPMAN: And we're going to get to this later on in some of my questions, but are the conditions that you've just described might lend themselves to a loss of situational awareness described another way, as spatial disorientation? Is that right?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: And just while we're there and you're describing attitude and pitch, can you just describe what is referred to as "angle of bank"?

LTCOL REINHARDT: So, you know, my hands are the wings.

MAJ CHAPMAN: Yes.

LTCOL REINHARDT: If I want to turn right, I roll the aircraft. And, you know, if you're thinking of a fixed-wing, these are wings, but if we're talking about a helicopter, you know, my hands are the rotors going around and I represent, you know, the rotor fixed here to indicate we're in an angle of bank to turn the aircraft. So in a helicopter you tilt the disc to tilt the rotor thrust, which will then turn the aircraft and provide a component of rotor thrust to help turn the aircraft around the circle.

MAJ CHAPMAN: So when the aircraft adopts or is executing a turn, it necessarily adopts an angle of bank position.

LTCOL REINHARDT: Yes. And, you know, that angle of bank information is important, right. Because angle of bank and instrument flight you need to fly predictable profiles. If you overbank, you run out of power. If you underbank, you won't turn quick enough in a valley, so you can't turn around in the valley. Angle of bank information is very important.

MAJ CHAPMAN: Thank you. And it was your evidence yesterday that AATES conducted its testing by day only; is that right?

LTCOL REINHARDT: That's correct.

MAJ CHAPMAN: Though there had been – and I believe you said this yesterday – there had been a plan to continue night testing.

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: Though that was terminated when this symbology error was identified?

LTCOL REINHARDT: Correct. For a number of reasons, yes.

MAJ CHAPMAN: And I think you described some of those reasons yesterday being that to continue the testing in those circumstances would exceed your authorisation for that testing.

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: Among other reasons.

LTCOL REINHARDT: Yes. However, you know, I also had gathered sufficient information to identify that there was a problem here that needed to be sorted out. And by me continuing to – flying, was only delaying the resolution of the issue.

MAJ CHAPMAN: And your conclusion concerning – and this is in the report – concerning the error in the symbology potentially leading to CFIT, was that a concern that you arrived at in the context of day operations when using the symbology?

LTCOL REINHARDT: No. So, you know, I'm using the term "me" and "I"; I'm using them generically as to AATES. I didn't physically fly the aircraft in this test. My test pilots, who are qualified in MRH, flew the test. However, they back briefed me on all these issues and I was fully across them. So your question was is this a problem by day?

MAJ CHAPMAN: Yes. And I think your answer was "No", which is - - -

LTCOL REINHARDT: Right. So explaining that, you know, by day – and when I say "day", it's a bright day, there's no dust, we're not in cloud – we can see a nice visual horizon, right. And that visual horizon is dominating your visual picture. And where the aircraft combing cuts that horizon, it gives you a very good appreciation of the aircraft attitude.

So, you know, if you said that the MRH was only – that we were going to limit the aircraft's configuration roll environment to day only, then this characteristic may not be an issue. But if the configuration of a roll environment of the MRH-90 was by night and in very low illumination and in high workload situations, and in formation, and in steep valleys and terrain, and in those areas, there are not overwhelming visual cues where you can judge the aircraft attitude.

MAJ CHAPMAN: Thank you. And the concern, as you've just answered the question, was not a concern arising by day because, as you've said, there's far greater natural situational awareness which is given by the outside world and your ability to see what's outside.

LTCOL REINHARDT: Correct. You know, by day you might get into dust or you might go into cloud but, you know, that's not really the point here. We're talking about good visual environment today.

MAJ CHAPMAN: Yes. And so the concern that you were raising was based on the ambiguity arising only at night, or predominately at night?

LTCOL REINHARDT: Yes. So, you know, based on my experience and my test pilots' experience who flew helicopters in the Navy and flew helicopters in the Army, and flew Black Hawk and reconnaissance helicopters, and also was a CFS instructor in the Air Force, plus the person who reviewed my report who flew Black Hawk and who flew MRH-90, and both of those people had been involved in a whole series of testings for the introduction of the Special Operations Capability MRH, plus my experience, you know, that is sufficient experience to draw a logical conclusion based on the results we saw.

MAJ CHAPMAN: The results that you saw by day which then extrapolated in the sense of formed the basis of your opinion that, together with the other considerations which I think you've referred to, which include low flight formation, a low environment, together would operate at night to potentially lead to CFIT?

LTCOL REINHARDT: Yes. And part of the role of a test pilot is we go on a long course and we're selected because we're B CATs and have role experience. Our job is to forecast that.

MAJ CHAPMAN: Yes.

LTCOL REINHARDT: You know, well, the opposite to not being able to forecast is go out and keep trying to have the problem. While that may provide more conclusive data, there comes a point where we have to get on with the problem. So, you know, I think, based on our experience and our training, and the position we were put in, and the organisation that we were created in within Avn Command and the DASA system, we could forecast that problem with only flying it by day.

MAJ CHAPMAN: And you consider that an appropriate assessment based, not only on your experience, but you reference also the entire purpose for Flight Test Organisation is to assess risk of this kind.

LTCOL REINHARDT: Yes. You know, in part, that's what they're there for. And, you know, some of the other reports, right, pilotage, FLIR, we could have gone on testing that for a long time, right. But we came to a conclusion that we had sufficient data to support our – we had gathered sufficient data, in our professional opinion, to support the conclusions that we made.

MS McMURDO: So just to clarify that, the pilot who was flying and experienced these things and reported to you was MAJ Ian Wilson?

LTCOL REINHARDT: Correct.

MS McMURDO: And the reviewer who reviewed the report that you wrote was David Lamb?

LTCOL REINHARDT: Correct. And you will note that that electronic signature is not matched to the writing below it. So I sought an extra level of review because I knew this issue was going to be topical and I wanted an extra set of eyes to go through that report independently and review MAJ Wilson's conclusions and where, you know, I was going with this report. I wanted that independent review.

MS McMURDO: Yes, and the extra level of assurance. Yes.

LTCOL REINHARDT: Correct.

MS McMURDO: Thank you. Now, we understand that your report, even though the authors were prepared to have it declassified, is currently classified but that the Army has not yet agreed to have it downgraded to be open classification.

LTCOL REINHARDT: Correct. But if we look at the reference following, which is unclassified - - -

MS McMURDO: Yes. Yes, I know.

LTCOL REINHARDT: - - - that talks about data in there that references my report, and I'm happy to talk about that.

MS McMURDO: Yes, I understand. I understand that. I'm just wanting it to be understood as to why we are not referring directly to that AATES report, because it's a classified document, and if we need to refer to that, that will be done in a private hearing.

LTCOL REINHARDT: Yes, ma'am.

MS McMURDO: At this stage, at least.

MAJ CHAPMAN: Thank you, ma'am. COL Reinhardt, this Inquiry, you may be aware, has received evidence that fatigue played a role in the accident; that the ships were in formation, they were executing turns, and they were executing the turns in a low cue, dark environment. Now, in those circumstances, these are all factors, are they not, that you had in mind when you presented the risk assessment some four years earlier?

LTCOL REINHARDT: Absolutely. So I've talked about role relation. So the test pilot must be able to understand how this is going to be used in the operational environment. So I was specifically thinking of some middle-level experienced pilots on a dark night, when it was raining, when they were tired, stuck in a valley out the back of the High Range Training Area, trying to turn around in a low cue environment, and then they either get startled by something or have a fear response because they've suddenly realised they can't turn around in the valley. And those sort of fear responses tend to drive boundary avoidance PIOs, which would then result in either complete loss of control of the aircraft or CFIT.

MAJ CHAPMAN: Could you just explain what "PIO" is?

LTCOL REINHARDT: So a PIO is Pilot-Induced Oscillation, but I also added the term "boundary avoidance", which is a particular type of PIO. Do you want me to describe that?

MAJ CHAPMAN: Please.

LTCOL REINHARDT: So the best way to think of a boundary avoidance PIO is when you're driving home after a holiday on a long drive, and you're feeling very tired and you fall asleep at the wheel. The next thing that wakes you up is the sound of the tyres in the gravel, and you wake with a startle and you think you're drifting off the side of the road at 100 k's an hour. Your instinctive reaction is to reef the steering wheel the opposite way, and you go, "Thank goodness for that. I'm back on the road". But now you've over-corrected, and you're heading into the opposite lane where there's a truck. And then you do another fear response where you just reef the steering wheel the other way. And now you're back in the lane, but heading into the gravel quicker and faster. And you rapidly diverge into either going off the road or into the other lane. That's a boundary avoidance PIO.

The two boundaries are: going off the road into the gravel, or hitting the truck. And when people are startled and enter that, they fly – or they operate the controls of the machine they're at instinctively and they over-correct and it becomes a fear response.

MAJ CHAPMAN: Is it your evidence that that can occur, using the analogy of driving a car, when someone obviously is fatigued and that could result from that event? Could it also result from a situation where one loses situational awareness or experiences spatial disorientation in a low cue environment, for example?

LTCOL REINHARDT: Yes. So I've experienced a boundary avoidance PIO myself when I was in pilot training. But, you know, if we relate it to a helicopter experience, you may think you're flying sufficiently happy and well, and then suddenly misjudge how low you are and suddenly see the terrain a lot closer than you expect. And you may instinctively pull back on the cyclic to raise the nose and climb. If you are under a low cloud base, you may suddenly go, "Well, that's good. I've avoided the ground, but now I'm about to go into cloud". So then you may instinctively just push forward because going into cloud has inadvertent IMC. It has its own set of consequences. And you could enter, in a low cue environment, if you're startled or something like that, a boundary avoidance PIO.

MAJ CHAPMAN: Just going back to your evidence about the cueing that pilots have during the day using their own eyes, and the opposite, that during the night that there's low cueing, in a low cue environment is it

your view that pilots rely on the HUD symbology to a much greater extent than during the day?

LTCOL REINHARDT: So I'll answer that question in a roundabout way, I guess. So, you know, TopOwl has significant advantages. The TopOwl system is integrated with the aircraft. The TopOwl system provides you hover cues that are linked to the autopilot that help you, in a degraded visual environment, hover the aircraft. There's a test standard called ADS33. As the visual cues reduce, it specifies what level of autopilot you need to safely operate an aircraft in a low cue environment, and they include things like Dopler hover, radar height hold, transitional rate command, attitude hold.

You know, the MRH-90 has a very powerful autopilot that, if used properly and understood, can significantly reduce the workload in a degraded visual environment. The TopOwl system is integrated into the aircraft, so some of that autopilot information is presented to you. Secondly, if you are at high power, you have a power indication in your HMSD, so you don't – you can keep your eyes out looking at those precious few hover cues continuously while you're monitoring your power. You don't have to look inside, away from those hover cues, where the aircraft will drift, check your power, and then look back outside.

So there was discussions – and Australia flew the MRH-90 for a while on ANVIS, and I know other countries fly MRH-90 on ANVIS only. There would be crew room discussions about this. My professional opinion would be that even though TopOwl may have some limitations with the NVD image because it's indirect view, because of the integration of TopOwl into the aircraft and the presentation of normally unambiguous information to you, it was better to fly MRH-90 with a fully integrated TopOwl. You could go and put ANVIS on, but I would say you would then need to integrate an ANVIS HUD, which would probably be unreasonable to do with the resources and time we had.

So the key there is understanding the limitations of your indirect view system, and your autopilot system, and using what you need in a low cue environment to fly.

MAJ CHAPMAN: As a general proposition, where you are lacking the outside visual cues in a low cue environment, pilots would necessarily be reliant more on the HUD? They rely on the HUD?

LTCOL REINHARDT: Yes, it absolutely reduces workload, right. If you don't want to use the HUD, the workload will go up, and that means you then need to reduce your operational flight envelope, or back off your

CRE. If you decide to remove a HUD from an aircraft, you would have to go back and review how hard you're going to fly this aircraft because you are driving the workload up for the aircrew. If the HUD information is poor, or not integrated properly, or ambiguous, you are going to create issues, and it's not going to be as advantageous as it should be.

MAJ CHAPMAN: Because there is this reliance on the HUD in a low cue environment, it's essential in those circumstances that the HUD symbology is accurate. You would agree with that?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: And it's essential also – I withdraw that. There's been some evidence, perhaps by you yesterday, that the flight information symbology is presented both onto the HUD and also on the multi-functional displays. Is that right?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And part of the issue that was identified in the AATES' findings was that there was an inconsistency between the information on the multi-functional display and on the HUD.

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And that – and we'll get into this – that the information on the multi-functional display was correct.

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: But the information on the HUD was not correct.

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: When looking off axis.

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: Are you aware of any Regulations at an international level with respect to inconsistencies between HUD information and Primary Flight Display information, and the risks associated with those?

LTCOL REINHARDT: So, in my report, I call out some generic specifications.

MS McMURDO: Perhaps we don't talk about what you do in the report.

LTCOL REINHARDT: Well, there's - - -

MS McMURDO: If you could just give us your opinion.

LTCOL REINHARDT: Well, can you reframe the question then?

MAJ CHAPMAN: Are you aware of any international flight Regulations which address the issue of discrepancies between HUD information and Primary Flight Display information?

LTCOL REINHARDT: Broadly, yes.

MAJ CHAPMAN: And where are they found?

LTCOL REINHARDT: They would be found in the FAA Regulations.

MAJ CHAPMAN: Could you just describe what the FAA Regulations are, please?

LTCOL REINHARDT: So the Federal Aviation Authority, which is a US government body. And they prescribe a set of certification standards. Now, of note, we don't necessarily have to comply with that. Various aircraft are built to various certifications. Europe has another equivalent certification standard. And some military aircraft are built to their own standard. All right, I'll take guidance on what I'm going to say next. So based on – so in the seven-step Risk Management - - -

MAJ CHAPMAN: Just if it would assist, I'm just asking you to be directed to the FAA guidance and what that says; nothing to do with what's in your report. I'm asking you questions about the FAA Regulation itself.

LTCOL REINHARDT: So they are broad conceptual requirements in generic paragraphs, and they talk about not being able to provide – critical information that is provided must be certified. So if you provide critical flight information in a place directly in front of the pilot that he cannot ignore, you must build it to the same certification standard as if you were making a PFD, and you cannot just put a note or something in the Flight Manual and tell the pilot to ignore it.

MS McMURDO: Just remind us, what a PFD is?

LTCOL REINHARDT: Primary Flight Display.

MAJ CHAPMAN: So that requirement, albeit in guidance, is suggesting that the HUD and the PFD must be aligned in all respects in terms of the presentation of symbology and attitude, and all these matters.

LTCOL REINHARDT: So I would say that if you put ambiguous information right in front of my eye, it has to be accurate. Now, you could say that this certification standard may not apply to the MRH-90, but I would say that a Commander who is considering an issue that's been pointed out to him by his Flight Test Organisation at the "Unacceptable" level needs to go through the seven-step Risk Management process. And part of that process is to become reasonably informed. So he would need to, when he defines his context, go and be aware of what other people do with these sort of issues so that he can understand what could be "Reasonable" requirement. And so, in considering these other certification standards, he would then understand the gravity of the decision he is about to make.

MAJ CHAPMAN: And was it your evidence just before that you understood from the FAA Regulation that it provided that one cannot go about remediating this with a warning or something – some warning or some caution provided in the Flight Manual; something to that effect?

LTCOL REINHARDT: That's my – yes, and in the unclassified document.

MAJ CHAPMAN: Can I just invite you to go to the minute we were referring to yesterday, which is Annex E?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: And can I take you to page 11 of that? Or page 8, actually, if you don't mind. At the top of the page 8.

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: And do you understand that to be a warning which is being suggested or recommended in the OPEVAL report to be included in a Flight Manual?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: So the recommendation as it appears in the OPEVAL report – which I'll come to in more detail – would, on its face, be inconsistent with the FAA Regulation, or the spirit of that Regulation?

LTCOL REINHARDT: Correct, and I provided formal advice to that.

MAJ CHAPMAN: Where did you provide formal advice?

LTCOL REINHARDT: In Annex F.

MS McMURDO: Sorry, what was that answer? I missed it. In?

LTCOL REINHARDT: Annex F, which is a document that is - - -

MS McMURDO: Classified. Yes.

MAJ CHAPMAN: Yes.

LTCOL REINHARDT: Yes.

MS McMURDO: We can't talk about the classified documents, as you know, but you are an expert in this area. That's why you were involved in all this. That's why we're calling you, so you can give your opinion. So you can give us your opinion.

LTCOL REINHARDT: Yes. So I formally advised the chain of command that I did not consider that that warning was appropriate in accordance with the specifications we've discussed.

AVM HARLAND: Could I just ask a question about that warning? So the first question is about night-vision devices. Where is the best image on a night-vision device? Is it straight forward, straight through, aligned with the image intensifier tubes, or is it off axis?

LTCOL REINHARDT: So the IIT image follows you – it's in your helmet. So wherever I turn, the image is the same as if I'm looking in front or left or right. The NVD image is the same, right, theoretically. If the helmet fit is not got, when you turn your head you might lose part of the edges of that image.

AVM HARLAND: Perhaps if I rephrase my question. Are things clearer in the middle of the image or on the edge of the image?

LTCOL REINHARDT: Yes, okay, I understand that. So we have found that the clarity in the middle of the image was better than the edge of the image. And in another test report that's classified, we discuss some of that.

AVM HARLAND: Okay, great. The next question is if you're in a scenario where you're in formation, low level, at night, and you're operating on TopOwl, to maintain formation as a wingman, such as in heavy left, for example, where would you be looking?

LTCOL REINHARDT: So I believe the Court has been described the various formation layouts. If you are dash 3 in heavy left, you, as the flying pilot, will need to – you cannot see your person in front of you by looking straight out the front. You have to look out to the side at some angle.

I have experience flying Kiowa on NVD and flying Tiger on NVD, and I flew MRH in formation with Tiger on one of our test programs. Reconnaissance and attack tend to fly a looser formation than probably what lift do. But there have been nights where I've flown NVD formation that if you ever look away from the person in front of you, you may not find them again, and then you'll have to declare "Blind".

So you will get to the point in really low cue environments with no visual horizon where it starts to become confusing whether you're above or below the person in front of you. It is very hard to look inside and check any performance on the PFD. Again, TopOwl provides you significant advantages because you can keep looking at your person in front of you and you can set powers, and you roughly know the aircraft altitude and RADALT and heading, and things like that. But, you know, there are times when you cannot look away from the person you are trying to formate off.

AVM HARLAND: Would that present you with somewhat of a dilemma given the warning that's been proposed or has actually been put out as far as TopOwl where you're in formation, the idea is that if you need to check your attitude or make any adjustments, you need to do that by looking forward, and yet you also have an obligation as a wingman to maintain separation within the formation, and the only outcome you have available to you if you are looking forward, is to call "Blind" and break formation? Is that a correct dilemma?

LTCOL REINHARDT: Yes, there's a conundrum there. So Tiger flies TopOwl. Tiger – if you look in the unclassified report, that report talks about a very similar issue that Tiger has with these sorts of off-axis attitude presentations. In Tiger, when you look off axis, the system will automatically turn off the pitch ladder. So once you get it past about 20 or so degrees from forward, it will turn the pitch ladder off.

We were involved in testing a HMSD symbology upgrade for Tiger. We had, in other testing by night on LHD, when we were integrating Tiger to that, identified that some off-axis attitude information would be helpful to fly to the ship. Airbus Australia, in the software upgrade to the HMSD, tried to address that, and they presented a non-conformal attitude display that was true wherever you looked. It, however, was a new display format. And given the time we were going to continue operating Tiger and the follow-on type to Tiger, AATES, DACM, and ARH Standards, and ARH Op Airworthiness worked collegiately through that problem and we identified that we would not pursue that non-conformal true representation of attitude off axis for various reasons.

So this problem was around and was being dealt with appropriately on other TopOwl platforms.

MAJ CHAPMAN: So just a couple of things for clarity on that. So what I heard there was that for ARH Tiger operating on TopOwl, when they implemented the symbology, if the pilot were to look off axis, the erroneous information would be blanked from their vision. Is that correct?

LTCOL REINHARDT: That's what I said.

MAJ CHAPMAN: And MRH-90, that is not the case?

LTCOL REINHARDT: No.

AVM HARLAND: So MRH-90, are we talking about conformal or non-conformal? Just in layman's terms, could you just describe what that means?

LTCOL REINHARDT: It can get very confusing. Conformal displays, we're talking conformal to the real world. Non-conformal is not conformal to the real world. There are advantages in conformal displays, and you want some information displayed conformally; like the horizon line or the flight path vector. There's some unclass German and NASA stuff I've included in my report, or statement, that talks about error rates and advantages and disadvantages of conformal and non-conformal displays.

So with ANVIS HUD, we have a non-conformal attitude representation. Wherever you look, the attitude will represent what it looks like out the front.

AVM HARLAND: So it would be as if you had part of your instrument panel move with your head?

LTCOL REINHARDT: So non-conformally, if I'm looking at the aircraft attitude like that in my HUD, wherever I look, that will display as it is. Conformal to the real world, if the aircraft is presenting like that in my HUD and I look out to the side like that, I will see the side of the aircraft like that. Now, we didn't – and I don't think we were ever provided definitive information of how that all worked. When we went to the OPEVAL, we got a revised system description from Airbus Australia that started to talk about this, but it was in no way a system description that an average pilot could understand.

And doing the mental gymnastics in a conformal display of attitude information from there, where I can see we're 10 degrees pitch up, but then when I look over here – you know, if you look in some of those reports, the error rates and the mental gymnastics becomes overwhelming. You might get away with that on a nice calm day where we're with sunshine and on your own, with nothing else but trying to work out what it says, but when you put yourself in a full ship formation where you're already tired, and it's dark, and it's raining, and things aren't going to plan, and drive the workload up, I challenge most pilots to be able to do that.

AVM HARLAND: So is the MRH-90 display non-conformal?

LTCOL REINHARDT: There are conformal elements to it. I don't think we ever fully worked out what the attitude information was really doing.

AVM HARLAND: Okay. Great. That's all, thank you.

MAJ CHAPMAN: Thanks, sir. Just for the benefit of the transcribers, LTCOL Reinhardt was in part displaying behaviour of conformal and non-conformal symbology with a paper plane.

MS McMURDO: The paper plane made out of his statement, which he's now unfolded, and it was very helpful to those who were present, and no doubt to those watching the video as well.

MAJ CHAPMAN: So LTCOL Reinhardt, just to return, if I may, to the question of the accuracy of the HUD symbology, it's essential in low cue environments that it obviously be accurate?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: That's because if it's not accurate, the pilots risk making adjustments to flight controls based on inaccurate information?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: Thank you. I just want to go back now a few steps and ask you to explain your understanding of the symbology upgrade that was under test, and then ask you to go through the unacceptable ambiguity as it appeared in the symbology. So starting with the system that was – or the modification or the upgrade under test, I've referred to it variously as the V5.10 and the symbology upgrade, but they're the same upgrade. It was a software upgrade to make a particular addition – a primary addition to the symbology, and had other smaller corrections inbuilt within it?

LTCOL REINHARDT: Yes, there was a particular characteristic that we wanted in this symbology set, and there was also solving some reports on bit checks on start up.

MAJ CHAPMAN: Yes. As you understand it, what was the principal purpose of the upgrade?

LTCOL REINHARDT: So we wanted distance to go information to be displayed in the HMSD.

MAJ CHAPMAN: Thank you. Can you go to, please, the OPEVAL report, which is Annexure E? And page 3 of that report, at paragraph 6, it says there, under the heading "System Under Test", it describes the purpose consistent with your evidence, that the V5.10 symbology upgrade incorporated changes designed to improve HMI. What's HMI?

LTCOL REINHARDT: Human Machine Interface.

MAJ CHAPMAN: Of flight and navigation information, in particular, in conduct of Special Operations approach profiles and, specifically, distance to run. So do you agree that, as you did at paragraph 55 of your statement, that the testing of the distance to go feature was supposed to be the primary purpose of the testing?

LTCOL REINHARDT: So "distance to run" and "distance to go" are interchangeable terms there. And, yes, that was my understanding of the primary purpose.

MAJ CHAPMAN: As you've described, I think, at paragraph 56 of your statement, the distance to run feature in basic terms, provided pilots with information concerning where the aircraft was at any one point relative to a particular nominated place.

LTCOL REINHARDT: Yes. So you would type in a grid or a lat/long for a place – it could be a nav route, it could be a landing zone, it could be a holding point – and it would give you continuously calculated distance to that point.

MAJ CHAPMAN: In metres?

LTCOL REINHARDT: It was in miles, which was not optimum. Other aircraft, Tiger, has got it in metres.

MAJ CHAPMAN: You mention at paragraph 55 of your statement that the distance to run feature was already a feature in the MRH prior to the proposed symbology upgrade. Is that right?

LTCOL REINHARDT: It was. It could be displayed in multiple formats on the PFD.

MAJ CHAPMAN: So the actual purpose of this upgrade being the distance to run feature, just to be clear, was already a feature which the MRH was enabled with on the PFD?

LTCOL REINHARDT: On the PFD, but as we've discussed, good, accurate information in the HMSD can reduce workload.

MAJ CHAPMAN: Though what this upgrade sought to achieve was to move that – well, not with that – I withdraw that. It was to upgrade the symbology to include that distance to run information in the HUD?

LTCOL REINHARDT: Correct, and there's some legacy there from previous platforms.

MAJ CHAPMAN: As I think we've established in the evidence yesterday, the symbology on TopOwl serves the purpose of providing pilots with real-time flight information and that's right in front of their eyes, which is intended to enhance situational awareness.

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: It's enhancing because it allows the pilots to focus – I think, as you put it in your evidence yesterday, to maintain eyes out? And is that a reference to eyes out, having situational awareness of the outside environment?

LTCOL REINHARDT: Yes. They don't have to look inside. It reduces workload, improves situational awareness.

MAJ CHAPMAN: And the HUD allows the pilots to focus on what is occurring outside, including when they're – particularly when they're in formation, and not have to be distracted from that task by monitoring, for example, instruments and the Primary Flight Display?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: But you'd also accept, would you, that where the symbology is not operating correctly – as you pointed out it wasn't in this case – and is depending on the nature of the incorrect information being provided, that can have serious implications for situational awareness?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: So I just want to go to the next step in the narrative in your – and that's the testing serials for the symbology upgrade. Just go to – I withdraw that. So I think we've covered some of these parts in the Air Vice-Marshal's questions. Just in terms of developing what the actual attitude issue was in the symbology, I'm going to ask you about that. And can I go to paragraph 56 of your statement, please – sorry, that's meant to be 59 of your statement.

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: Now, it's the case that you describe at 59 of your statement what your assessment of the errors in the symbology was. And we've introduced some of these terms that are described there, such as "roll", "pitch", and "off axis". But could you, please, just develop step by step how the symbology behaved in a way that you ultimately described as ambiguous?

LTCOL REINHARDT: So, you know, my test pilot and the Flight Test Engineer came back and initially described this, and I think we went back out – or they went back out on a second sortie to try and define and characterise some of this. And they put an aircraft in a roughly 10 degrees pitch-up attitude - - -

MAJ CHAPMAN: Sorry, sir, could you speak up a little bit?

LTCOL REINHARDT: Yes. So they put the aircraft in approximately a 10 degrees pitch-up attitude at zero angle of bank. And when looking straight out the aircraft that all made sense in the HMSD. It was true. They then looked off axis and the symbology then incorrectly indicated 10 degrees angle of bank.

MAJ CHAPMAN: So just pausing there to recap on that description. You have a situation where we're at 10 degrees pitch-up to maintain attitude; is that right?

LTCOL REINHARDT: It was just an example. You know, you'd probably be climbing with 10 degrees pitch-up.

MAJ CHAPMAN: And looking straight ahead, symbology displayed that there was nil or zero angle of bank in that state, and that was consistent with the attitude then of the aircraft. Although, they then went further and looked off axis and, maintaining the same attitude of the aircraft, the symbology recorded a positive angle of bank?

LTCOL REINHARDT: Recorded an angle of bank when there was no angle of bank.

MAJ CHAPMAN: Thank you.

MS McMURDO: So this is all reported to you by MAJ Wilson?

LTCOL REINHARDT: Yes. And there's another AATES person on the aircraft, the Flight Test Engineer.

MS McMURDO: Flight Test Engineer as well.

LTCOL REINHARDT: And he did a lot of this, right. Now - - -

MS McMURDO: And that was Jordan Zahra. Is that - - -

LTCOL REINHARDT: Correct.

MS McMURDO: Yes.

LTCOL REINHARDT: We didn't have a good system description. You know, people may come back to me and say, you know, "It was five degrees". I don't care; it's wrong.

MAJ CHAPMAN: The point is, you're saying that it was inconsistent with the Primary Flight Display?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: And it was inconsistent with all reality of what was going on - - -

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: - - - in terms of the position of the aircraft?

LTCOL REINHARDT: Yes. And, you know, with the pitch-up going angle of bank, maybe that's not too big an issue, right. But then we also looked at angle of bank and then looking off axis, and it appeared to us that if you were in an angle of bank 20-degree turn and then looked off axis, the angle of bank indication would washout and reduce.

MAJ CHAPMAN: So just pausing there for a moment, in the washout. Is it the case that to further interrogate this first finding the Test Team deliberately adopted an angle of bank attitude which, on the Primary Flight Display, looking ahead, and on the HUD, reflected the correct angle of bank?

LTCOL REINHARDT: When looking straight ahead.

MAJ CHAPMAN: Yes, when looking straight ahead. And then the next step, they look off axis, also in that adopted position - - -

LTCOL REINHARDT: With no change to the aircraft attitude. It was maintained, and we look off axis.

MAJ CHAPMAN: Look off axis. And the result was the opposite to the first serial of test, that the angle of bank was zero?

LTCOL REINHARDT: Zero, or at least washing out significantly.

MAJ CHAPMAN: Can you describe what "washing out" is?

LTCOL REINHARDT: Well, reducing from the – you know, say we had 20 degrees angle of bank, it reduced significantly and noticeably towards zero. So we now have an aircraft in an angle of bank, but when you look off axis the attitude information is not indicating that.

MAJ CHAPMAN: So to adopt another – and I'm accepting this was all done by day – but adopting a low cue environment situation where you have compromised visual appreciation of the outside environment, such as a horizon, in that scenario you have a situation where this symbology, if you're at an angle of bank, perhaps in a turn – if you're looking off axis, it is, on your assessment in your report, potentially indicating to the pilot that the aircraft is level.

LTCOL REINHARDT: Correct. And if you're in a heavy-left formation, waiting for something to happen, dark at night, and you're tired, and you're orbiting in a continuous turn or racetrack holding pattern, and you're getting this misleading information, right, you get distracted or whatever. So you're trying to maintain formation but, by looking – and suddenly angle of bank is saying it's not what you're expecting, so you might apply more angle of bank. And more angle of bank means tilting the thrust vector, which means to maintain level you're going to have to apply power. There comes a point, with excessive angle of bank, where there ain't sufficient power to maintain level.

MAJ CHAPMAN: So a situation where, in this low cue environment, you've adopted – the pilot is in this situation that we've developed, potentially being informed of information about the aircraft that it is level. There's potentially situational awareness issues going on here. And there's – you describe they would apply inputs to the aircraft based on information they have that the flight – that they are level?

LTCOL REINHARDT: Yes, they could.

MAJ CHAPMAN: And when, in reality, they could be at a 20-degree, for example, angle of bank?

LTCOL REINHARDT: Already.

MAJ CHAPMAN: Already. Which would then take it to - - -

LTCOL REINHARDT: Further.

MAJ CHAPMAN: - - - a much further, and potentially very dangerous, angle of bank which has - - -

LTCOL REINHARDT: Yes. You know, I do caveat it, right, that I'm not sure we ever got to the bottom of exactly how this system behaved. That was CASG's responsibility. That's why I wrote a quick report, to get it back, so that CASG could go away and find out what was going on. We had a limited update to substantiate the OPEVAL. And I, you know, reinforced my concerns with the second report. But, you know, again, there's a seven-step Risk Management process, and there's context, and there's being reasonably informed.

MAJ CHAPMAN: And if you're in this situation and there is a degree of spatial disorientation affecting a pilot, they are more likely, in your

experience, to be relying on their HUD information than they are to be verifying that information by reference to the Primary Flight Display?

LTCOL REINHARDT: Yes. On Tiger, you know, on nights I'm flying, you know, I will rarely look inside. You know, if you stick me in formation on a really dark night, if I look inside, I'm not sure I'm going to find the lead aircraft again if I look back out. So that is going to drive me even more to keep my eyes out. Because if I - - -

MAJ CHAPMAN: Because in Tiger - - -

LTCOL REINHARDT: Pardon?

MAJ CHAPMAN: In Tiger, you don't have erroneous bank information.

LTCOL REINHARDT: And, you know, if I declare "Blind", that significantly complicates the whole mission. Essentially, the mission stops. Everyone's got to separate and then rejoin.

MAJ CHAPMAN: And that's before you even get to the issue that this is – and I think recorded in some of the evidence and the material – that the display of symbology in the HUD is a compelling display of information that one is naturally inclined to accept.

LTCOL REINHARDT: Right. So if you are flying formation and are so worried that looking away you're not going to see the person in front of you and have to declare "Blind", you are just going to be looking at that aircraft. And then if you overlay information that is ambiguous and that you can't interpret easily, in a high workload environment, people won't interpret that information properly.

AVM HARLAND: Could I just go back to a point, just for clarification? So in that initial scenario where you're 10 degrees pitch and zero angle of bank – so wings level, effectively – and the crew's looking forward, everything matches. So the HUD matches with your Primary Flight Displays. In the case where the pilot looks out to the right, it indicates a bank situation; is that correct?

LTCOL REINHARDT: That's what my report says, yes.

AVM HARLAND: Is that bank situation consistent to – is it in the direction of where you're looking or - - -

LTCOL REINHARDT: I can't recall. And again, you know, I never – I don't know if we ever got to the bottom of this issue properly. We

requested flight test reports from Europe. CASG made some effort to get them. A NATO restricted document ended up coming back from Europe but that didn't give us satisfactory explanation, in my opinion.

AVM HARLAND: Do other – or NH90 users, I guess, around the world use TopOwl?

LTCOL REINHARDT: Yes. And my understanding is that this symbology set was flying in Europe with European operators. But I would note that that is – we don't know what their configuration, role and environment is. We don't know what their risk appetite is. We don't know – and I refer to this in my report – we don't know what risk controls they were applying to this, if any, or if they considered it an issue. Europe is a highly industrialised part of the world, with a lot of cultural lighting. They may not fly their aircraft in the dark environments we find ourselves in.

There are also advantages with conformal displays, right. And anecdotally, my experience on Tiger with TopOwl is there is a limited amount of capacity to draw symbology. So you could introduce other features that are described, like obstacle avoidance or obstacle indication, but that costs computing power. So you may trade that off and turn off the attitude mask because you have a higher safety risk in your configuration, role and environment in Europe. But we didn't understand any of that.

AVM HARLAND: Thank you.

MAJ CHAPMAN: You're aware that when flying the MRH, the flying pilot could be positioned in either the left or right seat?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: That the controls mirror one another and it was essentially a preference on the part of the pilot where they wish to sit?

LTCOL REINHARDT: Probably within the unit that operated that aircraft there probably would have been preferences where they sit. But, you know, all things being equal, you can fly the aircraft from either seat. There are cross-cockpit issues - - -

MAJ CHAPMAN: Well, yes, I was just going to come to that. So in this scenario that we've just been developing, would the pilot flying in a turn, flying cross-cockpit – and you understand what I mean by "cross-cockpit"

– be even more reliant on the HUD because they're looking into the turn and to other ships in the formation?

MS McMURDO: You mean by "cross-cockpit", I presume, you're in the right-hand side and you're turning left?

MAJ CHAPMAN: Turning, yes. Thank you, ma'am.

LTCOL REINHARDT: Well, you know, this is a complex problem. So flying cross-cockpit, more of the instrument coaming gets in the way, so you can't see the aircraft in front of you as well. Some crews may choose to hand over so that the person on the inside of the turn flies. But depending on what that other crew member's doing, right – he may be running the mission, he may be reprogramming the Flight Management System – so that may not be optimum. Sometimes in formation you have to change sides relatively rapidly. You use your arc, so you can maintain your energy and there's freedom of manoeuvre around the arc.

In some environments where you maybe have some – it's not as dark and you have some outside horizons, looking cross-cockpit will give you more airframe structure to set an attitude than looking out into the turn.

MAJ CHAPMAN: Though, is it - - -

LTCOL REINHARDT: It's a highly complex – if you have a lot of flying experience and you have good mentors, you'll be shown all the pros and cons and you will learn by experience and you will make appropriate selections.

MAJ CHAPMAN: Assuming for a moment that you were flying cross-cockpit, do you accept that that would likely involve more reliance on the HUD by reason of the fact you are likely also to be looking cross-cockpit towards your turn?

LTCOL REINHARDT: I don't think I can answer that question; I'd have to think about it.

MAJ CHAPMAN: Can I go now to the OPEVAL testing? At paragraph 64 of your statement you refer to there being a degree of dissatisfaction expressed within Army Aviation as to the conclusion of unacceptable risk to flight safety. Do you see that?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: You even recall, at paragraph 67, that there was a conversation that you had with someone within Army Aviation – you can't recall whom – that they took the view that this should go ahead as it's already been paid for.

LTCOL REINHARDT: So it was a very uncomfortable situation. This software upgrade was required for some milestones. My understanding was it had already been paid for. I believe my understanding for that came from the CASG MRH Project Director. We had people bailing up my FTEs at other - - -

MS McMURDO: Sorry, who was that?

LTCOL REINHARDT: The name, ma'am?

MS McMURDO: Yes.

LTCOL REINHARDT: So that would have been then COL Andrew Thomas.

MS McMURDO: Thank you.

LTCOL REINHARDT: We had people bailing up my FTEs and trying to explain why we were wrong. I would go to meetings to discuss my report and people would lead with, you know, "MAJ Wilson is wrong". And I would have to correct them and say, "This isn't MAJ Wilson's report. This is the AATES Flight Test Organisation report, which has been through a review process and it is signed by me". There was – it was awkward.

MAJ CHAPMAN: The recommendations made in the AATES report to the effect of the earlier version, version 4, be retained and that Army should go back to the original equipment manufacturer to make some enquiries about presenting a fix, is that right?

LTCOL REINHARDT: I did make some recommendations like that.

MAJ CHAPMAN: Are you aware of whether or not Army Aviation took any steps to contact the equipment manufacturer or the software - - -

LTCOL REINHARDT: So as I've described earlier, AATES made some suggestions about trying to get flight test reports, and I think I reference that in there. We may have seen one – I think I might have to correct what I said earlier, we may have seen one, but I think it was a very benign environment. We also got a NATO restricted document which seemed to

be more of a system specification. But – sorry, what was the question? I've lost my train of thought.

MAJ CHAPMAN: Whether in relation to recommendation that the OEM be contacted regarding a fix, whether to your knowledge that ever occurred?

LTCOL REINHARDT: Some attempts were made. However, in my opinion, for such an "Unacceptable" recommendation made by AATES, if I was conducting the seven-step Risk Management process, I would have wanted more information than I believe that we ended up eventually getting.

MAJ CHAPMAN: Just in terms of AATES' limited involvement in the operational evaluation which you describe, you say at paragraph 71 that a decision was taken to go down the operational evaluation path. Was that approach, in your experience, unusual at all for the chain of command to initiate in response to a finding such as "Unacceptable" in an AATES report?

LTCOL REINHARDT: Yes, it probably was unusual. However, as I say in my statement, I probably facilitated that. I had a number of considerations in that. There is another recognised Flight Test Organisation in Navy that could have done this testing. And Navy also operate MRH-90, and Navy had also looked at this characteristic in a first-of-class flight trial. They assessed it some weeks, or a month beforehand. They could have gone around me direct to DASA to do it. They could have applied various airworthiness instruments to do it.

I, rightly or wrongly, facilitated the OPEVAL. I imposed some safety limitations on it. The test plan was drafted by organisation and we applied for the Military Permit to Fly to allow them to do it. However, I did not conduct – none of the AATES' personnel participated in that testing, and we did not write the report.

MAJ CHAPMAN: So just to be clear, and pausing there for a moment, you have a situation where the OPEVAL process was suggested and AATES took a limited involvement in that process, in that you set the parameters for testing – some parameters for testing?

LTCOL REINHARDT: Yes. I may have suggested it; I can't recall. I know there was a meeting where this was all discussed. We set some parameters based on my - - -

MAJ CHAPMAN: And one of the parameters that you set, I believe, was that the testing should not be conducted in conditions less than two millilux?

LTCOL REINHARDT: Yes. I think there was an additional requirement to have a visual horizon.

MAJ CHAPMAN: Yes. And setting those, what are essentially safety parameters, reflected the concern that you had arrived at in your earlier report in terms of the performance of the symbology off axis.

LTCOL REINHARDT: The finding and those limitations are consistent.

MAJ CHAPMAN: And could I ask why did AATES ultimately either decide to go along with or, I think you may have said initiate, the OPEVAL process in the face of the unacceptable recommendation?

LTCOL REINHARDT: So, you know, I've already started touching on that. There was another Flight Test Organisation in Navy that could have done this testing. Army could have gone direct to DASA to get airworthiness instruments to do this. There were a number of test pilots outside my organisation. I wanted to remain engaged with Army Aviation. I did not want to become someone that was not invited to the meetings or not asked to be in the tent. I felt that I needed to be engaged as the Flight Test Organisation continuing in time because I believe flight tests would be able to add value for safety and capability in the future.

MAJ CHAPMAN: Wasn't - - -

MS McMURDO: Were you concerned to ensure the safety of this testing? Was that a major concern, and you wanted to be involved?

LTCOL REINHARDT: I did not want to do the testing, but I wanted to ensure that safety was met while the testing was conducted.

MS McMURDO: If it was to be done, you wanted to ensure - - -

LTCOL REINHARDT: Yes, and that's - - -

MS McMURDO: - - - it was as safe as it could be.

LTCOL REINHARDT: And that's why I applied those limits. And that process went through a Military Permit to Fly process and was assured by DASA. I, also, have already stated that there were two test pilots that were participating in that trial and I thought they would support my

conclusion and provide more weight to my argument, but that did not occur.

MS McMURDO: Specifically, that's how it came to be conditional that this OPEVAL was then done in circumstances where there was a prohibition on any flight in low illumination, without a visual horizon?

LTCOL REINHARDT: Correct. We don't want to go out and find the ultimate data point for this problem, right.

MS McMURDO: So you want to keep the pilots who are testing safe.

LTCOL REINHARDT: Yes.

AVM HARLAND: With respect to the two millilux restriction, how would you describe that in comparison to the kind of conditions that 6 Avn, for example, would be expected to fly in?

LTCOL REINHARDT: So I would say that 6 Avn would – they would think they need to fly in those conditions, and less than that.

AVM HARLAND: So less illumination?

LTCOL REINHARDT: Less illumination. They would think they need to fly in less illumination than that.

AVM HARLAND: So the testing was conducted in better conditions than 6 Avn would be expected to fly in?

LTCOL REINHARDT: 6 Avn would expect to fly in less than two millilux.

AVM HARLAND: Okay.

MS McMURDO: Do you know if the testing included flight information overwater?

LTCOL REINHARDT: Navy had flown it overwater in their first-of-class stuff. I can't recall, off the top of my head, whether they flew it overwater. You know, that may be best asked of the people who conducted the testing and wrote the report.

AVM HARLAND: And just in the interests of, I guess, fullness of information, what did the Navy flight trials – that first-of-class flight trial conclude? It's in Annex E, the unclass report.

MS McMURDO: Annex - - -

LTCOL REINHARDT: I had a conversation once I found - - -

AVM HARLAND: Paragraph 2.

MS McMURDO: Yes.

LTCOL REINHARDT: So when AATES found its results, I had a conversation with AMAFTU to discuss my results. And they did not come to the same conclusion that I did. In the unclass version of this report, it says in paragraph 2 that:

> *AMAFTU found the symbology satisfactory, acceptable for Service release for the maritime role.*

I'm not sure that's my exact recollection of their report. Their report discussed the issue, but I didn't think it concluded. There may be another document where the – so we had two Accountable Managers: MAOs in the MRH Fleet at that stage, COMFAA in Army Aviation. So there may be a document where COMFAA formally accepted this.

AVM HARLAND: COMFAA is?

LTCOL REINHARDT: Commander Fleet Air Arm. The Accountable Manager in charge of Naval Helicopter Operations.

AVM HARLAND: So the senior Navy Aviation Operator?

LTCOL REINHARDT: Aviator. Yes.

AVM HARLAND: Right. Thank you.

LTCOL REINHARDT: Fleet Commander of the Navy Flying Group.

AVM HARLAND: Thank you.

MAJ CHAPMAN: So just in terms, Colonel, of the OPEVAL report, wasn't that in effect a review or a retest that was being proposed of what AATES had earlier conducted and recommended?

LTCOL REINHARDT: In part. I mean, if you look at the specific measure of effectiveness and critical operational issues, you know, it's acknowledging there's a problem and it's trying to define how that affects

the role.

MAJ CHAPMAN: Do you have a view as to whether or not it may have been some attempt to work around or deal with, in a different way, the conclusions that AATES had reached in their report?

LTCOL REINHARDT: So, yes, I had thought that some of the people participating in that trial may have supported my assessment, even if at "Unsatisfactory". People were critical of who conducted the tests within AATES. You know, the Command have the right to become more informed by requesting more information to inform their seven-step Risk Management process, but maybe there should have been more critical analysis.

MAJ CHAPMAN: Was it your view at the time of the OPEVAL process that it was inappropriate in terms of the response to the issues that AATES had raised with respect to off-axis symbology?

LTCOL REINHARDT: Yes. And I wrote another report directly addressing the OPEVAL report.

MAJ CHAPMAN: And you maintain that view today?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: Just to close off on that topic, you were not involved, I think, in the testing beyond setting the parameters for safety?

LTCOL REINHARDT: Setting the test plan, applying for the MPTF, setting those safety parameters. Once I'd done that, it was their test to conduct. You know, there was, I guess, a broad level of overwatch. I did not conduct the test. I did not collate the results. I did not write the report. When I say "I", I mean AATES.

MAJ CHAPMAN: And to your understanding, the test, though you were not involved in it yourself, it was conducted in accordance with the parameters that AATES had set?

LTCOL REINHARDT: Yes, broadly. You know, you can look in some of those annexes there. There was some people – you know, the idea was to look at it in the roles to see if this characteristic was relevant. You know, some of the people that I would have expected to have flown it at night, didn't.

MAJ CHAPMAN: So this was a report which was sent by LTCOL Langley on or about 20 February 2022 to, among others, the Director-General of Army Aviation, and it essentially recorded the outcome of this further testing. And you're aware, aren't you, that on this further assessment they reached a – though undesirable, they noted it was undesirable in terms of the symbology upgrade, though also suggested that it was compliant. Is that right?

LTCOL REINHARDT: So they – so just working off my memory here, unless you want to point me to the specific paragraph.

MAJ CHAPMAN: I'm happy to go to the annexure, which is Annexure E.

MS McMURDO: I think the witness is wanting some more guidance as to where in the annexure you are referring to.

MAJ CHAPMAN: I'm sorry, I'll just turn that up.

MS McMURDO: Just while MAJ Chapman is doing that, so looking at paragraph 16, it does say that there were over 10 sorties conducted with 12 Navy and Army operational, and instructional, and flight test aircrew participating. Do you know any of the details of those sorties, how many were involved in each sortie, or anything like that?

LTCOL REINHARDT: No.

MS McMURDO: You don't know those details.

LTCOL REINHARDT: Like, there comes a point, right, where I've got to let people get on with their job independently.

MS McMURDO: You had to step back at that point.

LTCOL REINHARDT: Yes.

MS McMURDO: Yes, I understand.

MAJ CHAPMAN: At paragraph 16 of the report – this is on page 10 – as the Chair has just noted, they flew a number of sorties, you will see, by day and by night. It is noted that they were flown in accordance with Standardisation Manuals, and also recorded there that their findings are that there was no loss of situational awareness, unusual attitude or confusion on the aircraft encountered during the testing.

LTCOL REINHARDT: I can see that, yes.

MAJ CHAPMAN: And that the distance to go indication was found to be an enhancing feature, which was the primary purpose of, as you have noted, the upgrade.

LTCOL REINHARDT: Yes, I make some comment in my follow-on minute to that, but I think your original question was about what did this report find in the taxonomy of flight test results. I think they found it "Undesirable", and made a recommendation that the attitude information could be made non-conformal, and they also referenced a compliance with a specification.

Now, I have gone and reviewed briefly that specification, and I think, you know, specification may not necessarily mean an FAA certification. It could be a product certification to say, "We design it to behave like this". In reading that line, all I took from that was the system was behaving how the system specification intended it to behave.

So in my original report I outlined three possible problems, or reasons, why the symbology was behaving the way it is. One was an integration issue specific to the Australian aircraft. And I believe that recommendation was saying that the symbology was not an integration issue and it was behaving in accordance with how the manufacturer knew it behaved.

MAJ CHAPMAN: Did you see the report, this OPEVAL report dated 29 February 2020, at around the time that it was released?

LTCOL REINHARDT: I would say yes, because then I released another - - -

MAJ CHAPMAN: Yes, thank you.

MS McMURDO: We can't go to that because it's classified.

MAJ CHAPMAN: We can't deal with that one.

LTCOL REINHARDT: No, but there's a date there, right.

MS McMURDO: Yes, sure. Sure, all right. That gives you the date, but you can certainly tell us your opinion – 15 March.

LTCOL REINHARDT: So I wrote in that that I did not support the conclusions of that report, and that I - - -

MS McMURDO: Don't tell us what you wrote in that. Just give us your opinion.

LTCOL REINHARDT: My opinion is that I did not agree with it.

MS McMURDO: You did not agree with it because?

LTCOL REINHARDT: I still maintain that the ambiguity was unacceptable.

MS McMURDO: Going back to the OPEVAL report, E, when you get to the Table 5, Conclusions and Recommendations, you look at number 3, then there's a big warning there. This is:

> *On the line of sight, conformal attitude, presentation of the pitch scale was undesirable.*

There's a big warning there:

> *HMSD LOS must be aligned with the longitudinal aircraft axis when conducting a UA recovery.*

Can you tell us what that means in layperson's terms?

LTCOL REINHARDT: So there are two elements to that warning. They probably should be broken out separately. We have discussed initially that they are saying that if you – okay, a UA is an unusual attitude. So you have mis-assessed the aircraft state, and it has extremes of pitch or roll, or excessive airspeed, or rates of descent or climb, right. It's not where it's meant to be. It is unusual. And if you do not recover from an unusual attitude, you're going to lose control of the aircraft, or fly into the ground before you lose control of the aircraft.

So this is an emergency that we train for, and there's drills and that. So they're saying here, I guess, that if you – you could enter a UA because of ambiguous symbology information. And they're saying that if you do identify you're in an unusual attitude, you are to discipline yourself coolly and calmly in this unusual situation to look forward and then apply the correct – look at the correct attitude information now, and recover from that.

MS McMURDO: So that warning is, I assume, to go to pilots flying with this?

LTCOL REINHARDT: Correct. It would be in the Flight Manual, and the pilots would be expected to know this. There is a second part to the warning which talks about, alternatively, if you can't discipline yourself, and you're confused and you don't know what's going on, you could use the AFCS go-around mode for an automated unusual attitude recovery. So I have written another document, which is – I sent my AATES MRH-90 flight test pilots to go out and determine if this AFCS go-around function could recover from a UA. This was completely within the flight envelope of the aircraft, and they were appropriately qualified and trained, being experienced QFIs, to do this.

So they put the aircraft in a number of unusual attitudes, and pushed the go-around button. So the go-around button is designed when you're on approach, if you muck up the approach to a hover landing, you can press go-around, and it will automatically apply power and put the aircraft in a climb attitude, and safely fly you away from a mishandled landing. So we put them – or they put the aircraft in representative speeds and attitudes, and then pressed the go-around button.

This is probably not where the aircraft is designed to be – this is not where the go-around button is designed to be used, and we experienced the go-around function could not correct the aircraft attitude and we got into situations where we were approaching vortex ring states. We had excessive rates of descent. And we did not agree with that recommendation at all, and I articulated that to Avn Command.

MAJ CHAPMAN: So in a low-level environment, would that shortfall be more exacerbated?

LTCOL REINHARDT: Yes. You could – if you were flying - so lift aircraft can fly down to 50 feet. We generated high rates of descent that, you know, would've meant impact with the ground. You're already confused, you're already in an unusual attitude, and in some flight parameters where the go-around function was not designed to be used, pushing that button just made things worse.

MS McMURDO: So the crash we're investigating, we know the helicopter was number 3 in a four-helicopter formation, doing a left bank turn in showery conditions at night, possible long-term fatigue involved, stress. Do all those factors mean that it would become more difficult for a pilot to heed that warning?

LTCOL REINHARDT: Yes. And, as I've discussed, with the boundary avoidance PIO, and when your workload goes up, your higher-level thinking functions degrade. So there comes a point where pilots just start

reacting through fear or being completely overwhelmed. You know, we are meant to be making aircraft simple to fly. You know, test pilots and designers, we don't want aircraft that are tricky to fly because pilots need to be concentrating on the mission, not just trying to keep the aircraft upright.

MS McMURDO: Thank you.

MAJ CHAPMAN: And you sent the response you've referred to only within a few weeks of the OPEVAL minute; is that right?

LTCOL REINHARDT: Yes, I believe so.

MAJ CHAPMAN: And the substance of it, in effect, was that you didn't agree with the outcome of the OPEVAL assessment?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And was that the reason that you sent the response? Like, what caused you to send that response? Was it simply that?

LTCOL REINHARDT: So my initial report did not have DGAVN as an addressee. Then the OPEVAL – you know, and I think that was appropriate because that was an issue then that DACM could deal with. The OPEVAL report came out, and I think an addressee was DGAVN on that. I felt I needed to elevate the issue to the – well, the Accountable Manager, so you'll see that DGAVN is on there.

You know, I would say it's highly unusual for a Flight Test Organisation to go into a repechage round, but I felt so strongly about the issue that I wrote another minute - - -

MAJ CHAPMAN: And when – sorry.

LTCOL REINHARDT: AATES – before my time – had similar difficult reports, specifically about a night flight profile, and had written a report that was not well received. They did not go into a repechage round like I did. So, you know, I was concerned for the integrity of the Flight Test Organisation, that I was going to start – by writing this extra minute, I was going to start descending into, you know, getting down in the mud and wrestling with people who weren't qualified or authorised to make these opinions, but I felt strongly enough that I should inform the Accountable Manager of what his Flight Test Organisation had concluded.

MAJ CHAPMAN: So it's the case, isn't it, that, you know, certainly you weren't invited to make these representations? You did so off your own bat, out of concern?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And I take it that you provided the response because not only you didn't agree with it, but that you were not satisfied that enough had been done to address the concerns that you'd raised in the AATES initial report?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And, as you say, you wanted to ensure that, despite only having been involved in that planning phase, that you were making clear that you were committed to the views that you'd expressed in the original report, now having read the OPEVAL?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And is it the case that, with your response, you're attempting to, you say "elevate", but sound a warning that if this particular upgrade went into Service that you were concerned that it could lead to a potentially catastrophic outcome?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And can I just ask, what was the response to this minute that you sent to Aviation Command?

LTCOL REINHARDT: I don't think there was a response. You know, AATES made some continuing efforts, through CASG, to try and get flight test reports and more information out of Europe. Some was forthcoming. It was discussed, I think, at AASPC. You know, I had an anecdotal discussion with the SO1 Standards at the time, about how this issue was going to be dealt with.

MAJ CHAPMAN: So just to clarify, you were not formally invited to respond to the OPEVAL report. You initiated your own response out of a concern for safety. You sent that response and you received no formal response back from the addressees?

LTCOL REINHARDT: I don't believe so.

MS McMURDO: Who did you send your opinion that the OPEVAL

conclusions weren't accurate and weren't safe? Who did you send that to?

LTCOL REINHARDT: So the primary addressee was DACM.

MS McMURDO: DACM is?

LTCOL REINHARDT: The Directorate of Aviation Capability Management. Which is a full Colonel position within – well, it's within AVN Command now, and works on sort of current capability management issues. However, I include – and, you know, that's probably fair, right, because he was the person dealing with all this. But I also include - - -

MS McMURDO: And who was that person, please?

LTCOL REINHARDT: At that time, that was full Colonel Tim Connolly.

MS McMURDO: Thank you. And I think you were going to go on to say who else you said it to, or to whom – who else you gave your views?

LTCOL REINHARDT: So the – on the "for information", the first addressee there is DGAVN, who – well, so at this stage, you know, we were pre-AVN Command. So the MAO, I believe, at this stage was Commander Forces Command, but he is not an aviator and relies heavily on DGAVN to guide him, so that is why I've sent this to DGAVN.

MS McMURDO: All right. Anyone else?

LTCOL REINHARDT: Yes. There's a whole list of people here. So there's: Commandant AAvnTC; the Director of Op Airworthiness, Avn Branch; the Project Director MRH; the MRH-90 Chief Engineer; the SO1 Op Airworthiness B; the SO1 Standards; the SO1 TLH; and the OIC AMAFTU.

MS McMURDO: Thank you.

MAJ CHAPMAN: And do we take it, Colonel – first of all, can I just ask you, would you like a break?

LTCOL REINHARDT: No.

MAJ CHAPMAN: And do we take it, from the lack of a response to your response, that that reflected, to your mind, perhaps a reluctance, on the part of the chain of command to engage with AATES further on this issue?

LTCOL REINHARDT: Look, I think I'd made myself – my position very clear. Maybe there was no point engaging with me. You know, they had the information. They knew how strongly I felt about it. You know, I will give the chain of command the benefit of the doubt that they appropriately weighted my information.

MAJ CHAPMAN: Thank you. And what was it next that you heard about the upgrade in terms of implementation?

LTCOL REINHARDT: Look, I guess the most significant thing I heard was, anecdotally, that there had been a meeting between the then SO1 Standards and the then DGAVN, where this issue was discussed and, broadly, they disagreed – they considered that pilots would always look to the front when they reset their attitude information, and did not share my concern. And so, from an operational point of view, they were happy.

MAJ CHAPMAN: So you became aware at some stage in about 2020 that the symbology upgrade, together with the fault that AATES had identified, had entered into service on the MRH-90 fleet?

LTCOL REINHARDT: I'm not specifically aware of the date, you know. We had some further discussions about trying to get more test reports, but it just got rolled out.

MAJ CHAPMAN: But you're aware that the software upgrade, including this issue – the fault, as I described it – included in it, was rolled out, into Service?

LTCOL REINHARDT: Correct, yes.

AVM HARLAND: Who was that meeting between, where you believe they decided that the issue wasn't really - - -

LTCOL REINHARDT: So this was relayed to me when I was walking around at Oakey and I bumped into the then SO1 Standards and he said he had a meeting with the then DGAVN where they discussed about whether – you know, where pilots look when they go and change their attitude. And my understanding of what the then SO1 Standards told me was that they both agreed that, "Well, pilots just look to the front when they set the attitude, so why is this going to be a problem?"

AVM HARLAND: Yes. And who were in those positions at the time?

LTCOL REINHARDT: So the then SO1 Standards was

LTCOL Anthony Norton. And the then DGAVN was BRIG John Fenwick.

AVM HARLAND: John?

LTCOL REINHARDT: Fenwick.

AVM HARLAND: Fenwick. Thank you.

MAJ CHAPMAN: LTCOL Reinhardt, I'm now going to move on from that topic of the symbology upgrade to discuss with you the testing that AATES did in respect of the image intensifier tubes.

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: So AATES conducted some testing in respect of the image intensifier tubes on the MRH in about April 2020 and produced a report. Is that your understanding?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: Without going into the report, the outcome essentially that the tested product, which is the L3 tubes, represented, they were overall an improvement on, or a performance enhancement for, the TopOwl?

LTCOL REINHARDT: Yes. And this was also a demonstration of a capability process that went well. This testing that I did is probably what, in my time at AATES, I'm most proud of. There was a significant improvement in IIT's performance. It was rolled out to ARH as well. And all the people that participated in this, including DSTG, AATES, DACM, the then CO 6 Regiment at the time – we will never know who, on a dark night, we have helped by getting this through. And it wasn't without challenges. This was driven out of that initial report that was written pre my time in 2018, which put some limitations on a specific flight profile, but it showed where the process worked properly.

DACM took the – the report was not well received; there were some issues with it. But DACM took the information and went around the world and looked for solutions in the continuous review process of Risk Management and we found some novel ways to get better tubes into the HMSD and solved a problem within a couple of years.

MAJ CHAPMAN: When you say it's an example of a system which – or a process which works properly, you're comparing the success of that

process against what happened with respect to the symbology upgrade. Is that right?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: As you've noted at paragraph 91 of your statement, I think you used the term you're most proud of this because it lifted certain limitations on the MRH-90 that were impacting operational units.

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: This was the sort of work that AATES had been formed to conduct, and test pilots to complete, to improve operating conditions and equipment and so forth with respect to Army Aviation?

LTCOL REINHARDT: Yes. And the people all involved were working collegiately and we weren't trying to – people weren't playing the man or some stovepipe. We were just addressing the issue.

MAJ CHAPMAN: There was no unorthodox process such as an OPEVAL report or process engaged in in that way. It was simply a case of meaningful engagement between AATES and the chain of command to achieve a desired outcome?

LTCOL REINHARDT: Correct. But noting what I said earlier, that I may have facilitated that unorthodox process.

MAJ CHAPMAN: Can I just move then to the last of the reports that you were engaged with in respect to the MRH, and that's the FLIR. And we've introduced yesterday I think in evidence, that's an acronym for the Forward-Looking Infrared Camera.

MS McMURDO: Perhaps rather than saying the reports, rather the work that he did on it. Because I think this is also a classified report, isn't it?

MAJ CHAPMAN: Yes, this is.

MS McMURDO: So we'll stick away from the report, but more the work that he did on it, please.

MAJ CHAPMAN: Thank you, ma'am. The work that you did with respect to that was a substantiation study. Can you just explain what a substantiation study is in this context?

LTCOL REINHARDT: Well, I think I need to set some more context. So the Flight Manual that was written by the OEM did not approve the FLIR to be used for pilotage. However said, it was up to the country that owned the aircraft to determine how they were going to use the FLIR. There was a bunch of – well, there was a limited initial test done on this – using pilotage FLIR by ARDU, which was where the Army Flight Test Organisation was resident pre-2016, or something.

At some point some of the recommendations from that report migrated into the MRH Standards Manual. AATES did not appreciate how that happened. I would say that introducing a pilotage FLIR capability is a change in the configuration, role and environment of the aircraft and should have been introduced as a deliberate decision by the Accountable Manager and articulated through the SOIU.

It had become obvious to AATES that this was being – pilotage FLIR was being widely used, and it was demonstrated to me on one of my MRH famil flights that I did when I took over. And AATES believed that whole flights were being done on pilotage FLIR. There was a limited amount of guidance.

I had significant concerns about this. Some of my unit members had significant concerns about this. The system is nowhere near as reliable as IITs. There are a whole bunch of limitations. We did not have a good understanding of it. We did not have some of the support systems required to predict FLIR performance. There was further appetite for Army Aviation to extend its use into smoky or IMC environments to extend the operational flight envelope of MRH-90 in even further degraded visual environments by day.

The then Director of Op Airworthiness, I believe was becoming aware of the issues that AATES were becoming – or were already aware of and was becoming uneasy with the amount of information that supported this, and he was asking me to do testing. I did not want to get involved with it because I knew it was a hiding to nothing for AATES in trying to characterise this against the popular opinion that had already developed. But in the end, I agreed that if AATES weren't going to try and characterise this, then who would? And I accepted a DOPAW's position and recommended to DACM that we be tasked to look at pilotage FLIR.

Pilotage FLIR is also very topical because we are acquiring Apache, and Apache uses pilotage FLIR. However, the context is completely different. Apache is designed to be flown with pilotage FLIR. There was angst in Avn Command that AATES would – AATES's results would

impede Apache's introduction to Service, but I think that was naive because, as I said, the context was completely different.

So we accepted that we would go and look at it, and it was a big task. So we started with a literature review and we started with looking at reliability and how we define it and how we can provide information to an operational aircrew. And we outlined all that and we found that the system was much less reliable. It was not comparable to other equivalent systems that we used for pilotage FLIR, and we articulated a lot of that information. We articulated that at an intermediate stage to see if Avn Command still had the appetite to go ahead with it.

Broadly, that report was acknowledged as having been accepted and we were told to move to flight test phase. I think I've got up to where you asked the question.

MAJ CHAPMAN: Yes. You covered a lot there, thank you, LTCOL Reinhardt. Perhaps just to go back to the very start to orientate people to the context that we're addressing. At 92 you refer to what this system is, and it's fair to say that it is a physical camera which is mounted on the nose or underneath the nose of the MRH; is that right?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: It provides pilots, as you say at 92, with an additional visual capability, particularly for degraded visual environment conditions.

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: And can you just explain what that provides pilots in terms when contrasted with night vision?

LTCOL REINHARDT: So night vision amplifies existing light and near infrared energy. So if there is no light, NVD will not provide you with an image to fly off. The darker it is, the less useful that image is. Forward-Looking Infrared looks for heat, and it looks for heat difference, a Delta T. So it's thermal energy it's looking for; you don't have to have visible light. The heat of the rock, the heat of the road, the heat of the trees are different. So it can measure that difference and provide you with an image to show you the rock and the tree and the road.

And typically FLIRs are used for targeting, but there are aircraft that are specifically designed to fly off FLIR, and there are limitations with all systems with it. So the MRH-90 FLIR could present the information, the FLIR picture, in your HMSD. It was one or the other; it was either

NVD image or FLIR image. You couldn't have both. And only one person could get the FLIR image, because the FLIR is on the nose of the aircraft, and it has to point where you're looking. So the TopOwl helmet tracking system – the FLIR will follow where you're looking, but it can't look in two directions at once. So two pilots can't have the same image in their HMSD.

MAJ CHAPMAN: Is that the reference to where the device is "slaved" to the pilot?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: So only one person can have it.

LTCOL REINHARDT: So now you've got the two people that are responsible for flying the aircraft having different images, with different limitations and different characteristics. So now we're – as well as the SOIU, there's a training requirement now. How do we train our pilots how to use this? What's the CRM involved now? If someone's got a better visibility, whose visibility are we flying to? If we're flying past the co-pilot's visibility, that's a different skillset for the person that's flying the aircraft.

These are a whole bunch of issues that needed to be teased out, formally explained, and the Accountable Manager accept.

MAJ CHAPMAN: And you're asked to look into the FLIR to be used possibly as a primary pilotage aid in circumstances where the manufacturer had prohibited the use of the FLIR for that purpose?

LTCOL REINHARDT: The manufacturer did not allow it for pilotage but, however, also said that it was up to the people that owned the aircraft to determine how they wanted to use it. And as I've also already explained, our airworthiness system does not constrain us. If the context is sufficient that we need to use pilotage FLIR, then as long as we go through the seven-step Risk Management process and correctly articulate the risks and accept them at the right level and adopt a continuous review process, if the context is right and we've demonstrated all that, then that's okay.

MAJ CHAPMAN: And ultimately, this was agreed with certain conditions, or there was a consensus reached between AATES and chain of command, with respect to implementing this system?

LTCOL REINHARDT: So we did further testing and found further results and we held a TERC, which – is this where we're going?

MAJ CHAPMAN: Yes, can I get you to expand on what TERC refers to?

LTCOL REINHARDT: So after any flight test process, we should conduct a TERC, which is a Test and Evaluation Review Committee. That meeting is owned by DACM and that is the time where the Aviation Command digest what AATES has reported. So who is invited to that TERC varies, and the TERC can be scaled depending on what we discover of significance, or whatever.

So people you might invite to a TERC that has major safety issues could include Op Airworthiness Standards, Safety, the SPO, the OEM representative, Training – a whole bunch of people. And this is where we sit down and try and work out what AATES's recommendations really mean and perhaps we might discuss what some possible ways to treat risk are, and a path forward is proposed. It's a meeting that's owned by DACM.

So we produced a whole – we did a bunch of testing and produced some results, and then we held a TERC, and the TERC broke down. Essentially, it did not conclude. It became – AATES presented a whole bunch of information, and it descended into a bunch of major QFIs who just basically said, "We don't agree".

MAJ CHAPMAN: Don't agree with AATES?

LTCOL REINHARDT: Yes.

MAJ CHAPMAN: And the purpose of this TERC, as you put it, this is a – you said that the DACM convenes this meeting; is that right?

LTCOL REINHARDT: The DACM organisation, yes.

MAJ CHAPMAN: And the purpose of it – it's convened following each AATES report to get the stakeholders together to discuss outcomes, presumably.

LTCOL REINHARDT: It should be.

MAJ CHAPMAN: And the intent behind convening a meeting of that kind is to bring the SMEs all together to try and achieve a satisfactory mutual outcome.

LTCOL REINHARDT: I wouldn't say "mutual outcome", but we're going to define where we're going and we're going to say, "Okay, if we've had an 'Undesirable' and we've just got to amend the Flight Manual to give the pilots more information, then we would say, Op Airworthiness Standards, can you take on this task? Here's what we recommend". Publish it in the Standards Manual.

If we've recommended that this issue needs to be tracked in the OTCRM or AVIART, we would go to SO1 Safety and say, "Well, you own this. Here is the issue. We need to" – or if it's a very controversial issue, we might have to staff a decision brief-up outlining the left and the right, and for the Accountable Manager to make an informed decision.

MAJ CHAPMAN: But it's a formal meeting of a group of stakeholders where there's an opportunity to ventilate issues that they've identified in the AATES report and for AATES in turn to respond; is that right?

LTCOL REINHARDT: I wouldn't use the term "ventilate", but it's AATES's opportunity to lay out what it's found, and we formally sit down and discuss. There should have been a time where everyone's had beforehand to digest the report, and then we come, having read it, and work out the way forward.

MAJ CHAPMAN: So it's convened following AATES releasing the report?

LTCOL REINHARDT: Correct.

MAJ CHAPMAN: And you've mentioned the TERC having been convened in the context of this FLIR meeting. Was the TERC convened in respect of the IITs, as you recall it?

LTCOL REINHARDT: I don't recall it. So this was all around COVID and we - - -

MAJ CHAPMAN: This is the – sorry, the IITs are not – I'll get to the symbology.

LTCOL REINHARDT: Sorry. Sorry, what was the question then?

MAJ CHAPMAN: Do you recall a TERC being convened in respect of to consider your report dealing with the image intensifier tubes?

LTCOL REINHARDT: No, I don't think so, because, as I said, the TERC is scalable, right. And so there was – for the IIT tube, we needed to

get results to meet budgetary requirements. So I released an interim report that said, "Based on DSTG information" – so I made an initial verbal recommendation that, "Based on DSTG information, this is going to work. Just do it". DACM wanted to make sure, and said, "No, AATES, I want you to keep going and keep testing". And so we did, and I released a very quick interim report to say, "It's all working. Go". And then I followed up with a much more in-depth report. But, again, the TERC is scalable, right. So there was probably not a need for an in-depth report TERC for that.

MAJ CHAPMAN: Though the expectation is following the release of an AATES report, you would generally convene a TERC to discuss - - -

LTCOL REINHARDT: That is the standard procedure, and DACM were good at that in this time. But I - yes.

MAJ CHAPMAN: And lastly, do you have a recollection of whether a TERC report to consider findings was convened in respect of the symbology upgrade?

LTCOL REINHARDT: I don't think there was. So this was in the middle of the initial COVID lockdown. Although, I have already spoken about a meeting where we discussed the OPEVAL.

MAJ CHAPMAN: Though your understanding of that meeting wasn't – sorry, in respect of the OPEVAL. I'm talking about just in respect of the meeting following the release of the AATES report; you're not aware of one?

LTCOL REINHARDT: For HMSD 5.1?

MAJ CHAPMAN: Yes.

LTCOL REINHARDT: So I can't specifically recall one, right. But we had a meeting where the OPEVAL process was discussed. That could have been a scalable TERC for HMSD 5.1, but I cannot remember the formal TERC for HMSD 5.1, and we may not have held it.

MAJ CHAPMAN: Which, if it was to have occurred, it likely would have occurred prior to organising anything in relation to the OPEVAL. Or the OPEVAL could have been a product of a TERC?

LTCOL REINHARDT: Correct. That's what should have happened, right. So out comes AATES's 5.1 report, everyone think about it and

digest it for a while, and then we would meet and a possible outcome of a TERC could have been, "All right, we're going to do an OPEVAL".

MAJ CHAPMAN: Do you have, looking back on it now, any understanding as to why the TERC in respect of the symbology upgrade wasn't convened?

LTCOL REINHARDT: It was around when COVID initially happened, right. And TERCs were traditionally face-to-face activities, and a lot of DACM Staff Officers were typically at Enoggera, so we would typically drive down to Enoggera and it would be held there.

MAJ CHAPMAN: So you're saying, are you, that it's possible that the TERC didn't convene by reason of COVID restrictions?

LTCOL REINHARDT: That's possible.

MAJ CHAPMAN: Or you're not sure?

LTCOL REINHARDT: I'm not sure.

MAJ CHAPMAN: Did you conduct any TERCs during the COVID lockdown period online?

LTCOL REINHARDT: Yes, we did. We got better at that. And most of them are running online – a lot of them are running online. I tend to find face to face is better.

MAJ CHAPMAN: Just give me a moment, LTCOL Reinhardt. I think that's the evidence, thank you.

MS McMURDO: Thank you. So we're not intending – you're not intending to go into private session as we may need to do?

MAJ CHAPMAN: No. No, not at this stage.

MS McMURDO: I've just got a few questions, if I could ask you? If you want to look at your report under the heading, "Status of AATES Recommendations", around about paragraph 31 and 32? I just want to talk to you about the system. You've told us that AATES recommendations are not binding and that it then goes on for an operational decision to be made, effectively, taking account of the AATES system. With your very significant experience, do you think this is the optimal system that's in operation at the moment? If you had a magic

wand, and you were setting up an optimal system, would it be this one, or would you make changes?

LTCOL REINHARDT: So AATES's recommendations are not binding, but they're authoritative. So there are people that can't challenge it. Look, our whole airworthiness system gives flexibility to Command because we are not a civilian airworthiness system; we have unique requirements. And Command needs flexibility. If I was a Commander, I would want to retain that flexibility. Command just have to consider the seven-step Risk Management process and do it properly.

MAJ CHAPMAN: I want to ask you about that too. That without it being a memory test, can you take us through the seven-step process, or refer us to where we can find it?

LTCOL REINHARDT: So I believe it's articulated in the WHS Act 2011. Defence used to run an ALARP Risk Management process, "as low as reasonably practicable", but we transitioned vicinity 2014/15 – something – to SFARP, which is "so far as reasonably practicable", which is more in line with the Act. The seven-step Risk Management process starts with: establish the context, become reasonably informed, eliminate risk where you can. I guess, then you manage risk that you can't eliminate using the hierarchy of controls. You then characterise the risk using consequence and likelihood to give you a level. And there's a matrix that's accepted within Defence that would be articulated by DFSB, but there can also be technical risk levels. So I think we're up to - - -

MS McMURDO: Six.

LTCOL REINHARDT: Characterise the risk, accept the risk. So acceptance of the risk means by the chain of command at the right level, and there's different levels of the chain of command have different delegations to what risk they can accept. And then seven should be continuous review.

And time is important in that process. So for a quick risk assessment, the standards of how reasonably informed you have to become and what controls are reasonably practicable to be implemented would be less. But you could not then rely on that analysis if time started winding on, and you would have to do more rigorous analysis and controls that you determined were not reasonably practicable for a short period of time that would – that logic would no longer be valid as time went further on, because you would have access to more resources, you would have had more time to do more review, the context could have changed, and technology moves on.

And IITs is a good example, right, where technology moved on and now we had an opportunity in a continuous review process to get better performing IITs, and Avn Command were working collegiately together there, and that process worked.

AVM HARLAND: So as the Flight Test Organisation in an authoritative sense, would you consider you would be involved in that seven-step risk process, or would your report be the input to that?

LTCOL REINHARDT: It could be both. Our report could start the process, but there could be an independent issue. For example, Chinook, possibly we're upgrading the Chinook AFCS. That means that it may not be compatible with the HUD that we've got, so we may not be able to have a HUD with the upgraded digital AFCS. So Command would go through a seven-step Risk Management process there to identify that the configuration of the aircraft has changed.

Command may choose to task AATES to inform it of what the outcome is of that change to configuration and how the role and environment might need to change. So we could get tasked to inform the seven-step risk process, but similarly, our reports could start the seven-step Risk Management process. Did that answer your question?

AVM HARLAND: It does, thank you.

MS McMURDO: Then, paragraph 58 of your statement, you are taking about the 14 June AATES report and who it was distributed to. I just wanted to find – you said "among others, the Commanding Officer of 6 Aviation Regiment at the time was" - - -

LTCOL REINHARDT: So - - -

MAJ CHAPMAN: Sorry, LTCOL Reinhardt, there's going to be a pseudonym list. Thank you.

LTCOL REINHARDT: Yes, right. Got it.

MS McMURDO: Pseudonym list. Thank you. Of course.

LTCOL REINHARDT: All right. So I believe the name that I'm about to mention is not on this list.

MS McMURDO: All right. Well, you can give that to us out of session then, thank you.

LTCOL REINHARDT: But what I would like to say is that CO at the time was involved in helping to work through that IIT process, and that CO went overseas and looked at a peer operator of MRH-90 and brought back information that, with DACM, allowed us to embark on some of the pilotage – some of the IIT upgrade information. So, again, IIT upgrade process was where things were working properly.

MS McMURDO: Okay, good. Then the Directorate of Aviation Capability Management at the time – this is June 2019.

LTCOL REINHARDT: So I've given you that it was COL Tim Connolly.

MS McMURDO: Thank you. And the Director of Operational Airworthiness?

LTCOL REINHARDT: So that was COL David Lynch.

MS McMURDO: You did say "among others". Was there anybody else that you should include there?

LTCOL REINHARDT: So there was some internal distributions within AATES. So, yes, CO 6 Avn, CO AMAFTU, Commandant AAvnTC, CO SAA, SO1 Op Airworthiness at Avn Branch, SO1 Standards at Avn Branch.

MS McMURDO: If you could give us the names of the people holding those positions at the time, if you know them? You actually - - -

MS MUSGROVE: I'm sorry, just if I may.

MS McMURDO: Yes.

MS MUSGROVE: If the witness can perhaps put his report face down because it's on the camera.

MS McMURDO: Yes, we're worried about it being videoed, you see.

MS MUSGROVE: And if it assists, if we can go through the list of the distribution list and the Commonwealth can assist and provide the correct names for the Inquiry.

MS McMURDO: Correct names. Okay, I'd appreciate that. Thank you, Ms Musgrove.

MS MUSGROVE: Thank you.

LTCOL REINHARDT: All right. So, thank you. I'll just complete the list, as - - -

MS McMURDO: You don't need to. It'll be all right because the Commonwealth said they'll give it to us, so we'll have that information.

LTCOL REINHARDT: Okay. Thanks, ma'am.

MS McMURDO: So thank you for that. Yes, and one other question. If you could turn to Annexure A, the OPEVAL minute?

UNIDENTIFIED SPEAKER: E.

MS McMURDO: E, sorry. E, the OPEVAL minute. Paragraph 1 of that, it reads:

> *Under Plan Palisade, the MRH-90 helmet-mounted sight display symbology is being upgraded to conform to the new OEM symbologies version 5.10, updated from version 4. MRH-90 Project Office requested AATES to conduct human-machine interface (HMI) assessment and training gap analysis and support of Service release of the HMSD V5.10 software upgrade. The subsequent very limited scope of testing was reported at reference A.*

What do you say of the reference to your work as a "limited scope of testing"?

LTCOL REINHARDT: So I've already partially discussed this this morning. In part, that statement is correct; we only flew the aircraft by day. However, I think it's possibly misleading. The results that we observed by day, given the vast experience that my test pilots had, and the experience I have, and our training at Test Pilots Course, I think it is completely reasonable that we forecast the conclusion we had by the results we saw by day.

MS McMURDO: Thank you. Is there anything else you wanted to say about that?

LTCOL REINHARDT: No.

MS McMURDO: Thank you, that's all I had. Did you have some questions?

AVM HARLAND: Yes, just had one follow-up, and it's more of a round-up question, really, like a bigger picture question.

When you took to get yourself reasonably informed about testing for the symbology, did you come across any other examples of aircraft that are flying that have ambiguity or difference between their Primary Flight Displays and their Head-Up Display, and whether that had been accepted?

LTCOL REINHARDT: Well, apart from what I've already talked about on MRH-90, where the issue was masked so the pilot did not practically achieve it - - -

AVM HARLAND: And ARH?

LTCOL REINHARDT: And ARH.

AVM HARLAND: Yes.

LTCOL REINHARDT: No, I do not – well, okay, there have been cases where – you said "HUD", didn't you?

AVM HARLAND: Yes, between - - -

LTCOL REINHARDT: You specifically said "HUD"?

AVM HARLAND: Well, I'm talking about, like, a TopOwl-type display.

LTCOL REINHARDT: No, I did not find any specific examples of what we're talking about in other aircraft.

AVM HARLAND: Or misalignment between a traditional Head-Up Display and your primary flight instruments, which really is about having ambiguity or mismatch between your attitude displays.

LTCOL REINHARDT: I did not.

AVM HARLAND: So to follow on from that, would you characterise that as unusual, that an aircraft would fly around with a mismatch between attitude displays?

LTCOL REINHARDT: Yes.

AVM HARLAND: Okay, thank you.

MS McMURDO: Now, I presume there'll be applications to cross-examine. Can I get some idea of the estimate of time for the applications to cross-examine because LTCOL Reinhardt is obviously planning to return to his home interstate today.

MR MEEHAN: Yes, I would make application on behalf of Thales Australia with an estimate of less than 10 minutes.

MS McMURDO: Thank you. Any other applications?

LCDR GRACIE: Ma'am, I'd seek leave. I think half an hour.

MS McMURDO: Okay.

LCDR TYSON: Ma'am, I'd be about 10, 15 minutes.

MS McMURDO: All right. Any other applications?

MS MUSGROVE: I don't have an application in relation to cross-examination for this witness, but I can indicate that the Commonwealth has indicated to Counsel Assisting that we are hoping to assist the inquiry with information and evidence that addresses some of this witness's evidence. We don't have it at this point in time because it hasn't been requested and we're working with, hopefully, Counsel Assisting to provide the best information for the Inquiry.

So I'm not in a position to effectively cross-examine this witness at this point in time, but I just wanted to flag that we're hoping to work with Counsel Assisting to provide that information to the Inquiry.

MS McMURDO: Thank you, but can I – I appreciate that, and I thank you and the Commonwealth for that cooperation. It's appreciated. But do I understand from that that you might want to cross-examine the witness? No?

MS MUSGROVE: At this point in time, I don't have cross-examination for this witness.

MS McMURDO: Thank you. Okay, well, at least that gives the Lieutenant Colonel some idea of when we'll likely to finish this afternoon. We'll have a lunch adjournment now and resume at 1, so that might help you with the flights this afternoon. Thank you.

HEARING ADJOURNED

HEARING RESUMED

MS McMURDO: Yes, LCDR Gracie.

LCDR GRACIE: Ma'am, sir, I do understand, based on the position put on behalf of the Army, that there will be evidence adduced going to this issue. Of course, I'm ready to cross-examine now but it does sound like - - -

MS McMURDO: I didn't understand that.

LCDR GRACIE: Okay.

MS McMURDO: I didn't understand that.

LCDR GRACIE: I thought it was evidence - - -

MS McMURDO: Ms Musgrove, you might like to clarify that.

LCDR GRACIE: I'm sorry, I thought it was evidence to contradict some of these matters. I must have misheard it.

MS MUSGROVE: I can indicate that the Commonwealth has made an offer to Counsel Assisting to find the best witnesses that could assist in relation to the evidence that this witness has given, to actually give some more information and context to this witness's evidence, and also the decision-making within the appropriate organisation. So that was the offer that we've made.

MS McMURDO: That's what I understood, Ms Musgrove.

MS MUSGROVE: Yes. Thank you.

MS McMURDO: Thank you.

LCDR GRACIE: Well, I am sorry.

MS McMURDO: No, this is your opportunity to cross-examine.

LCDR GRACIE: I misunderstood. Yes, it is. But I understand there may be some other issues coming out of other evidence.

MS McMURDO: Well, there hopefully will be.

<CROSS-EXAMINATION BY LCDR GRACIE

LCDR GRACIE: Colonel, sir, my name is LCDR Malcolm Gracie. I represent the interests of CAPT Danniel Lyon. Can I just ask you some really rudimentary things about the Defence Aviation – I think it's called Safety Framework. There was a joint Directive 21/2023 which I understand sets out what is known as the Defence Aviation Safety Framework. Is that correct?

LTCOL REINHARDT: I don't know. You know, you'd have to show me the document. I - - -

LCDR GRACIE: All right. So are you aware that there is such a policy or a document called the Defence Aviation Safety Framework?

LTCOL REINHARDT: Broadly, yes.

LCDR GRACIE: And within that framework can I just tease out a couple of things. There is, within that framework, broadly speaking – I won't hold you to it – there's the Defence Aviation Authority?

LTCOL REINHARDT: Okay, yes.

LCDR GRACIE: Defence Aviation Safety Authority?

-

LTCOL REINHARDT: Yes.

LCDR GRACIE: Defence Aviation Safety Program?

LTCOL REINHARDT: Yes.

LCDR GRACIE: Defence Aviation Safety Regulations?

LTCOL REINHARDT: Yes.

LCDR GRACIE: And possibly it may be separate, but the Defence Flight Safety Bureau?

LTCOL REINHARDT: Yes.

LCDR GRACIE: And that framework is also informed by the Commonwealth Work Health and Safety Act, isn't it, in terms of safety?

LTCOL REINHARDT: Well, we are all under the Commonwealth WHS Act.

LCDR GRACIE: But the seven-step process that you talked about within the context of this Aviation Safety Framework is informed by the Work Health Safety Act?

LTCOL REINHARDT: I believe I've already said that, yes.

LCDR GRACIE: And then I understand there's also – and I'm not sure whether it sits within this Aviation Safety Framework, or I'll call it the ASF – there's the Directorate of Aviation Operations?

LTCOL REINHARDT: DAVN Ops?

LCDR GRACIE: Yes.

LTCOL REINHARDT: Yes, I'm aware of an organisation called DAVN Ops.

LCDR GRACIE: And is DAVN Ops separate to any of those other entities I've mentioned, or is it within one of them?

LTCOL REINHARDT: Well, DAVN Ops would be a subpart of DASA – D-A-S-A, the organisation.

LCDR GRACIE: And DAVN Ops takes the lead on air safety?

LTCOL REINHARDT: Look, if you're after specific definitions and all of that in this area, you know, I may not be the best person. DAVN Ops looks at a lot of operational issues that, you know, aren't necessarily contained by technical design of things. But I'm not really sure where you're trying to go with this.

LCDR GRACIE: I'm just trying to understand the structure.

LTCOL REINHARDT: Well, I don't think I'm best-advised - - -

LCDR GRACIE: All right.

LTCOL REINHARDT: I don't think I'm the best person for you. You know, there are other witnesses coming that might be better asked.

LCDR GRACIE: What role does the Director of Aviation Capability Management have, DACM?

LTCOL REINHARDT: So they are within Aviation Command. So there is a group of – so there is the Directorate of Operational Air Worthiness, which is headed by a full Colonel. There is the Director of Aviation Capability Management, which is headed by a full Colonel. And then there's the Director of Battlefield Aviation Program, right. So they're a staff system that supports DGAVN in running the Army Aviation Capability. DBAP would be forward capability. DACM would be current capability. DOPAW is sort of operational Regulation – or operational advice and standards and rules and procedures, and OIP. But again, you know, there may be better witnesses to ask these questions of.

LCDR GRACIE: What I'm really wanting to get to, in a clumsy way – for which I apologise – is where does the Army Aviation Testing and Evaluation Section, AATES, sit within that framework? Do they get tasked by DACM?

LTCOL REINHARDT: So I believe you're asking the question related to when I was in charge and when I wrote those reports.

LCDR GRACIE: Yes.

LTCOL REINHARDT: Okay. So when I took over as the SO1 T & E of AATES, AATES was a section within the Army Aviation Training Centre, which is commanded by the Commandant of the Aviation Training Centre. Commandant Aviation Training Centre, you know – broadly, I guess, Army Aviation Capability would report to, when I was in charge – the functional arrangements have changed from a airworthiness line, reported to DGAVN.

My tasking, when I was in charge, came from DACM. And DACM would prioritise the tasking and filter the tasking. Because Flight Test Organisations are very much in demand and can be overtasked and need focus. So DACM would entertain requests from DOPAW, DBAP, DFSB, the SPOs, the OEMs, DSTG. And, you know, DACM understood the priorities of the program and would allocate that.

And loosely, there would be a minute that would be written that would allocate me tasks with priorities, and that would be reviewed six-monthly. That process has been refined and improved since I left.

LCDR GRACIE: Now, AATES is a Flight Test Organisation – licensed Flight Test Organisation. Is that - - -

LTCOL REINHARDT: I'm not sure we're licensed but we are the Flight Test Organisation for Army Aviation.

LCDR GRACIE: And who approves AATES as being the sole FTO?

LTCOL REINHARDT: I'm not sure I could even answer that question. It's inherent in our organisation structure.

LCDR GRACIE: But there is only one Flight Test Organisation, that's AATES?

LTCOL REINHARDT: So there is an Army Flight Test Organisation, which is AATES. There is a Navy Flight Test Organisation, which is AMAFTU. And there is an Air Force Flight Test Organisation, which is ARDU.

LCDR GRACIE: In respect of the MRH-90, it's the AATES, the Army one?

LTCOL REINHARDT: Right. But, you know, at the time, MRH-90 was operated by both Army and Navy.

LCDR GRACIE: And Navy has a separate FTO?

LTCOL REINHARDT: Organisation.

LCDR GRACIE: Yes.

LTCOL REINHARDT: And in my testimony, I talked about AMAFTU doing flight test on MRH-90. You know, they are the authoritative experts on ship aircraft integration and so any time we would take an Army helicopter to do flight tests onto a ship or something like that, it would be conducted under AMAFTU.

LCDR GRACIE: And you weren't part of the Navy testing of the TopOwl, were you?

LTCOL REINHARDT: I have participated in AMAFTU trials with TopOwl on Tiger onto LHD. So, you know, I guess I was posted – well, TTY, temporarily allocated to AMAFTU. But the command structure, the airworthiness, the flight authorisation was all conducted by AMAFTU.

LCDR GRACIE: Right. But the AMAFTU report that's reference B in the OPEVAL, Annex E, do you know the parameters of the testing that was undertaken for that report?

LTCOL REINHARDT: Look, I'm broadly aware. But, yes, if you have specific questions, they're probably best answered by AMAFTU.

LCDR GRACIE: Well, did it replicate the sort of environment that AATES were testing the TopOwl under?

LTCOL REINHARDT: AMAFTU flew their 5.1 testing by night in a maritime environment with ship/helicopter integrated testing, so it was different. We have different – as I said, Navy is responsible for ship/helicopter integration.

LCDR GRACIE: So it was integrated with the ship technical capabilities?

LTCOL REINHARDT: Well, they were doing testing of the interface with the MRH-90 and ships, and they got the HMSD 5.1 software put onto the MRH that were doing that testing to get a quick look at it in the maritime environment.

LCDR GRACIE: As far as I understand it – and tell me if I'm wrong – there's a – within, I think, the Directorate of Aviation Operations there's a system of Airworthiness Boards that meet.

LTCOL REINHARDT: So there are a series of Airworthiness Boards that DASA – D-A-S-A – are responsible for running. There are people in DAVN Ops that coordinate those meetings. You know, who specifically owns the Airworthiness Board is probably a question for follow-on witnesses.

LCDR GRACIE: Can you just explain to me, within AATES, I understand there's a demarcation between Airworthiness and Aviation Safety in a structural sense? Is that right?

LTCOL REINHARDT: In AATES, A-A-T-E-S?

LCDR GRACIE: Yes.

LTCOL REINHARDT: I don't understand the question. That question doesn't make sense to me.

LCDR GRACIE: Within AATES, one of its obligations is to assess airworthiness; is that right?

LTCOL REINHARDT: So AATES can make recommendations or observations on airworthiness. But, yes, we have many functions which probably weren't covered in some of my initial testing. We may just be required to gather data for an engineering organisation. And because the aircraft may need to be modified to get that data, we have all the test processes and abilities to get function. So we may just be gathering data for an engineering organisation to design a mod or whatever.

You know, we are subject-matter experts in things like HMI: handling qualities, workload, performance, stability and control. But I'm having trouble really understanding your question.

LCDR GRACIE: Then can you tell me what's the difference between airworthiness and airworthiness certification?

LTCOL REINHARDT: Well, airworthiness, I guess, is a concept where you have, you know, correctly designed aircraft operated – you know, designed by approved organisations that are maintained in a framework with correctly qualified and trained maintainers, and operated by pilots and aircrew in a system with categorisation, and training, and overwatch. You know, it's a broad conceptual term.

Certifying an aircraft – you know, aircraft are often built to a standard, and that would be outlined. And then, in a systems engineering process, it's a set of agreed goals that you would build the aircraft to. You can have a whole bunch of different certification standards, and I've covered some, like, from the European and American systems. But, you know, advanced military aircraft just have their own specification, which is like a product specification.

So I'm not sure I'm answering your question, but there are follow-on people that are probably better to answer that.

LCDR GRACIE: That's all right. As a Flight Test Organisation though, is it within the responsibility or the role of AATES to issue airworthiness certification?

LTCOL REINHARDT: We can determine compliance with a certification standard. So we may be asked to go out and confirm that an element, or a characteristic, or a modification meets a certification standard. And that would probably be in things like handling qualities, performance, stability and control, because engineers are not necessarily

equipped to gather that data. But similarly, as I explained before, we just may gather the data for someone else to make the determination of is it certified – meeting a certification standard. So it depends what we're talking about.

LCDR GRACIE: But if AATES, in its testing, identifies non-compliance with a certification standard, that means a certification standard, what, issued by the Civil Aviation Organisation?

LTCOL REINHARDT: Well, you know, aircraft are built to different certification standards, and that would be outlined. And, you know, while some elements may be certified to FAR 20 – to the relevant FARs, there may be other systems on the aircraft that don't meet, or have different certification standards that could be more onerous or less onerous. So I think I also said in my testimony that we could make a finding, or a recommendation, or an observation about compliance with certification, but ultimately the Accountable Manager does not necessarily need to comply with that. If they go through the seven-step Risk Management process and can outline it, then that is how our system works.

LCDR GRACIE: And, as you said, it all depends on context.

LTCOL REINHARDT: Context, resources, time, and the principle of what is reasonably practicable.

LCDR GRACIE: Can I just ask you to have a look at Annex E of your statement, being the OPEVAL? I just want to ask you a couple of - - -

LTCOL REINHARDT: So this isn't my report.

LCDR GRACIE: Sorry, Annex E of your statement, I think.

LTCOL REINHARDT: Yes.

LCDR GRACIE: Have you got it there? Thank you. The first thing I was going to ask is, would it ordinarily be expected in an OPEVAL of this type that there would be a Risk Assessment process, or a Risk Assessment document?

LTCOL REINHARDT: Yes, and there was, and AATES helped generate that. So in order – do you want me to stop there?

LCDR GRACIE: No, I'm interested in this.

LTCOL REINHARDT: Okay. So we needed a Military Permit to Fly to do our testing, and this testing required a Military Permit to Fly as well because we were putting equipment on that was not, at that stage, approved for Service release. There was a Risk Management process conducted, and that would have been part of the supporting evidence for the AATES application for the Military Permit to Fly, and that would have been articulated in the Flight Test Plan. DASA would have then assured that Test Plan and that Risk Management, and would have issued the Military Permit to Fly to conduct this testing. And the Standards Branch that conducted this testing would have been expected to comply with that Risk Management Plan.

LCDR GRACIE: Just if you look at the first page of Annex E, would you expect that to be referenced as one of the documents governing the OPEVAL?

LTCOL REINHARDT: Not in this document, no. So there would have been a test plan, and that would have contained the Risk Management as an annex. This document could have said, and referenced, the test plan. Let me just have a look. They don't specifically, but a lot of my reports do reference test plans, but I am not sure that this is an unworthy characteristic of this report.

LCDR GRACIE: That's all right. That's in relation to the AATES Test Plan. What about in relation to the Risk Assessment process as the outcome of the OPEVAL? There would be one, wouldn't there?

LTCOL REINHARDT: Right. So, you know, post the OPEVAL, we've discussed TERCs, and an outcome of a TERC would be – so if you notice in the reports there's an annex which has all the findings in a tabular format, and that tabular format is meant to be easy to be cut and pasted into the TERC to be presented and gone through. So at the end of the TERC, and considering the report, you know, the system outside of AATES, I would have expected for these findings to have constructed a Risk Management to inform the seven-step Risk Management process.

LCDR GRACIE: Again, while we're still on this page, can I ask you to look at Reference E?

LTCOL REINHARDT: Yes.

LCDR GRACIE: What is the source of the format specification? Is that a document produced by NH Industries? Is it something produced by Army, or something else?

LTCOL REINHARDT: So I briefly reviewed that specification in the lead-up to this. TTH is a term used for the MRH-90. I believe this document is a European NHI document.

LCDR GRACIE: And that was the specification to which the OPEVAL had regard in terms of informants, or otherwise?

LTCOL REINHARDT: So I talked about it earlier, that we weren't sure how the symbology was functioning. And I've also talked about how different specifications can be written, right? So this, in my mind, is a product specification that engineers would write to say, "We want a system that functions in accordance with this specification".

I'm happy to be corrected by the author of the report later, but my reading of this report is that they are saying that they observed behaviour that is compliant with the format specification of the aircraft. And I had made observations earlier that we weren't sure how the symbology was functioning, and it could've been an integration issue. And I believe that the reference here to "E" is telling us that the symbology is functioning how it was meant to.

LCDR GRACIE: Because that wasn't a document, was it, that the AATES testing had regard to, in terms of its evaluation?

LTCOL REINHARDT: No, not specifically. I don't think we had that document when we embarked on our testing, but I don't think we necessarily needed it as well, right. Because the objective of our test was a HMI assessment, and a training gap analysis. And I had a specific conversation with the then DACM, and I asked them, "Am I just doing a regression training test, or am I specifically looking at HMI issues?" And he specifically told me he would prefer to know about HMI issues now than find out about them later.

LCDR GRACIE: Thank you. Can I just go to your statement? It's a very slippery slope on which we work here. If you go to paragraph 59 to which you were taken a bit earlier – page 11 of your statement there – helpfully, sir, it sets out a description of what you referred to as "ambiguous or incorrect attitude information". Can I get you to turn the page, to page 12, and the second bullet point? I just want to ask this. Where you've said, further down that the error to which you've referred about the pilot turning their head off axis, indicating a 10 degrees angle of bank when it was a zero degrees, you've said in the last sentence of that second bullet point:

> *This error in the angle of bank reading increased, incrementally, from looking at zero degrees through to 90 degrees, or*

270 degrees.

Does that mean that, if you're looking at 90 degrees, the angle of bank that's being indicated is incrementally larger, i.e. 30, 40, 50 degrees? How does it increase "incrementally"?

LTCOL REINHARDT: Okay. Well, to illustrate the point, we will just pick some theoretical numbers, okay. So let's say that, when I look straight ahead, angle of bank is zero. And when I look full off axis left, it's 10. All right. Now, there is a graduation as I go through – let's go this way so we're doing positive degrees – as I go from zero to 10, to 20, to 30 off axis, it will get to – when I'm 90, it'll be 10, right. So halfway, probably going to be five; a quarter of the way, probably going to be 2.5; three-quarters of the way, probably 7.5. Right. But I've also said that, you know, we didn't have a really good, clear indication of how this was behaving, and we never really got a good description of what was going on. Have I helped you, in explaining what I mean there?

LCDR GRACIE: Yes. If I can just restate it – and tell me if this is correct – if you go through to the full 90 degrees, it will depict angle of bank of 10?

LTCOL REINHARDT: Picking these theoretical numbers to illustrate the point, yes. But if I only look half axis off, it would be, you know, five.

LCDR GRACIE: Five.

LTCOL REINHARDT: Half. It seemed to – incrementally. So we have picked some theoretical numbers to illustrate and clarify your point.

LCDR GRACIE: And something I just want to explore in the next bullet point is where they're talking about 20-degree angle of bank, all right. And then indicating a zero degrees, which returned to 20 degrees when looking back forward. So what I'm trying to work out is the difference between the second bullet point and the third. So in the first bullet point you've got a zero angle of bank with a right look 90 degrees, which gives you 10 degrees angle of bank, incorrectly. Is that right?

LTCOL REINHARDT: That is - - -

LCDR GRACIE: Theoretically?

LTCOL REINHARDT: That is what that statement says, yes.

LCDR GRACIE: The second one, though, is that if you adopt a 20-degree angle of bank, the aircraft – and you turn to the 90 degrees, then it's indicating a zero-degree angle of bank?

LTCOL REINHARDT: That's what that statement says.

LCDR GRACIE: So although in that second bullet point you talked about it being "incremental" up to 10 degrees, it's then compounded if the aircraft itself has an angle of bank?

LTCOL REINHARDT: Well, we split pitch and roll. Right? If we try and put them together, it's going to get inordinately confusing. But, again, there's still the incremental change, right. So if we're entwining angle of bank when I'm looking forward, and then I look full left and it's zero, if I only look 45 left, I'm saying that the change is going to be about a half. But, you know, again, we were never really sure how this system behaved.

LCDR GRACIE: And can I – sorry to jump around a bit, but can I just ask you to go back to the OPEVAL report, Annex E to your statement, and in particular page 3? And I just would like your assistance in understanding what is being said here. At the bottom of page 3, after some discussion about actual pitch and attitude and so forth, at the bottom it says, about the fifth-last line:

> *As the pilot rotated the head laterally and the line of sight was moved to 90 degrees from the aircraft axis, looking left out the cockpit door, the difference between the HMSD horizon line and pitch scale resembled a roll indication of the same magnitude –*

I think that's a 10-degree left roll –

> *as the pitch indication 10-degree nose-up, when looking forward.*

In simple terms, does that mean that the roll and the pitch have been reversed?

LTCOL REINHARDT: That was some of the thinking, yes. But, you know, we got an updated document from Airbus, when we were developing the substantiation for the OPEVAL report, that gave some more guidance along this. But, again, you know, I didn't write this report.

LCDR GRACIE: No. That's why I'm asking if you can explain what I think it said - - -

LTCOL REINHARDT: Well, the best person to explain that is the person that wrote the report.

LCDR GRACIE: Yes. But since you did a repechage to it, I would like your opinion on whether or not my reading of it is the same as yours, namely that this is representing a reversal of pitch and roll, in the symbology?

LTCOL REINHARDT: So it says:

> *resembled a roll indication of the same magnitude as the pitch indication.*

So I don't think that's saying that they're swapping. It's just saying that the roll indication became the same magnitude as the pitch indication.

LCDR GRACIE: So whether it's reversed or not, it is simply saying that the angle of bank is depicted to the same degree as the pitch?

LTCOL REINHARDT: You could reach that conclusion from that sentence. But, you know, the conditions could be – have been set, initially, that, you know, correlation is not necessarily causation.

LCDR GRACIE: No. But the converse would be – sorry, I withdraw that. Did you have any understanding – because I think you touched on it – that there was some assessment or evaluation made by AATES that there was a reversal of roll and pitch indicators in the symbology at some point?

LTCOL REINHARDT: I don't think that's what my report says.

LCDR GRACIE: No, correct. But I think you said that there was some indication of that, and you made some enquiries about it.

LTCOL REINHARDT: There was some discussion and, you know, that was a line that we thought about, but I don't think I've said that in my report.

LCDR GRACIE: No, but there was that concern that probably didn't see things through because of the shutting down of the testing.

LTCOL REINHARDT: Well, no. Like, we can think many things, right, and just because I think something doesn't mean it's true. We postulated, and tried to understand this, right, and that was a line of discussion. I don't think that's specifically called out in my report.

LCDR GRACIE: No. But tell me about the line of discussion then. Was there some suggestion that there was - - -

LTCOL REINHARDT: So, look, I don't think this is credible evidence, right. We didn't know how it was behaving. You know, we explored what could be happening, but I am not prepared to say that pitch and roll reversed.

LCDR GRACIE: Was there any testing that showed that a – no, I'll withdraw that. Can I ask you something still while we're on the OPEVAL report? Is there a classified version of this report?

LTCOL REINHARDT: No, not to my knowledge.

LCDR GRACIE: It was always unclassified?

LTCOL REINHARDT: That's my understanding.

LCDR GRACIE: The only reason I say it is that your repechage maintains a higher classification than the document to which it's referring, so I wasn't sure if there was another version.

LTCOL REINHARDT: Not to my knowledge, no.

LCDR GRACIE: Can you just go to Annex A of this OPEVAL?

LTCOL REINHARDT: Yes.

LCDR GRACIE: You see it's got, "Annex A, Advice for Readers". Is that unusual to include in an OPEVAL?

LTCOL REINHARDT: Okay. Sorry, I'm - - -

LCDR GRACIE: Sorry.

LTCOL REINHARDT: No, I think that's fine, that they've used that.

LCDR GRACIE: Well, it's just that under "Acceptability" it refers to the test and evaluation conclusions, which I would have thought was something that would be pertinent to an FTO, not an OPEVAL.

LTCOL REINHARDT: So OT&E can use these terms, and Operational Tests and Evaluation doesn't necessarily involve aircraft, right. It can be

looking at a ground vehicle or something. Yes, they can use this terminology.

LCDR GRACIE: Just if you come up to the very first sentence, it says:

> *This report assesses the suitability of the aircraft, as tested, in the context of a capability as defined by the Defence Aviation Safety Regulations.*

Do you see that?

LTCOL REINHARDT: I do see it.

LCDR GRACIE: Do you disagree with that statement?

LTCOL REINHARDT: Not specifically.

LCDR GRACIE: But as far as AATES were concerned, and you on behalf of AATES, the testing that AATES did, did not satisfy capability as defined by the DASR, did it?

LTCOL REINHARDT: Well, I'm not sure DASA regulates capability. Can you choose a different term to "capability"?

LCDR GRACIE: Yes, certification. One of the CAO orders.

LTCOL REINHARDT: So DASA – so there's probably better witnesses to talk about this later, but DASA can accept multiple certification standards, and they can recognise foreign FAA, European, foreign military standards. They've recognised French standards. So there are multiple standards they can recognise. But DASA would provide the umbrella for that logic train.

LCDR GRACIE: Let me just bookmark it this way: AATES formed the informed view that the symbology that was part of the HMSD was not able to be certified for use.

LTCOL REINHARDT: So, no, I wouldn't put it in those terms. So I looked at standards that were covering similar issues, but my findings were more related to a role and operational airworthiness conceptually. I think – so flight test reporting uses a seven-part paragraph format, and the last part of that – last or second-last, depending, of that is spec compliance, where you make a determination if something you have tested is compliant with a relevant specification. My reports do not – or the AATES reports do not contain a sentence in that seven-part paragraph

about specification compliance. I do, however, draw out other standards that a reasonable person might go and make themselves familiar with in the seven-step process to give them context and to inform them of what other reasonable people might consider.

LCDR GRACIE: But that, can I suggest, is because you weren't referencing the specification. You had, independently of the specification, formed a view that the ambiguity in attitude reported by the symbology could lead to a controlled flight into terrain.

LTCOL REINHARDT: I'm happy to agree with that statement.

LCDR GRACIE: Just help me here again with the process because I'm not familiar with it, and it seems like there's many overlays of levels to deal with. But does it mean that as far as the AATES testing was concerned, it would not recommend the certification of the TopOwl system for use in the MRH-90 with the upgrade to 5.10?

LTCOL REINHARDT: Well, I didn't make any recommendation about certification. I would say that I wouldn't – I would say that some of my conclusions did not indicate that this should go to Service release.

LCDR GRACIE: Thank you. My next point is this: who then certifies it?

LTCOL REINHARDT: So ultimately that would go out through DASA, and there are – so DASA.

LCDR GRACIE: And, in the ordinary course of events where there is this requirement for certification or concern expressed on the part of AATES about compliance, would it normally go to an Airworthiness Board for review?

LTCOL REINHARDT: So there is paperwork where DASA have made determinations for the certification of this. It's not in my statement, and other people can provide that, right. An Airworthiness Board is not an approval process, so they don't sit there and stamp a whole bunch of modifications, right. They are an assurance process that the system is working properly. So there's various forms – I can't quote them; it might be a 28 or a 31 – that this went through, where DASA signed it all off. An Airworthiness Board comes back and, I guess, takes various snapshots of how the system is running.

The flight test does have an input to that, but at that time, as a legacy of when Army was within ARDU, the Director TED, who was a delegate of

the Safety Authority to issue Military Permits to Fly, would write a minute for each Airworthiness Board on the testing that had been conducted on the platform that they were reviewing, with high points and stuff for the previous 12 months.

So the Airworthiness Board would see that information from an assurance review point of view, but Director TED within the Air Warfare Centre is the person that collates that document and presents it to the Airworthiness Board. The Airworthiness Board may also see this issue if it was in the OCTRM or AVRs, or in minutes of Aviation System Safety meetings and such.

LCDR GRACIE: Just coming back to the testing of the TopOwl system, there are various categories of testing, aren't there, that are required?

LTCOL REINHARDT: Correct.

LCDR GRACIE: Can you just briefly explain what a Category 1, 2, 3 might be?

LTCOL REINHARDT: So there's Category 1, 2, 3 and 4. We don't traditionally use Category 3 because that's like building the aircraft off a production line. Category 4 is sort of like minor modifications that have little impact or don't require complex flight test techniques or processes to do. And there are options where non-test pilots could do Category 4 flight test. An example might be a EMI/EMC testing of a new radio to be used on the aircraft.

I think the testing that we did on HMS 5.1 was Category 2 flight test. Some of the things that we would consider to put that would be we would reference DASR Flight Test 05, where they talk about substantial and non-substantial changes. And there's things like workload or training or HMI and things like that.

Then the highest level is Category 1, which is you are completely departing from the aircraft flight envelope or exploring new boundaries to the aircraft flight envelope. We have done examples of that with clearing new weapons and stores carriage, or carrying very heavy loads under Chinook over the max take-off weight of the aircraft.

But the various levels of flight test result in a Military Permit to Fly, which is assured by DASA. Category 1 and 2 would be – and 4 – would be approved by a Delegate of the Safety Authority Flight Test. There are some Category 4 flight test activities that can be approved by the military-type certificate holder.

LCDR GRACIE: And if this, as you said, was a Category 2 test, is there some requirement that that be conducted by AATES as the FTO?

LTCOL REINHARDT: So, yes, but I think if we went back and looked at the paperwork, the OPEVAL would have been a Category 4 test. Because the Category 2 initial test that AATES did to determine that, you know, there was no integration issues or regression issues, the system modification hadn't caused the aircraft to misbehave unexpectedly; we'd broadly characterised the issue. I'd have to go back and look at the paperwork, but I think the OPEVAL was probably a Category 4, which allows more scope for who can fly it.

LCDR GRACIE: But just to come back to the Category 2. Category 2 testing has to be done by qualified test pilots, doesn't it?

LTCOL REINHARDT: Normally, yes.

LCDR GRACIE: Category 4, not qualified test pilots?

LTCOL REINHARDT: You can use other people, right. But here's the critical point: it's all about risk management and assurance. So within the test plan I have to articulate who I'm going to crew it for and I have to articulate what I'm testing, the system description, how I'm going to do it, and then – in that process, right. That process is assured by DASA then, right. So just because it's Category 4 does not necessarily mean anyone can do it. It would be outlined in the test plan and then it would be assured by DASA.

LCDR GRACIE: That was your test plan to get the permit to fly?

LTCOL REINHARDT: That was the AATES Test Plan, yes. And I have done, as a Delegate of the Safety Authority, I have done and approved non-test pilots to do some elements of test flying because there were no test pilots available. And the context that was presented to me meant that non-test pilots had to captain the aircraft and various other things. But that's a digression. I mean, the Military Permit to Fly process is very flexible and it's very dependent on context.

LCDR GRACIE: Can I suggest this though – and tell me whether you agree or not – would you agree that the issues that AATES were dealing with in relation to the upgrade to the 5.10 should have been the subject of testing under Category 2 testing by qualified test pilots?

LTCOL REINHARDT: It was a Category 2 flight test and it was done by a test pilot.

LCDR GRACIE: Do you agree with me that based on the fact that this was a Category 2 test and conducted by AATES, that it was effectively downgraded to a Category 4 to achieve a particular outcome?

LTCOL REINHARDT: I don't necessarily agree with the connotation you're perhaps inferring there. I was happy as the organisation. I didn't sign the Form 18, but I was happy that the OPEVAL could be done under Category 4. And I articulated that, and the Delegate of the Safety Authority for Flight Test assured that activity.

LCDR GRACIE: I understand that. But didn't you say that you had some misgivings or regret, as opposed to being happy?

LTCOL REINHARDT: Is that in a specific paragraph?

LCDR GRACIE: There was a reference in paragraph 101 to you having some misgivings in signing the minute which incorporated the decision brief.

LTCOL REINHARDT: But that's a different issue. That issue is FLIR.

LCDR GRACIE: Okay. But it's still the outcome of AATES testing that wasn't accepted by Army.

LTCOL REINHARDT: But it's a different issue. So if you want to talk about FLIR and talk about that issue, we can. But I thought we were talking about HMSD 5.1.

LCDR GRACIE: Well, FLIR was all part of the same assessment though, wasn't it? There were three elements to it.

LTCOL REINHARDT: No, it wasn't.

LCDR GRACIE: Are there three elements to the TopOwl system?

LTCOL REINHARDT: We looked at three different things that are involved in TopOwl.

LCDR GRACIE: The paragraph I'd like you to look at is paragraph 71 at the top of page 15, where you say that:

Army Aviation was seeking to use the OPEVAL process to circumvent AATES in order to achieve a desired outcome, i.e. introduction of the upgrade against the advice of AATES.

LTCOL REINHARDT: That's what my statement says.

LCDR GRACIE: Isn't that consistent with what I suggested to you, that they effectively introduced a Category 4 regime to overcome the Category 2 testing that had effectively rejected the upgrade?

LTCOL REINHARDT: Avn Command didn't introduce a Category 4 system; I did.

LCDR GRACIE: But did you introduce the Category 4 system to be able to get the desired outcome to circumvent AATES?

LTCOL REINHARDT: I am AATES. So I have discussed this before. People could have gone around me for this. They could have gone to AMAFTU to do this testing. They could have gone direct to DASR to do this testing. I have already said that I may have suggested or facilitated this process. And I also have stated that I needed, as a Flight Test Organisation, to remain engaged with the Army Aviation system and be consistently inside the tent where I can raise my concerns. And I also had two test pilots – or the OPEVAL had two test pilots in there that I thought would come to similar conclusions to me.

LCDR GRACIE: Let me just put a couple of scenarios. First is, you agree that the OPEVAL process to approve what was a major change in design was irregular? You agree with that?

LTCOL REINHARDT: Where did I say that?

LCDR GRACIE: Do you agree with it, though?

LTCOL REINHARDT: Can you state it again?

LCDR GRACIE: Yes. Using the OPEVAL process to approve what was a major change to type design was irregular.

LTCOL REINHARDT: Well, the OPEVAL didn't approve it. The OPEVAL gave it more information that could be fed into the final decision to approve the Service release.

LCDR GRACIE: So maybe instead of "approve", "recommend"?

LTCOL REINHARDT: No, it was another body of information that stood along with my report that the decision-makers could consider before they made a decision.

LCDR GRACIE: Well, have a look at paragraph 69 and the first sentence, and tell me if you want to correct anything there.

LTCOL REINHARDT: Okay, I stand corrected, that's my statement.

LCDR GRACIE: So you agree it was irregular to use the OPEVAL process to approve what was a major change to the type design?

LTCOL REINHARDT: That's my statement.

LCDR GRACIE: Do you still stand by it?

LTCOL REINHARDT: Yes.

LCDR GRACIE: And at the top of paragraph 51 you talk about the process to circumvent AATES to achieve a desired outcome.

LTCOL REINHARDT: Which paragraph, sorry?

LCDR GRACIE: Para 71, at the top of page 15.

LTCOL REINHARDT: Para 71, top of 15. Yes, I think I've discussed that.

LCDR GRACIE: What I want to put to you is that you knew, while still trying to be involved and control the dynamic to some extent, were aware that the OPEVAL was to overcome the AATES findings?

LTCOL REINHARDT: I was aware of the risks that we were undertaking in allowing this to go ahead, right, but there was some considerations that I've already outlined that mitigated where this would have ended up. Can you say the question again?

LCDR GRACIE: Just since you've had the impression that the OPEVAL was to overcome the AATES reports or the effect of the AATES conclusions, you participated in this process knowing that it required, effectively, a Category 4 evaluation to get it through?

LTCOL REINHARDT: I'm happy that it was a Category 4 assessment. You know, we'd flown it under Category 2 and I was happy to take it to Category 4, and that decision was assured by DASA.

LCDR GRACIE: Yes, I understand the decision being assured by DASA but you seem to embrace the fact that you knew the OPEVAL was to overcome the AATES findings?

LTCOL REINHARDT: So I have already said that I may have facilitated this process. And I've already said that there were reasons why I need to remain engaged with Aviation Command. And I've already said that there were two test pilots that were going to be involved with this which could have provided supporting evidence to my conclusions. I don't think your statement is necessarily accurate. I think there are other considerations in why I facilitated this process.

LCDR GRACIE: But you knew the OPEVAL was to get the outcome of the introduction of the upgrade?

LTCOL REINHARDT: I didn't know that until I wrote the report.

LCDR GRACIE: Well, you say - - -

MS McMURDO: Is that an opinion you formed with hindsight?

LTCOL REINHARDT: Yes.

MS McMURDO: Thank you.

LCDR GRACIE: So in hindsight, you've formed the impression – well, at the bottom of paragraph 71 you say:

> *A decision was taken to go down the OPEVAL path which, while I was ultimately involved in the planning for this process, left AATES with the impression that Army Aviation was seeking to use the process to circumvent AATES.*

Was that the collective view in AATES, was it?

LTCOL REINHARDT: Well, this is my report.

MS McMURDO: He is AATES, isn't he?

LCDR GRACIE: Well, there are others in it. But, okay, should I read that that left you with the impression?

LTCOL REINHARDT: Well, I am at times using "me"/"I", when I probably should be talking more about AATES as the Flight Test Organisation.

LCDR GRACIE: But you're saying that your impression now was that the process was to achieve the desired outcome of introducing the upgrade against the AATES advice?

LTCOL REINHARDT: Well, again, correlation is not necessarily causation, right. They're honestly trying to gather more information, right, and when that is presented to the decision-makers, they can make that decision on their information. They can wait for the OPEVAL versus my report, and they make their own decision.

LCDR GRACIE: But do you agree that to an extent, with the benefit of hindsight, your role in the OPEVAL was perhaps – I'm sorry, I withdraw that. Did you feel that you were pushed into assisting the OPEVAL?

LTCOL REINHARDT: I have already stated that I may have – that I may have – there was a meeting held where it was either proposed to me or I offered to conduct this activity.

LCDR GRACIE: But you said you had concerns as to the approach to the OPEVAL.

LTCOL REINHARDT: Yes. But as I have already stated, you know, there were other reasons why I thought this was the best way to deal with a difficult situation, and I could not forecast the outcome of the OPEVAL. And there were also two test pilots that participated in that OPEVAL which could have supported my position.

MS McMURDO: You were expecting your position to be supported or, at least, if it wasn't, that there would be some very good reasons put forward as to why it wasn't?

LTCOL REINHARDT: Correct.

MS McMURDO: And when it wasn't, with hindsight, you formed the view that perhaps they'd used this process to circumvent your report?

LTCOL REINHARDT: I think the command chain I think were honestly trying to get information, right, and it's probably not an unrealistic expectation by Command to want to gather more information. The Staff Officers working in that system to support Command, you know, they may have different opinions.

MS McMURDO: Indeed, you wanted more information, didn't you?

LTCOL REINHARDT: Yes, but I wanted to gain that information in a different way.

MS McMURDO: Yes.

LCDR GRACIE: The point that I want to ask you about is this: if your impression, albeit with hindsight, was that Army Aviation were using OPEVAL to circumvent AATES to achieve the outcome that they wanted to introduce the upgrade, did you feel that that was a process that was effectively conducted outside the Defence Aviation safety framework?

LTCOL REINHARDT: No. I think it's entirely reasonable that Command wants more information and to make a reasonably informed decision.

LCDR GRACIE: But where you have this scenario, AATES are saying that this upgrade should not be put into Service, you're participating in an OPEVAL which is seeking an outcome that's different to that?

LTCOL REINHARDT: I didn't participate in the OPEVAL; I set the conditions for Standards to do it.

LCDR GRACIE: Well, you said:

I ultimately agreed that AATES would support the OPEVAL.

LTCOL REINHARDT: And by supporting that, we raised the test plan, we signed a Form 18, and we got the Military Permit to Fly for them to conduct it.

MS McMURDO: I think we've gone over this a lot of times already.

LCDR GRACIE: We have. What I'm really trying to put to the Colonel, ma'am, is this: is it the fact that the OPEVAL process had the risk of introducing the upgrade despite the misgivings of AATES that it was not airworthy?

LTCOL REINHARDT: So "risk" is a broad term. Are you defining it as a high risk or a very low risk? In hindsight, things didn't work out how perhaps I thought they might but, you know, I am not going to say Command can't gather more information.

LCDR GRACIE: Well, it went further. It made recommendations, didn't it?

LTCOL REINHARDT: Which report?

LCDR GRACIE: The OPEVAL.

LTCOL REINHARDT: It did, and then when I saw the outcome of it, I then wrote more material to reinforce my position.

LCDR GRACIE: Let me put it as bluntly as this: despite the OPEVAL, your position on behalf of AATES did not change in terms of opposition to the introduction of the 5.1 upgrade?

LTCOL REINHARDT: Correct. My position did not change, and I also outlined more material that I thought would be helpful in a seven-step Risk Management process.

LCDR GRACIE: I just want to ask you one more thing. You've helpfully put in, as Annex B, a NASA Technical Memorandum 4438. I just want to ask you something about that because you touched on it in your evidence-in-chief. You said in relation to conformal displays: one is, the TopOwl system has some conformal integration, but at the same time you weren't quite sure of the extent of them or the nature of them because you couldn't understand it, for want of a better term. Is that a fair summary?

LTCOL REINHARDT: That's a good start point for now.

LCDR GRACIE: When I look at the abstract, or more importantly, the concluding remarks of this document on page 6, it says that:

> *Pilots made pitch judgment errors three times more often with the conformable display.*

Can you just explain why that might be?

LTCOL REINHARDT: I mean the report, the NASA Tech Memo should talk about that. It's very hard to do the mental gymnastics on a conformal attitude display when you're looking off axis, as I've tried to outline with my paper plane example.

LCDR GRACIE: That's what I thought. I just wanted you to - - -

LTCOL REINHARDT: And, you know, as I think I gave in earlier

evidence, on a nice clear day, with a good horizon, on your own, just trying to work it out specifically, yes, maybe you can do it. When it's dark and there's a whole bunch of other stuff going on, your mental capacity is reduced so your workload is high.

LCDR GRACIE: Yes, all right. Ma'am, I think that's all that I have for the Colonel.

MS McMURDO: Yes, thank you.

LCDR GRACIE: Thank you, Colonel.

MS McMURDO: Yes, next application for leave to cross-examine?

MAJ CHAPMAN: Just before we go to that, I just had a couple of clarifying questions based on LCDR Gracie's cross there.

<RE-EXAMINATION BY MAJ CHAPMAN

MAJ CHAPMAN: Firstly, with the OPEVAL, were any of those sorties conducted in formation at low level on NVD?

LTCOL REINHARDT: I don't believe so.

MAJ CHAPMAN: And are you aware if Navy flies routinely low level at night in formation on NVD?

LTCOL REINHARDT: I would not consider that they're routine, the way they operated the maritime ship helicopter.

MAJ CHAPMAN: Okay, thank you.

MS McMURDO: Yes, CMDR Tyson.

<CROSS-EXAMINATION BY CMDR TYSON

LCDR TYSON: Lieutenant Colonel, my name is LCDR Matthew Tyson. I represent COL Alex Naggs, one of the aircrewman in the MRH-90 that was lost in the accident.

Sir, what I want to do is, I just want to tease out some of the logic and the

implications of some of your report at perhaps a high level. First, would you agree with this: that the use of TopOwl by a pilot in an MRH-90 reduces the pilot's workload?

LTCOL REINHARDT: I think that's a good, general starting point.

LCDR TYSON: And would you also agree with this as a general starting point, that the use of TopOwl by a pilot in an MRH-90 in some flying conditions can enhance the pilot's situational awareness?

LTCOL REINHARDT: Yes, I would probably say more than some.

LCDR TYSON: All right. But not all flying conditions?

LTCOL REINHARDT: So I've already talked about the limitations of direct and indirect view night-vision devices. But I've also talked about how the TopOwl system is integrated with the aircraft and its autopilot.

LCDR TYSON: And is it the case that in a situation where a pilot is using TopOwl when flying an MRH-90, the very circumstance that the pilot is using TopOwl is a circumstance that creates an incentive or encourages the pilot to fly eyes out of the helicopter's cockpit rather than looking at the instruments or displays on the dashboard inside the cockpit?

LTCOL REINHARDT: I would generally agree with that statement. And I believe I've already said that in my evidence.

LCDR TYSON: So then is it also the case that the combination of that effect, that effect of TopOwl to create that encouragement or incentivisation for the pilot to fly with eyes out of the cockpit, if you combine that with the problem of the symbology of TopOwl giving the pilot incorrect and ambiguous indication of pitch and roll when the pilot looks off axis.

The combination of those two things, would you agree, has the potential to cause or contribute to the spatial disorientation of a pilot flying an MRH-90?

LTCOL REINHARDT: I believe I've already said that in the evidence I've given.

LCDR TYSON: You agree with that proposition?

LTCOL REINHARDT: Yes, that was a very long statement.

LCDR TYSON: I know. I'm trying to tease together some of the logic, but you agree with that?

LTCOL REINHARDT: Well, can you say the statement again, a little - - -

LCDR TYSON: We take, as step 1, TopOwl encourages or incentivises the pilot to fly with eyes out of the cockpit; correct?

LTCOL REINHARDT: Yes.

LCDR TYSON: Then according to AATES, the symbology of TopOwl causes a problem for a pilot in that it gives an incorrect and ambiguous indication of pitch and roll when the pilot looks off axis; correct?

LTCOL REINHARDT: Look, to be fair to Thales, that is not an inherent problem of TopOwl. That is a problem of the HMSD 5.1 symbology that we decided to introduce.

LCDR TYSON: This type of device?

LTCOL REINHARDT: Look, the problem with the attitude information is because we put HMSD 5.1 on. HMSD 4.0 did not have this attitude information ambiguity problem.

LCDR TYSON: But the version of it that did have the ambiguity problem, if you combine that with the fact that TopOwl encourages or incentivises a pilot to fly with eyes out of the cockpit, can those two factors, together, do they have the potential to cause or contribute to the spatial disorientation of a pilot flying an MRH-90?

LTCOL REINHARDT: So I'll read it back so I think we've got it clear. So the combination of TopOwl being a very good system that allows you to reduce your workload and fly the aircraft and incentivise you to look out, if you then put in some incorrect or ambiguous attitude information, those two adding up together, as I think my report says, leads to some unacceptable risks.

LCDR TYSON: Yes.

MS McMURDO: Yes. Try and keep away from the report and what your opinion is, please.

LTCOL REINHARDT: Well, my opinion is that, you know, theoretically, those combinations lead to spatial disorientation or CFIT

and accidents.

LCDR TYSON: Yes. So you agree, don't you, sir?

LTCOL REINHARDT: Yes.

LCDR TYSON: Yes, thank you. Now, I just want to give you seven flying parameters. So you're flying an MRH-90 at night, that's parameter (1); overwater; at a relatively low level; (4) you've got reduced visibility to the horizon because of cloud cover; (5) you've got intermittent showers over the course of the flight; (6) you've got formation flying and, in particular, you've got a four-ship formation in a heavy left; a (7) you've got workload, for example, changeovers between pilot and co-pilot, mission planning, et cetera.

Those seven flying parameters, do you accept those, sir?

LTCOL REINHARDT: Well, it's your hypothetical example that you've constructed, and those seven parameters would not be usual or irregular in a complex Army Aviation mission.

LCDR TYSON: So I'm just trying to get you to understand there, there's seven flying parameters I'm giving you. Do you understand, sir?

LTCOL REINHARDT: Yes.

LCDR TYSON: Is it further the case that a pilot using TopOwl who might be at risk of losing spatial disorientation in the circumstances you've outlined in your statement, that that risk becomes even more acute if that pilot is flying in those seven flying parameters that I've given you?

LTCOL REINHARDT: I believe I've already given evidence that supports what you've said.

LCDR TYSON: And then you might have it with you. I want to read from paragraph 84 in your statement. I think it might be Exhibit 41, ma'am; I'm not sure. So in 84, citing from some of your earlier work, you said this:

> *AATES has not changed its assessment of the HMSD version 5.10 display - - -*

MS McMURDO: You better not talk about the AATES assessment - - -

LTCOL REINHARDT: That's a direct quote.

MS McMURDO: Yes, that's a direct quote. That's why we're not going there. But you can ask him about his opinion.

LCDR TYSON: Do you have the opinion, sir, that in relation to the HMSD version 5.2 display, the main risk is that in low visibility, low cue, no horizon environments of high workload, the flying pilot will be unable to ignore erroneous information directly in front of them and could become disoriented, leading to impact with the ground, loss of the aircraft and multiple casualties. That was an opinion that you'd agree with, sir?

LTCOL REINHARDT: Yes.

LCDR TYSON: I just want to try to understand, if I can, the use of "become disoriented" and particularise that and try to elucidate in what respects a pilot can become disoriented. If you take, for example, four different flying outputs – so altitude, attitude, position in a formation if you're flying in a formation, and then airspeed, rate of descent – can the HMSD volume (sic) 5.10 display make a pilot become disoriented in relation to the altitude at which the aircraft is flying in combination with the circumstances of low visibility, low cue, no horizon environments, of high workload?

LTCOL REINHARDT: So broadly, yes, the pilot could become disorientated to his actual angle of bank and overbank, and then not have the required power to maintain level and descend.

LCDR TYSON: So it can actually impact on altitude awareness?

LTCOL REINHARDT: Yes, it could impact on a lot of those factors you listed. This is a very complex problem which can be very hard to define, but a lot of those issues could be the result.

LCDR TYSON: Certainly I think your report very much suggests that the attitude - - -

MS McMURDO: No, no. Not the report, please.

LCDR TYSON: Sorry.

MS McMURDO: In his opinion.

LCDR TYSON: In your opinion, the pilot could also become disorientated in relation to the attitude of the aircraft?

LTCOL REINHARDT: That's my opinion.

LCDR TYSON: Yes. The pilot could also become disoriented in relation to the position within the formation that he was flying?

LTCOL REINHARDT: That could be a harder one to draw. He will know – the person will know relatively where they are in the form by directly observing lead. But if the attitude information is incorrect, he may not be aware specifically of some of the finer details of that position, whether he's low or high, and things like that.

LCDR TYSON: But certainly if you lose the flight lead, you can become disoriented in trying to regain your position, particularly if you're flying, say, number 3 in a heavy left formation?

LTCOL REINHARDT: So number 3's contract is to avoid number 2. If he loses visual on 2 – so part of the cockpit structure might get in the way, the formation could be turning through some cultural lighting and he looks away and then looks back and can't pick up the aircraft in amongst the cultural lighting, or whatever. He is obliged to declare "Blind" and execute a drill that then would provide safe separation from him and the aircraft in front of him. And then there would be a procedure to rejoin the formation. Have I answered your question?

LCDR TYSON: Well, you have. But just without cavilling with that answer, one of the problems for – if you're flying 3 in the formation, you've got two issues, don't you? You've got the issue with maintaining the formation distance between 2, but you've also got to navigate off the flight lead, don't you? You've also got to be looking at number 1.

LTCOL REINHARDT: No, I would say the contract is 3 avoids 2, and 2 avoids 1. So there's some reliance and trust that everyone's doing their job properly, right. If you start trying to second-guess what 1's doing, you're going to divide your attention and increase your workload, and you won't be able to maintain your contract with 2. So broadly, you would have SA on where 1's going, perhaps, but your primary responsibility is to avoid 2.

LCDR TYSON: All right, sir. And then just getting back to the topic of the question, so just in terms of understanding your opinion as to how a pilot might become disoriented, in terms of – you could also become disoriented in terms of airspeed and the rate of descent of the helicopter?

LTCOL REINHARDT: Look, I don't think airspeed's necessarily going to be the first thing that pops up. You're more likely probably to become

rate of descent or altitude. Airspeed in the HMSD is accurate and the same as the PFD. So if the pilot has got sufficient capacity and is doing the internal HUD scan properly, he should be aware of what his airspeed is. If, however, the erroneous attitude information is confusing him or taking more attention than he needs, he may drop airspeed out of his scan and that could change. There wasn't a problem with airspeed indication in the HMSD 5.1 symbology. But the presentation of attitude information could drive the workload of the pilot so that he is no longer scanning airspeed. And if there is deviation in airspeed, he may take longer to pick it up.

LCDR TYSON: So if the disorientation has caused you problems in relation to altitude and attitude, it can then affect other flying outputs.

LTCOL REINHARDT: Right. So if he's not aware of his attitude and the nose drops, the aircraft will accelerate, right, and then that will have an impact on airspeed. And if his workload is high and his capacity is reducing, his scan to that airspeed could reduce and he may take longer to pick that up.

LCDR TYSON: Thank you, sir. Now, in terms of the antidote or one of the responses to this situation of disorientation, it's your opinion that in these situations not all pilots are likely to be able to discipline themselves, when alarmed or surprised by a threat, to look forward before moving the flight controls? That's your opinion, isn't it, sir?

LTCOL REINHARDT: That's my opinion.

LCDR TYSON: So just trying to understand the logic of your report and your oral evidence yesterday and today, the antidote to the problem of disorientation is being able to look forward; correct?

LTCOL REINHARDT: That was someone's proposal as the antidote. That is not my opinion as to the solution to this problem.

LCDR TYSON: Well, I might explore that in a moment. But certainly if the pilot is disorientated, one solution/one antidote might be the pilot looking forward.

LTCOL REINHARDT: That could solve the problem, yes.

LCDR TYSON: But is there an inherent problem with that? Because if the pilot's looking forward in circumstances where you've got reduced visibility to the horizon because of cloud cover, you've got – you're flying at night, low illumination, overwater, at a low level, the ability to look

forward might actually not be a reliable saviour in that situation. Is that fair?

LTCOL REINHARDT: Well, I would have constructed that question differently because they're in formation. So if you are concerned about your attitude and it's very dark and you're doing as best you can just to keep visual on 2, and you now have to look forward, you're not visual on 2 - - -

LCDR TYSON: So looking forward is not an antidote?

LTCOL REINHARDT: Well, it's my opinion that, as I've stated a few times, that in high workload, low visual cue environments, that over the service life of this aircraft not all pilots will be able to apply that workaround strategy for the deficiency that AATES identified and eventually someone will fly off the ambiguous information off axis.

LCDR TYSON: Well, another potential antidote, and I think you've addressed it, was the AFCS go-around function could be used. But, in your opinion, that's not a reliable solution or antidote to the problem either?

LTCOL REINHARDT: So it is my opinion, and it is based on AATES going out and physically trying to fly those suggestions, that that is not a reliable risk control.

LCDR TYSON: So if looking forward and AFCS aren't reliable risk controls, what is the reliable risk control, sir, in this situation?

LTCOL REINHARDT: I think I'll answer this question in two parts. So it is my opinion that we should have kept HMSD 4 and we – the distance to go function was present in better formats in other areas, and we should have kept that until we – and if distance to go was so important, we should have paid for a bespoke software upgrade to get the distance to go in a good format into the symbology without introducing other problems.

However – now I've lost my train of thought for the second point. It's not my decision; it's Command's decision.

LCDR TYSON: Now, you were asked some questions by sir about flying MRH-90s in the maritime environment. You also gave some evidence about other NATO partners flying MRH-90s. You'd agree that the MRH-90 can do very different types of missions; correct?

LTCOL REINHARDT: That's a broad statement.

LCDR TYSON: Yes.

LTCOL REINHARDT: The MRH is a multi-role helicopter that can do Troop transport and external lift, and can do maritime support flying formation.

LCDR TYSON: Well, would you, from your general Service knowledge, be aware that Fleet Air Arm MRH-90s, when they were being used, they were doing things like maritime logistics, anti-submarine warfare, maritime search, those types of machines.

LTCOL REINHARDT: I would not have thought MRH did anti-submarine warfare, but I am aware that they did maritime support. I was on LHD when MRH-90 did practice search and rescue operations, yes. But I would not classify the MRH-90 as an anti-submarine warfare helicopter in the variant that we owned.

LCDR TYSON: But when you use the MRH-90 in a maritime environment, you generally are not using it in a close flying formation; correct?

LTCOL REINHARDT: Well, the maritime support helicopter is a different role and environment and whilst I'm sure Navy pilots can fly formation, the primary role of the maritime support helicopter was not to fly around in formation, and quite often you would only find one of them on the ship.

LCDR TYSON: Also, someone like 5 Avn might use the MRH-90 as a general Troop transport, whereas Special Operations is a completely different type of flying operation, in many cases using close formation.

LTCOL REINHARDT: Well, 5 Aviation, I would say would fly similar close formations, or similar distances in formation, to 6 Avn. 6 Avn would argue that they have a different flying requirement to 5 Avn.

LCDR TYSON: But you accept then 6 Avn does have a different flying requirement to 5 Avn?

LTCOL REINHARDT: 6 Avn have a different role to 5 Avn.

LCDR TYSON: But using a helicopter in Special Operations can be quite different to using it in a general Troop transport role; correct?

LTCOL REINHARDT: It's a different role.

LCDR TYSON: All right. They're my questions, ma'am.

MS McMURDO: Thank you, LCDR Tyson. Yes, thank you.

<CROSS-EXAMINATION BY MR MEEHAN

MR MEEHAN: LTCOL Reinhardt, my name is Simon Meehan. I'm Counsel for Thales Australia in the Inquiry. In your statement, you have indicated some involvement you had in Defence Acquisition, I think in the late 90s. You don't appear to have had any direct involvement in the procurement or acquisition of the TopOwl digital display system that you've described in your statement. Is that right?

LTCOL REINHARDT: Apart from the testing we undertook on the software upgrade to 5.10, I would say that's a correct statement.

MR MEEHAN: In terms of procurement or the acquisition process?

LTCOL REINHARDT: I was not involved in the CASG process to acquire TopOwl.

MR MEEHAN: Thank you. Now, I just want to explore what you've described as the system. You described it as having two separate elements in paragraph 39 of your statement, namely the helmet and the helmet-mounted sight and display. There are both hardware and software components of the system. Do you agree?

LTCOL REINHARDT: Yes.

MR MEEHAN: And that the hardware would include the helmet, the display module, the cockpit tracking. Do you agree?

LTCOL REINHARDT: Yes. There would be an element of software in the cockpit tracking.

MR MEEHAN: Yes.

LTCOL REINHARDT: Like the components that the – there are components for the cockpit tracking that live in the helmet and there's a component of the software tracking that lives in the cockpit.

MR MEEHAN: Yes, I'll come to the software in a moment. But the physical components include those things and the connection module; correct?

LTCOL REINHARDT: Yes.

MR MEEHAN: And the control panel?

LTCOL REINHARDT: Yes.

MR MEEHAN: And the electronic unit?

LTCOL REINHARDT: Yes.

MR MEEHAN: Is it accurate to describe that unit as an interface between the HMSD and the other aircraft systems located in the avionics bay?

LTCOL REINHARDT: Have you got a reference?

MR MEEHAN: No, I'm just asking you based on your understanding.

LTCOL REINHARDT: So my main experience on TopOwl is on Tiger. I have limited experience on MRH. There is another control panel in the cockpit for TopOwl in the MRH.

MR MEEHAN: I think you already accepted there is software in addition to those physical components of the overall system?

LTCOL REINHARDT: Correct.

MR MEEHAN: It's that software, do you agree, that creates the symbology about which you've given detailed evidence?

LTCOL REINHARDT: Yes.

MR MEEHAN: It's that software that enables the data to be presented on the visor in the form of the symbology that you've described as including the presentation of attitude?

LTCOL REINHARDT: There is software that does that, yes.

MR MEEHAN: Yes, all right. Now, in paragraph 37 of your statement, would you just turn to that for me?

LTCOL REINHARDT: I have that.

MR MEEHAN: Yes. Do you see there you have referred to the system as having been created and manufactured by Thales Group?

LTCOL REINHARDT: I can see that sentence, yes.

MR MEEHAN: I want to suggest to you, you don't know whether or not it's the case that the software component of the system was created and/or manufactured by Thales?

LTCOL REINHARDT: That's an entirely reasonable statement. There would be the software to display the HSMD would need a bunch of liaison with the manufacturer of the aircraft.

MR MEEHAN: Yes. Well, might it be more accurate for the Inquiry to take that statement in the first sentence of paragraph 37 as related to the physical elements of the system?

LTCOL REINHARDT: I think that's a reasonable position.

MR MEEHAN: Yes, thank you. Nothing further.

MS McMURDO: Yes, thank you, Mr Meehan. Any other applications to cross-examine? Any re-examination?

Thank you very much, Lieutenant Colonel. Your evidence has been of great assistance to the Inquiry. It's been long and perhaps rather tedious for you, but for the time being, at least, we don't need you any further and you're excused. Thank you very much for your assistance.

<WITNESS WITHDREW

MS McMURDO: Yes.

FLTLT ROSE: Ms McMurdo, would it be appropriate to have a short comfort break?

MS McMURDO: It probably would be actually, but I thought you might be keen to get on with the next witness. All right then, we'll have a short 10-minute break.

HEARING ADJOURNED

HEARING RESUMED

MS McMURDO: Yes, Lieutenant.

FLTLT ROSE: Flight Lieutenant.

MS McMURDO: FLTLT Rose. I keep on wanting to promote you.

FLTLT ROSE: I call Mr David Edwards.

<DAVID CHARLES EDWARDS, Sworn

<EXAMINATION-IN-CHIEF BY FLTLT ROSE

FLTLT ROSE: Can you please state your full name?

MR EDWARDS: David Charles Edwards.

FLTLT ROSE: And you're the Officer in Charge of Air Combat, Continuing Airworthiness Assurance, at the Defence Aviation Safety Authority?

MR EDWARDS: That's correct.

FLTLT ROSE: Can you confirm you've received the following documents prior to today: a section 23 Notice requiring your attendance to give evidence?

MR EDWARDS: Yes.

FLTLT ROSE: An extract of the Inquiry's Directions?

MR EDWARDS: Yes.

FLTLT ROSE: A copy of my appointment as an Assistant IGADF?

MR EDWARDS: Yes.

FLTLT ROSE: Frequently Asked Questions Guide for Witnesses in IGADF Inquiries?

MR EDWARDS: Yes.

FLTLT ROSE: And a Privacy Notice?

MR EDWARDS: Yes.

FLTLT ROSE: Did you prepare a statement for these proceedings?

MR EDWARDS: I did.

FLTLT ROSE: I'll hand you a document. Can you confirm that that is the statement that you prepared?

MR EDWARDS: Yes, it is.

FLTLT ROSE: Is it dated 11 June 2024?

MR EDWARDS: Yes.

FLTLT ROSE: 13 pages?

MR EDWARDS: Yes.

FLTLT ROSE: Is that your signature on page 13 – electronic signature?

MR EDWARDS: Yes, it is.

FLTLT ROSE: Now, there are three annexures to your statement: A, B, and C.

MR EDWARDS: Correct.

FLTLT ROSE: I'll only be taking you to Annex C today. So if you want to deconstruct that bundle, it might be easier for you just to have your statement, Annex C, before you, and put the other ones to the side. Do you wish to make any amendments to your statement?

MR EDWARDS: No.

FLTLT ROSE: I tender that statement with the annexures.

MS McMURDO: That'll be Exhibit 42. Thank you.

#EXHIBIT 42 - STATEMENT BY D C EDWARDS

FLTLT ROSE: I'll start by asking you some questions about your background and qualifications. Are you currently a member of the Defence Force?

MR EDWARDS: Public Service, Australian Public Service.

FLTLT ROSE: Were you formerly a member of the Defence Force?

MR EDWARDS: No.

FLTLT ROSE: You said you were part of the Australian Public Service; is that correct?

MR EDWARDS: Correct.

FLTLT ROSE: And is the Officer in Charge of Air Combat, Continuing Airworthiness Assurance always filled by someone from the Public Service, or can it also be a Defence member?

MR EDWARDS: It can be a Defence member. We interchange our positions depending on experience levels within the organisation.

FLTLT ROSE: And how long is it that you've worked for the Defence Aviation Safety Authority?

MR EDWARDS: So 23 years in total. Previously, it was Director-General Technical Airworthiness, before moving into Defence Aviation Safety Authority.

FLTLT ROSE: Are you comfortable if I refer to that as DASA for convenience?

MR EDWARDS: Yes.

FLTLT ROSE: So when did you actually commence in your current role?

MR EDWARDS: Approximately November/December last year.

FLTLT ROSE: So it's been, effectively, about 10 months in the role?

MR EDWARDS: Yes.

FLTLT ROSE: Now, you mentioned before that you had the Deputy

Director Regulations role and the Deputy Director Continuing Airworthiness?

MR EDWARDS: Correct.

FLTLT ROSE: Are they two separate - - -

MR EDWARDS: They're separate roles. They were held at different times.

FLTLT ROSE: And the Officer in Charge of Army Aviation, Continuing Airworthiness Insurance; is that correct?

MR EDWARDS: Correct.

FLTLT ROSE: And that was responsible for oversight and enforcement of Army Aviation, Continuing Airworthiness approvals?

MR EDWARDS: That is correct.

FLTLT ROSE: Do you have any aviation or maintenance experience yourself?

MR EDWARDS: Yes. I'm an aviation technician by trade, in structures. I did about nine years as a tradesperson before going into a senior technician role, then moving into Quality and Compliance with Ansett Airlines.

FLTLT ROSE: NZ Airlines?

MR EDWARDS: Ansett.

FLTLT ROSE: Ansett. Sorry, I misheard you. And was that fixed-wing or helicopters?

MR EDWARDS: That was in fixed-wing.

FLTLT ROSE: And you're also, now, a senior auditor or Level 3 Aviation Safety Assurance Officer?

MR EDWARDS: That's correct.

FLTLT ROSE: And you have an Aircraft Maintenance Engineer qualification?

MR EDWARDS: Correct.

FLTLT ROSE: And a Diploma in Quality Management?

MR EDWARDS: Correct.

FLTLT ROSE: And a Diploma in Quality Auditing?

MR EDWARDS: Correct.

FLTLT ROSE: And then, Training and Safety Management Systems, Risk Management, and Human Factors?

MR EDWARDS: That is correct.

FLTLT ROSE: In terms of your current role, which city are you based in?

MR EDWARDS: Melbourne.

FLTLT ROSE: And you lead a team of four persons?

MR EDWARDS: Correct.

FLTLT ROSE: And that has two APS personnel and two ADF, currently?

MR EDWARDS: Correct.

FLTLT ROSE: In terms of where you and your team sits within DASA, you're part of the broader Directorate of Continuing Airworthiness?

MR EDWARDS: Correct.

FLTLT ROSE: And then, under that, sits the Continuing Airworthiness Assurance Team?

MR EDWARDS: Correct.

FLTLT ROSE: And under that sits the Air Combat Group?

MR EDWARDS: Correct.

FLTLT ROSE: And that's what you head-up?

MR EDWARDS: That's what I head-up at the moment, yes.

FLTLT ROSE: What is the Air Combat Group specifically responsible for in terms of oversight of which particular units of Defence, or which particular airframes or componentry?

MR EDWARDS: Yes. So it's all of the Air Combat airframes. So that's a number of airframes. But we also are involved in both Army and Navy and other Air Force platforms as well. So whilst we lead-up the role for managing that oversight, we do actually participate in oversight of other platforms.

FLTLT ROSE: And who is it that you report to, yourself?

MR EDWARDS: I report to the Deputy Director of Continuing Airworthiness.

FLTLT ROSE: So part of your role is to oversee the maintenance organisations, performing maintenance, and managing the continuing airworthiness of military aircraft?

MR EDWARDS: Correct.

FLTLT ROSE: And that used to include those organisations that maintained MRH-90?

MR EDWARDS: Correct.

FLTLT ROSE: Is there something you wanted to say additionally to that?

MR EDWARDS: No. That's a correct statement.

FLTLT ROSE: And there are two different types of organisations referred to in your statement, and we'll tease these out. The first is the DASR Part M, Continuing Airworthiness Management Organisations?

MR EDWARDS: Correct.

FLTLT ROSE: Are you comfortable if I refer to them as CAMOs?

MR EDWARDS: Yes.

FLTLT ROSE: And "DASR" stands for Defence Aviation Safety Regulations?

MR EDWARDS: Correct.

FLTLT ROSE: For convenience, I'll refer to those as "the Regulations". Otherwise, it would be indistinguishable to the transcribers.

MR EDWARDS: Yes, that's okay.

FLTLT ROSE: So there are a number of different Regulations and Parts of Regulations, but one is relevant to CAMOs, is the Part M?

MR EDWARDS: Correct.

FLTLT ROSE: And was there a CAMO responsible for the continuing management of the MRH-90?

MR EDWARDS: Yes, there was. It was Forces Command, and then changed their name to Avn Command.

FLTLT ROSE: And, physically, where is Avn Command located?

MR EDWARDS: Well, they were located in Enoggera, in Brisbane. They're now located in Sydney Headquarters. However, there's parts of the organisation that are throughout the country.

FLTLT ROSE: Just in terms of the nomenclature, did you have a specific name for it, or did you just refer to it as the CAMO?

MR EDWARDS: As the CAMO.

FLTLT ROSE: In terms of oversight structure, DASA, the authority, approves the Continuing Airworthiness Management Organisations; correct?

MR EDWARDS: Correct.

FLTLT ROSE: And those approvals are done by another team in DASA, not yours, I take it?

MR EDWARDS: No, they're done by our team.

FLTLT ROSE: Your team. But not specifically within your group within the team?

MR EDWARDS: Not specifically within my current group that I work within. We have an Army CAMO Team, or an Army Continuing Airworthiness Team.

FLTLT ROSE: And do you sit collocated with them?

MR EDWARDS: Yes. Yes, we do.

FLTLT ROSE: In Melbourne?

MR EDWARDS: Yes.

FLTLT ROSE: Is it the responsibility of your team – and when I'm saying "your team", I presume – correct me I'm wrong – you and the four other persons that you work daily with – to ensure that the CAMOs are keeping the aircraft in their approved configuration, to meet their intended purpose, and to ensure that the aircraft are safe to fly?

MR EDWARDS: That is correct.

FLTLT ROSE: So that's your assurance part?

MR EDWARDS: Assurance, yes.

FLTLT ROSE: Then, secondly, there are also the DASA 145 Maintenance Organisations?

MR EDWARDS: Correct.

FLTLT ROSE: The authority. DASA, the authority, does that approve the Part 145 MOs as well?

MR EDWARDS: Yes, we do.

FLTLT ROSE: And are they done within a separate unit or team?

MR EDWARDS: Within the same team.

FLTLT ROSE: Your team of five, that's part of your responsibility?

MR EDWARDS: No. So the way the teams are structured at the moment, we have four teams. One is Air Combat Group. One is Air Mobility Group. We have Army, and Navy. Sorry, five teams. And then we have Surveillance, Warfare and Training. So any of those platforms that sit within those. The teams are the lead for those platforms, but we all work together on all the various organisations, depending on workload and people's capacity.

FLTLT ROSE: So it's not a siloed - - -

MR EDWARDS: It's not. No, it's not as siloed as that.

FLTLT ROSE: So is one of the responsibilities of your team then to ensure that the Part 145 MOs are keeping the aircraft in their approved configuration to meet their intended purpose, and ensure that they are safe to fly?

MR EDWARDS: So the Continuing Airworthiness Organisations are to ensure it's in the approved configuration. The Part 145 is purely responsible for swinging the spanners. So, in simple terms, the CAMO will – so if it's like owning a car, a CAMO will make sure that, you know, if you have a recommended servicing that has to be done by the manufacturer, or you had safety alert recall, you're responsible for making sure that all those things required to keep the platform safe to operate from a technical perspective are done. Whereas a 145 is purely for swinging the spanners and performing the maintenance. So we approve those organisations that they have the appropriate people, processes, they have the right tooling, they're using the correct manuals to actually physically perform the maintenance.

FLTLT ROSE: And the way that you perform that role is by conducting independent safety assurance activities with both the CAMOs and the Part 145 MOs?

MR EDWARDS: Yes, we do.

FLTLT ROSE: And these activities are conducted by persons called Aviation Safety Assurance Officers?

MR EDWARDS: That is correct.

FLTLT ROSE: Are they APS or ADF?

MR EDWARDS: There's a mixture of APS and ADF, both Army, Navy, Air Force members, and also APS. There's about a fifty-fifty mix.

FLTLT ROSE: That's the current mix, I take it? And it can fluctuate?

MR EDWARDS: That's current, yes. Generally, that's our – the numbers are fixed. Obviously, we have people that come and go as they get posted in/posted out, and APS that come and go and move on to different roles.

FLTLT ROSE: And are those officers – I'm talking about the Aviation Safety Assurance Officers – they're not part of your permanent workforce in your team of five?

MR EDWARDS: Yes, they are. So I have four that work directly for me. The Aviation Safety Assurance Officers are often referred to as Desk Officers.

FLTLT ROSE: And are there additional personnel you can call on if there's a particularly busy period?

MR EDWARDS: Yes, from the other teams. We'll normally balance the workload amongst the different teams.

FLTLT ROSE: And how you conduct those activities, that's set out in the Defence Aviation Safety Manual, Volume 1, Chapter 3?

MR EDWARDS: Correct.

FLTLT ROSE: And if you – sorry?

MR EDWARDS: Sorry, that's a higher-level document. That tells us the fundamental principles that we need to follow, but below that we have a set of instructions which are common across on how to conduct oversight activities, what information we need to gather, those sorts of things.

FLTLT ROSE: And if you do identify incidents of non-compliance, who do you report that to?

MR EDWARDS: So we will report that back to the chain of command. We raise findings. So depending on the level – there's three levels of findings that we can raise. Level 1: there's a finding that lowers the safety standard and seriously hazards flight safety. A Level 2 is a non-compliance that could hazard flight safety. And then a Level 3 is a potential problem or a non-compliance that possibly could lead to hazard flight safety.

FLTLT ROSE: So when you say you refer that back to the chain of command, does that also, as a separate step, have to be referred to an Independent Review Board, or are they – does it go through the chain of command first and then the Review Board?

MR EDWARDS: So when we do our oversight activities, we will identify, you know, good/bad issues, things that are compliant or potentially non-compliant. We will then take all those – we call them

discoveries – so what we do is we take a list of all the discoveries, we take them back, we assess them against a group of peers. So all the OICs, the five OICs will sit in the room with the Activity Team.

FLTLT ROSE: OSEs?

MR EDWARDS: Officers in Charge, sorry. The Officers in Charge of each of those teams that we talked about, they'll sit in the room with the Audit Team. They'll have a look at what the discoveries were and identify and look at, "Well, what hazards to flight safety could that pose?" – those non-compliances. And then we'll make a determination as to what level the findings are and then the lead of the activity will issue the report with the findings.

FLTLT ROSE: So just to follow that through, issue the report to – when you say "chain of command"?

MR EDWARDS: So we issue the report to the organisation. So the Accountable Manager and also normally the Quality Manager of the organisation. So, for example, if it was a CAMO, it would go to the Accountable Manager for the CAMO. If it was the 145, we would generally send that to the Accountable Manager of the 145 and also the Accountable Manager of the CAMO because they're utilising those services.

FLTLT ROSE: And when then, because in paragraph 7 – take a look at your statement. In paragraph 7(b) you refer to Independent Review Boards.

MR EDWARDS: Yes. So Independent Board of Review is a function that's not carried out by our department. However, DASA will put in a submission to those Boards of Review on an annual basis – generally an annual basis, I should say, whenever requested to do so. And it's basically a summary of the activities we've conducted and the things we've identified as non-compliances.

FLTLT ROSE: So when it's independent, is it independent of DASA? Is it independent of the ADF?

MR EDWARDS: Yes. That'd probably be – probably a best question to be answered by the DGDASA. He would explain that better than I would.

FLTLT ROSE: And when you say "Independent Review Boards", is another term for that Airworthiness Boards?

MR EDWARDS: Yes. I should refer it to Airworthiness Boards, sorry. We used to call them Independent Boards of Inquiry but now Airworthiness Boards.

FLTLT ROSE: So the current name is Airworthiness Boards?

MR EDWARDS: Yes, Airworthiness Boards, correct.

FLTLT ROSE: Are there any other types of boards other than Airworthiness Boards that you refer these matters to?

MR EDWARDS: No.

FLTLT ROSE: So in terms of the reporting lines, is it the case that both the CAMOs and the Part 145 MOs conduct their activities on behalf of the Military Air Operator?

MR EDWARDS: Correct. So the CAMO is actually part of the Military Air Operator. The Regulations require that a Continuing Airworthiness – that the operator must become authorised as a CAMO, so they must have the appropriate people and staff. So they're actually part of the Air Operator. A 145 may be part of the Air Operator.

In most cases we'll have – the military organisations will be part of the Air Operator, and other cases they won't be. But we also have contracted 145 organisations who generally are not part of the Military Air Operator. Rather, they're just a contracted service.

FLTLT ROSE: So, for example, if Airbus was a contractor of a Part 145 Monday, that would be an example of - - -

MR EDWARDS: Absolutely. Yes.

FLTLT ROSE: Now, the Military Air Operator, or the MAO as it's sometimes referred to, is that an actual person?

MR EDWARDS: No, it's an organisational approval, I understand. But you'd be best to ask the Operations people about that.

FLTLT ROSE: And is there one single Military Air Operator in Defence or is there a separate one for each service?

MR EDWARDS: There is multiple.

FLTLT ROSE: And was there a particular Military Air Operator for Army Aviation in, say, 2022/2023?

MR EDWARDS: Yes, but you'd be best to ask the Operations people. My area of expertise is Continuing Air Worthiness.

FLTLT ROSE: Understood. In terms of your assessment activities, this starts from paragraph 10 of your statement. You outline something called a PSOE assessment. What does that stand for?

MR EDWARDS: So, overall, the PSOE assessment is what we use to determine whether an organisation is in compliance with the Regulations.

FLTLT ROSE: Can you just assist the Inquiry with teasing out what PSO and E stands for?

MR EDWARDS: Yes. So P and S is "Present" and "Suitable". That means that they have a document and system that is present and it is suitable for the type and size and complexity of the organisation. So organisations will vary anything from a small maintenance organisation to a very large, complex, Continuing Airworthiness Management Organisation with multiple platforms. So we make sure that the system that they have documented is suitable for that size and complexity. And that's basically a desktop assessment that we carry out. The "Operating" and "Effective" is to ensure that the organisation's systems are actually operating and they're effective in providing the barriers that the Regulations require.

FLTLT ROSE: And we'll probably tease that out a bit further. So at paragraph 15 you state that:

> *DASA* –

the authority –

> *has a tailored PSOE process measure to measure the CAMOs and the Part 145 MO's compliance with the Regulations.*

And at paragraph 16 – sorry, is that correct?

MR EDWARDS: That's correct.

FLTLT ROSE: And at paragraph 16:

> *The assessments are conducted through a desktop audit and the*

onsite performance assessment.

Which is, essentially, what you just gave evidence about. The P and the S, the Present/Suitable, is the desktop audit component.

MR EDWARDS: Correct.

FLTLT ROSE: And the O and the E, the Operating/Effective, is the onsite performance assessment?

MR EDWARDS: That is correct.

FLTLT ROSE: At paragraph 17 you state that:

> *The audit looks at whether the requisite safety requirements are clearly documented within the organisation's safety management documentation.*

That's the P part for Present?

MR EDWARDS: Correct, yes.

FLTLT ROSE: And then you've already given that evidence about the S, whether it's suitable for the size, nature and complexity of the organisation you're looking at.

MR EDWARDS: Correct. So did you want an expansion of the Present, what that means?

FLTLT ROSE: Yes, please.

MR EDWARDS: So for it to be present we actually do a desktop assessment against the Regulations. So depending on which application you're applying for, whether it be a Continuing Airworthiness Management Organisation or a Maintenance Organisation approval, we will go through each of the Regulations and we'll then look at that and your documented system that you provide to us in your application on how you actually comply with each of the Regulations.

FLTLT ROSE: And then, so once you've gone through the P/Present, then you can move on to the S for Suitable?

MR EDWARDS: Correct.

FLTLT ROSE: And it is always done in that order, I take it?

MR EDWARDS: Yes. The Present and Suitable are done simultaneously, really.

FLTLT ROSE: And then, for paragraph 18, you talk about the onsite performance assessment checks.

MR EDWARDS: Yes.

FLTLT ROSE: So that's looking at whether the documented system is operating effectively and providing the risk mitigation to the threats identified in the Regulations.

MR EDWARDS: So we will go onsite and we will sample the system operating. So we'll normally take an Audit Team between – once again, it depends on the size and the complexity of the organisation. Between two and six people. And they will allocate certain areas, certain Regulations, for people to look at, and then they will get familiar with those processes and procedures that they use to demonstrate compliance. And then they will sample through interviewing people, sampling the products, reviewing records, gathering any other safety data that may be relevant.

FLTLT ROSE: And this Audit Team of two to six, I take it, comes from your Assessment Officers that you have within your group and, as you said before, others in the wider team that you work within.

MR EDWARDS: Correct.

FLTLT ROSE: So essentially that's looking at the O/Operating. So when you're doing those checks, you're looking at the requisite safety requirements that are in use, and whether – the output that's being produced by them.

MR EDWARDS: That is correct.

FLTLT ROSE: And it also looks at whether the requisite safety requirement is becoming increasingly effective at achieving the desired outcome through improving maturity and, most noticeably, the effectiveness in managing associated aviation hazards and risks.

MR EDWARDS: Yes. So what we look there for is we will sample to see if there's anomalies or errors within the system, to see if it actually has been effective. So, for example, if we were looking at each task must be certified, and they have a system of how they certify it, then we will look for information to say, "Well, actually, is it being certified in all cases?

Are all members aware that the system is in place? So is it actually effective in making sure that that has occurred?"

FLTLT ROSE: You take that in the context – you said about the maturity of the platform, or of the output. What does that mean in that context?

MR EDWARDS: So the PSOE model is based on an ICAO standard – International Civil Aviation Organisation – which is recognised as probably best practice world-wide for aviation. The PSOE model was originally developed for safety management systems, which measures maturity. So it's a – the ultimate goal is to get to the utopia of having the best practice amongst all.

But when you're looking at it from pure compliance, that's where the tailoring comes in. So the Effective is really look at is it effective in ensuring that the organisation is complaint. So there's slightly different terminology.

In this context, that's the SMS. That's how it was written. In our context, it's really looking at the compliance.

FLTLT ROSE: So the PSOE is a structure that many Assurance Teams would use in different contexts around the world, I take it?

MR EDWARDS: Yes.

FLTLT ROSE: Did you take that directly from the ICAO?

MR EDWARDS: Directly from ICAO annex.

FLTLT ROSE: Standards?

MR EDWARDS: Yes.

FLTLT ROSE: Then at 19 you state that your team uses a bowtie analysis then to understand the risks.

MR EDWARDS: Yes. So a bowtie analysis is a common tool that's utilised to identify controls that you can put in place to treat hazards. So it's a good way of looking at, "Well, what's the hazard we're trying to treat, and what are the controls, and are they appropriate?" So it's commonly used within different quality systems, and other forms for that purpose.

FLTLT ROSE: Is there anything significant about the bowtie aspect, or are you just trying to tie everything together?

MR EDWARDS: It's just a tool we've chosen to use so that we can – we use it, as much as anything, to educate people. So, for example, if there's a Regulation here, it's to demonstrate why that Regulation is there so that our ASAOs can understand, "Well, this Regulation is here to treat these hazards. And these are some of the controls that are in place to stop those, what we call top events, from realising".

For example, you might have a Regulation that says you must have FOD control, so we will look at, "Well, what is the purpose of having FOD control? It's to stop an aircraft being damaged. The top event is that you've actually FOD'd your aircraft, which could result in an accident", for example.

So we'll look at are those controls appropriate, and are there some recovery barriers in place. It enables people to understand why we have those particular Regulations, and what hazards they're trying to treat.

FLTLT ROSE: You said "ASAOs". Was that the Aviation Safety Assurance - - -

MR EDWARDS: Aviation Safety Assurance Officers, yes.

FLTLT ROSE: Just for completeness, at paragraph 45 – so we're jumping forward – you do set out some other tasks that your team is responsible for, but I won't necessarily go through each of them today. What I will do is take you back to paragraph 24 of your statement. This is in respect to the initial approval for CAMOs, or Part 145 Maintenance Organisations. At paragraphs 24 to 27, that's where you set out the approval process that DASA goes through when assessing the suitability of the various organisations that apply to become CAMOs, or Part 145 MOs.

MR EDWARDS: That's correct.

FLTLT ROSE: And once the approval is granted – and not necessarily by yourself because that may be done through, as you have already established, other people in your team/the organisations – that's when they become subject to ongoing DASA oversight from your team?

MR EDWARDS: Correct.

FLTLT ROSE: Then at paragraph 29 you state that:

Approved organisations are subject to an oversight cycle that does not generally exceed 24 months.

MR EDWARDS: That is correct. That's in accordance with – so we – our Regulations are based off an ICAO standard, which was EASA, European Civil Aviation Regulations. And there's the European Military Airworthiness Requirements that derive from that. So they're a militarised version of the EACA Regulations. And within that there's – it tells basically a regulator, "Hey, if you're a good authority, these are the things you do", and it recommends that a 24-month period of oversight be carried out, or audit, as they used - - -

FLTLT ROSE: No longer than 24 months. So it could be that you audit a particular organisation more often than that, but you shouldn't leave it longer than 24 months between audits?

MR EDWARDS: That is correct.

FLTLT ROSE: And, of course, some organisations are reviewed more frequently than those dates, or the DASA reviews of safety data indicate they should be?

MR EDWARDS: Correct.

FLTLT ROSE: Where does the safety data come from?

MR EDWARDS: So there's various sources of safety data that we utilise. So we also provide endorsement of key personnel. They're called Form 4 Holders, so that might be a Responsible Manager, a Quality Manager, an NDT expert. There's certain roles. So when those key personnel change over, then they're all – that can be safety data. We also have occurrence reports. So there's a requirement to report to the authority when there's an incident or a condition that could hazard flight safety, so then we will use that data as well to inform our decisions.

There's various other sources that we – you know, any information really that comes to the authority. It could be as simple as somebody ringing us up and saying, "Hey, we've got a concern about organisation X because X, Y, Z may have occurred". We gather all that information to use to inform our oversight activities.

FLTLT ROSE: Just on that latter piece of evidence, is it the case that you have some sort of website or web form that someone can fill in if they

want to make a confidential report about a concern in relation to a CAMO or a Part 145 MO?

MR EDWARDS: So I'm not sure if we do have confidential reporting to DASA. You would be best probably to ask the DG. But we certainly – people tend to - - -

FLTLT ROSE: Pick up the phone?

MR EDWARDS: If they have concerns, then they'll ring or they'll send you an email directly. That's been my experience.

FLTLT ROSE: So if there was a Class A or a Class B incident for an aircraft, that's one of the approved organisations that are responsible for maintaining, that would warrant an expedited review of that particular organisation?

MR EDWARDS: Depending. There are – it could lead to additional oversight. It depends on how the organisation reacts, what systems are in place, whether we felt it was an organisational issue that needed to be addressed. There's no black and white answer for that; it just varies on what that incident was. It could lead to additional oversight.

FLTLT ROSE: Is your team the only team in DASA that is part of the oversight process, or are there other teams, say, in other cities that are involved?

MR EDWARDS: So there is other teams. There's also organisations that look at operations for the MAOs. There's organisations that look at 21, which is design organisations as well. We also look at ANS, Air Navigation Services. So there's a raft of various parts within DASA that do oversight.

FLTLT ROSE: Is there a level of cooperation then between the various Oversight Teams?

MR EDWARDS: Yes.

FLTLT ROSE: So do you share information if needs be?

MR EDWARDS: Yes, we do.

FLTLT ROSE: Is there any limits on that sharing of that information?

MR EDWARDS: No.

FLTLT ROSE: So you would have access to other teams' data?

MR EDWARDS: Yes, we do.

FLTLT ROSE: At paragraph 28 of your statement you refer to a DASP Enforcement Policy –

> *which supports compliance with the Regulations, which has been developed with due consideration of the Defence Aviation environment.*

Do you see that at paragraph 28?

MR EDWARDS: Yes.

FLTLT ROSE: Does "DASP" stand for the Defence Aviation Safety Program?

MR EDWARDS: Yes, it does.

FLTLT ROSE: What is that? It's probably a large program, but - - -

MR EDWARDS: Yes. Look, it would be best answered by the DG, because he's in charge. I only look after a very small part of the DASP; whereas the DG has visibility of the whole DASP, be the best person to explain that.

FLTLT ROSE: So there's this overarching program and the assurance of the organisations you're interested in, the CAMOs and the Part 145 MOs is a small portion of that jigsaw puzzle.

MR EDWARDS: Correct. Absolutely.

FLTLT ROSE: Let me know if you can't answer this question, but what is different about the Defence Aviation environment that means that DASA has to apply its enforcement policy differently to the way it applies it to other types of regulated organisations?

MR EDWARDS: I don't quite understand your question.

FLTLT ROSE: Perhaps that's more to do with the program itself that's been developed for Defence Aviation.

MR EDWARDS: So are you asking, within Defence Aviation, do we have different enforcement policy?

FLTLT ROSE: Well, let's start with that. Do you?

MR EDWARDS: No. It's a common set of practices across the whole of DASA. So we have communities of practice which all key members from each of the different directorates are involved and with us there's an oversight and enforcement community of practice, which means that all the directorates are represented in that and they set a common framework for us to do our oversight and enforcement activities.

FLTLT ROSE: But I take it from what you were saying before, you've taken some structures and some guidance, some ICAO, and then applied it to the military context in terms of what you do in Assurance?

MR EDWARDS: Correct.

FLTLT ROSE: I imagine that there's been some adjustments because it's a military or Defence organisation?

MR EDWARDS: Yes. What ones, I couldn't tell you. That will need to be discussed by probably the Regulation Team. They have a look in-depth of each of the Regulations and whether any of those things need to be tailored to suit a Defence environment.

FLTLT ROSE: Understood. So at paragraph 30 you state that:

> *DASA has a consistent enforcement framework –*

as you just said.

MR EDWARDS: Yes.

FLTLT ROSE:

> *And a policy that uses a fair, proportional and graduated response to remediate deficiencies within the management of Aviation safety risks.*

So what does this mean in terms of timelines that are being set for compliance when you're talking about making a fair, proportional and graduated response to remediate deficiencies?

MR EDWARDS: Yes. So we'd say it's a concept that some – for example, there are some organisations that may unknowingly be compliant, for example, and the risks that the safety – the hazards that we identify may be low. So, therefore, it's reasonable to work with the organisation to try and get them up to a level of compliance, versus someone who was fully recalcitrant and just has complete disregard. That would have a different influence on the way we work with those organisations. Our intent is to help organisations get back to a level of compliance and acceptable level of safety.

So each situation is a little bit unique. We will graduate our response from initial just, say, issuing findings. Then if we don't get any adequate response, then that can be escalated through the process. Say, for example, a Level 3 finding could become a Level 2 finding over time, which could become a Level 1 finding.

As for timeframes, we generally ask that organisations respond within two weeks of us issuing a finding, and then give us a plan that we will agree to. So some things, there may be immediate – there may be an immediate – well, there is a requirement to have an immediate action. So if there was a hazard that we identified that seriously hazards flight safety, they would have to tell us what they've done immediately to prevent that realising.

And then we would also work with an organisation. There might be a longer-term fix, for example. So what did they do immediately? What mitigations? Have they done a root cause analysis to understand why they became non-compliant? And then we work with the organisation. So it really depends on – that individual situation will vary each time. And we can agree to different timeframes.

FLTLT ROSE: If there is an immediate risk, I take it from your response that the timeline for remediating that immediate risk would be shorter.

MR EDWARDS: Correct.

FLTLT ROSE: Than, say, a lower-level risk.

MR EDWARDS: Correct.

FLTLT ROSE: At paragraph 31 you state that if DASA finds instances of non-compliance or potential non-compliance, then it doesn't tell the organisation what to do to remedy it but, rather, it's the responsibility of the organisation to identify the immediate actions, as you say, the root causes and the corrective actions necessary to address the non-compliance.

MR EDWARDS: Correct. So the DASRs are outcome-based Regulations, which means we don't prescribe exactly how you must be compliant. So it enables the flexibility for organisations to use different methods of compliance depending, once again, on the nature and the complexity of their organisation.

FLTLT ROSE: Does that outcome-based organisation also come from the ICAO structure?

MR EDWARDS: Yes.

FLTLT ROSE: So is that common, for assurance organisations to empower the person that you're auditing to come up with the solutions needed?

MR EDWARDS: Yes. We don't prescribe how you do business, but we prescribe the standards that you must meet. So it's an organisation who is non-compliant and they need to understand their context and what they do and how they can become compliant. And they need to demonstrate to the satisfaction of the authority that they have reached that level of compliance.

FLTLT ROSE: What level of understanding then do you and your team, or other Assurance Officers, have of the context of the particular organisation you're auditing? Is it a high-level understanding of the context or, over time, have you developed that deeper level that you can adequately understand their plan or their program that they're presenting to you for remediation?

MR EDWARDS: Yes, good question. So we have a fairly in-depth understanding of each of our organisations. That's why we allocate the teams as their primary focus, so that they can get an understanding of exactly how an organisation is compliant. Because as you can imagine, it's quite complex, the different procedures that go right across the spectrum of the organisation, in a large organisation. So we become very – we have a very in-depth understanding of those levels of compliance and what is required. Obviously that grows with time as well.

FLTLT ROSE: I take it yourself, having 23 years in the job, would be able to assist those more junior members to get towards that understanding?

MR EDWARDS: Yes, so we have an Aviation Safety Assurance Officer. We have a training requirement. We actually have a process that

they must follow. And it can take up to three years for – as a minimum for someone to become a Level 3 ASAO, depending on how much exposure, how much experience, they gain in that timeframe.

FLTLT ROSE: Is that why it's sometimes beneficial to actually employ persons who were maintainers, say, in an ADF context?

MR EDWARDS: Generally, it's a – well, it is a prerequisite to either have maintenance or engineering experience within Aviation.

FLTLT ROSE: But not necessarily ADF Aviation?

MR EDWARDS: Not necessarily ADF Aviation.

FLTLT ROSE: In your experience, does this approach that you've just outlined speed up the process or in fact slow it down in terms of achieving the outcome that you're looking for – DASA's looking for, allowing the organisation to come through the process themselves and work out what they need to do to remediate the deficiency?

MR EDWARDS: The organisations would probably be best to answer that question; I would just be making an opinion.

FLTLT ROSE: I think what I'm trying to ask, from your experience – you've had lots of experience; 23 years in the job – do you think that it protracts the enforcement process if you have to wait for the organisation to identify the remedies rather than, say, for example, DASA prescribing them to them?

MR EDWARDS: So the organisations understand the nature of their business probably more in-depth than what DASA does for each organisation. So I think if we start prescribing things, it may not fit the nature and the complexity of their organisation but, rather, by them being able to demonstrate to compliance, and us assisting along the way, I think it would make it a lot easier for an organisation.

FLTLT ROSE: I take it actually DASA isn't even set up in its structures to be able to prescribe recommendations. It doesn't have, as you say, the context knowledge that the organisation has itself?

MR EDWARDS: So we work with the organisation, so they will ask our advice on a regular basis. For example, they might say, "We want to try and work the system this way. Is that within the boundaries of the Regulations?" We will provide that advice on a regular basis.

MS McMURDO: I suppose the advantage is supposed to be that then it gets the organisation thinking in a safety way. Is that what's behind it?

MR EDWARDS: Yes, correct, ma'am.

MS McMURDO: Yes, a safety-focused way.

FLTLT ROSE: And being proactive?

MR EDWARDS: Correct.

FLTLT ROSE: So at paragraph 35 you state that DASA does track the findings that you've issued to organisations through, to ensure that the actions they recommend to address the non-compliance are managed and completed.

MR EDWARDS: Correct. So we have a system where all findings that we raise get entered into and then we have the timeframes, as I said, that are agreed on the corrective action forms that come in. So we will – if, for example, an organisation hasn't got back to us, we will get in contact with the organisation and say, "Your finding is coming up due. We haven't heard anything from you. Where do we sit?" We are in regular contact with the organisation.

FLTLT ROSE: At paragraph 38 you state that the organisation must implement a short-term solution to contain the non-compliance while the root cause analysis assessment and fulsome implementation process can be done.

MR EDWARDS: Correct. So where they're non-compliant, they need to take immediate action. I talked about the immediate action earlier on. Then the root cause analysis is to understand how did they – one is to fix the non-compliance, and then the next part is to understand "How come we became non-compliant?" So understand that and put remedies in place that prevent them from just becoming non-compliant again.

FLTLT ROSE: So is there a set timeline for when their remediation process should ideally be completed or is that timeline context-specific?

MR EDWARDS: So the immediate action?

FLTLT ROSE: Well, I'm thinking more of the longer-term mediation process.

MR EDWARDS: Longer term will depend. So, for example, you could have something that's really simple to fix where human factors say training had lapsed and we found that, and that's non-compliant because it has to be done by a defined period. The reason might have been because – a simple fix – you know, we had a change of staff that wasn't aware of the requirement, so they might put in – they might say, "Well, we've now trained that person up but we've now put in our system that whenever that person posts out, it's now included as part of the list of duties that has to be done". It's a relatively quick fix, so we would agree that they'd do that in a short timeframe.

There might be other non-compliances that the root cause might be larger scale. So, for example, it might be that they needed to train a whole workforce across ADF, for example. That might take 24 months. So the immediate fix might be to limit who can do that, but the complete fix might take 24 months for them to train everyone across the ADF. So we would monitor that and keep that open until that final action had been carried out.

FLTLT ROSE: So it could be anywhere from days to years?

MR EDWARDS: Potentially. It's very rarely that it would be years though.

FLTLT ROSE: At paragraph 48(b), which is page 10 of your statement, you state:

> *One of the principles of the DASA Enforcement Policy is that enforcement action shall commence at the lowest level commensurate with the increase in risk to Aviation safety and willingness of the organisation to address non-compliance, and should be escalated only when necessary to ensure compliance.*

Can you develop that and explain to the Inquiry what you mean by that, or even provide an example if that's easier?

MR EDWARDS: So what paragraph were you looking at, sorry?

FLTLT ROSE: Paragraph 48, and then it's subparagraph (b) within that. So it's actually on page 10.

MR EDWARDS: Yes. So as I explained a little bit earlier, we have levels of findings. So that's based on hazard flight safety, so based on risk. It will start at the lowest level where appropriate. We assess, as the team, what the level of risk to safety – what are the non-compliances

potential impacts to safety. Then we'll raise, based on our definitions or our criteria within our findings, we'll raise the appropriate level finding, whether it be Level 1, Level 2, or Level 3.

A Level 3 finding, for example, there's no mandatory requirement to report back to us. It's like an opportunity for improvement, if you like. But we follow that up at the next scheduled oversight activity to see if that actually had been rectified and whether their system had been working to improve.

FLTLT ROSE: So it's not mandatory for them to feed that back to you but you take an interest anyway and make sure that you follow that?

MR EDWARDS: Yes, and we document that to say – we don't issue a corrective action form for Level 3; it's issued as part of the report. But we'd also state upfront that, "We will revisit this to see if it has escalated, to see if it actually turned in" – because it's a potential problem – "to see if it actually has become a problem and we'll monitor that". If an organisation hasn't done anything and we still think it's escalating, we can move that up to a Level 2. Or vice-versa, if we have a Level 2 finding that potentially has hazard flight safety and there was no action taken, then we could escalate that into a Level 1 finding because the organisation is failing to take the appropriate actions.

FLTLT ROSE: At paragraph 49 you list some key factors that can influence DASA's decision to escalate an enforcement action. Is that what you're talking about moving from potentially a Level 3 to a Level 2, or a Level 2 to a Level 1?

MR EDWARDS: So that's one of the reasons. It could be the willingness of an organisation to remedy the issue. There's a number of different factors that we'll use and determine as to whether to escalate.

FLTLT ROSE: So just for the benefit of those that don't have the statement, as you state:

> *The willingness of the organisation to address the non-compliances; the nature and sufficiency of available objective evidence of the non-compliances; the action required to effectively and efficiently address safety risks that have been identified were likely to arise; the need to obtain expert assistance on a complex technical operational issue, including legal advice; and the obligation to be fair, consistent, impartial, and proportional in taking enforcement action.*

Is there any others?

MR EDWARDS: No.

FLTLT ROSE: Is that set out in your internal policy for your team?

MR EDWARDS: That's set out in our internal policy, yes.

FLTLT ROSE: I want to ask you some specific questions now about the MRH-90.

MR EDWARDS: Certainly.

FLTLT ROSE: So if you go back to paragraph 20, as you set out for DASA Authorised Forces Command, which was the predecessor to Aviation Command, in September 2016, as a CAMO – a Continuing Airworthiness Maintenance Organisation – Management Organisation – to ensure the continuing airworthiness of the MRH-90 – so that was 2016?

MR EDWARDS: Correct.

FLTLT ROSE: At paragraph 21 you state that DASA approved 16 Aviation Brigade, also in September 2016, as a Part 145 Maintenance Organisation, and that included responsibility for the MRH-90.

MR EDWARDS: Correct.

FLTLT ROSE: Then at paragraph 22, DASA approved Airbus Group Australia Pacific Military Rotary Wing, which is now called Airbus Australia Pacific, and approved that as a Part 145 Maintenance Organisation, which included responsibility for the MRH-90.

MR EDWARDS: Correct.

FLTLT ROSE: It approved – is it Turbomeca engines?

MR EDWARDS: Yes.

FLTLT ROSE: So approved Airbus as a Maintenance Organisation for the Turbomeca engines fitted to the MRH-90.

MR EDWARDS: Correct.

FLTLT ROSE: And for component maintenance as well.

MR EDWARDS: That is correct.

FLTLT ROSE: So three aspects that Airbus is responsible for.

MR EDWARDS: Yes.

FLTLT ROSE: At paragraph 23 DASA approved Safran Helicopters Engines Australia as a Part 145 maintenance organisation for the Turbomeca engines in September 2017.

MR EDWARDS: That is correct.

AVM HARLAND: Excuse me. Where does the maintenance of life support equipment and mission equipment such as TopOwl reside in this CAMO and also the Part 145 approval?

MR EDWARDS: So depending on the equipment, if it's part of the scope of the 145, the maintenance will be done within the 145.

AVM HARLAND: So are you aware if TopOwl is done – the maintenance is done within Airbus Part 145?

MR EDWARDS: I'm not aware, exactly. I couldn't answer that. I don't know, specifically.

AVM HARLAND: Okay. Thank you.

FLTLT ROSE: So I take it from that answer that you and your team, then, don't have a role in auditing the TopOwl components or haven't – didn't in the past?

MR EDWARDS: I don't know the answer to that. We may have; I don't know.

MS McMURDO: Who would know?

MR EDWARDS: You'd be best to speak to DGDASA on that, as in to where that may – where that fits. So aeronautical product falls under a 145, but there are some exceptions. It can – and I don't know what the classification of the material is – I'd need to know the classification as to whether that – but DG would probably be the best person to answer that question.

MS McMURDO: Okay. Thanks.

FLTLT ROSE: So were all those approvals that I just mentioned in place at the same time, or did the later ones override the earlier ones?

MR EDWARDS: So they were all in place at the same time.

FLTLT ROSE: So is it the case that these organisations conducted maintenance of the aircraft and engines at the same time but at different locations?

MR EDWARDS: Yes.

FLTLT ROSE: At paragraph 51 of your statement you state that:

> *The Continuing Airworthiness Assurance Team within the Directorate of Continuing Airworthiness undertook 15 oversight activities of approved organisations performing airworthiness management and/or maintenance of a MRH-90 platform between 2016 and 2024.*

MR EDWARDS: That is correct.

FLTLT ROSE: So that's 15 oversight activities. And does that include those four organisations that I referred to before: Safran Helicopters, Airbus, 16 Aviation Brigade, and Aviation Command? Does that - - -

MR EDWARDS: That is correct.

FLTLT ROSE: Across all of those four?

MR EDWARDS: Yes.

FLTLT ROSE: Any others apart from that?

MR EDWARDS: No. They're listed in the annex.

FLTLT ROSE: That's the full four. And now your team's oversight activities resulting in two Level 1 findings? This is in - - -

MR EDWARDS: That is correct.

FLTLT ROSE: And 27 Level 2 findings?

MR EDWARDS: Correct.

FLTLT ROSE: And 41 Level 3 findings?

MR EDWARDS: That is correct.

FLTLT ROSE: And that's over that whole period, 2016 to 2024?

MR EDWARDS: Correct.

MS McMURDO: Can I just ask, did you say earlier that in your role as Air Combat, Continuing Airworthiness Assurance you apply the same standards based on the ICAO structure as would be applied by CASA?

MR EDWARDS: No.

MS McMURDO: No?

MR EDWARDS: I didn't say that. But they are very similar.

MS McMURDO: Very similar.

MR EDWARDS: They are based off the same principles.

MS McMURDO: And is there allowance made for the fact that this is a Defence situation and there could be operational issues which could cause a need for different standards? Is that considered?

MR EDWARDS: Yes. So the Regulations, ma'am, are – whilst they're based off ICAO, they're tailored for military use. And they're – so ICAO set the standard, and then we have what are called "implementing Regulations" – how you meet that. And our Regulations are tailored for Defence purposes.

MS McMURDO: All right. Okay, thank you.

FLTLT ROSE: Paragraph 33 of your statement, that's where you set out the Level 1, Level 2, Level 3 findings context. And you have already given evidence about that, but just to – because we're about to go into the details – just as a reminder, so Level 1 is any non-compliance with the Regulation requirements which lowers the safety standard and seriously hazards its flight safety?

MR EDWARDS: Correct.

FLTLT ROSE: And Level 2 is any non-compliance with the – with requirements which lowers the safety standard and possibly hazards flight safety?

MR EDWARDS: Correct.

FLTLT ROSE: And then Level 3 is any non-compliance or potential problem identified by objective evidence that could lower the safety standard and possibly hazards flight safety?

MR EDWARDS: That is correct.

FLTLT ROSE: So if you turn back to paragraph 53, you state that there were no open Level 1 or Level 2 findings affecting the MRH-90 operations as at 28 July 2023?

MR EDWARDS: That is correct.

FLTLT ROSE: But there were some Level 3 findings still open?

MR EDWARDS: Yes. So Level – so the organisational approval, the Level 3 findings that were open – as I stated earlier, there's no requirement for an organisation to respond immediately on Level 3 findings; however, we do revisit those. So internally we still track those as findings, so that, on our next scheduled oversight activity, we'll look at that. And some of those – when we audit a 145, they might look at maintenance from multiple platforms. So they can vary from – for example, 16 Aviation Brigade, we could have Chinook, Black Hawk, ARH, MRH aircraft.

FLTLT ROSE: So in terms of the numbers that you gave us before about having the – some Level 3 findings still open, this is though specific to MRH, and there could be other findings open in terms of those other platforms. But - - -

MR EDWARDS: Yes. So the majority of those were relating – because the later activity that's documented in here was on 16 Avn – was focused on Chinook aircraft.

FLTLT ROSE: That was going to be one of my questions. So what I think I'll do is, you've prepared, at Annex C - - -

MR EDWARDS: Correct.

FLTLT ROSE: - - - a list of the activities that you refer to in your statement, and you've compiled this list from various sources within DASA?

MR EDWARDS: Yes. We - - -

FLTLT ROSE: Or is it just from sources within your team's - - -

MR EDWARDS: So this is a corporate tool used to track all findings.

FLTLT ROSE: Okay. Did you compile it for the purposes of drafting a statement? Or do you have – was this a direct printout you could easily find within that database?

MR EDWARDS: I compiled this because it probably wouldn't have meant much if I just did a printout.

FLTLT ROSE: There's no criticism of that. I just wanted to understand what we're looking at.

MR EDWARDS: No. Yes. So I compiled it. I went through all the activities that we conducted for that period and put together a list of all the findings that resulted from those activities out of the oversight reports.

FLTLT ROSE: And then you prepared your statement. You signed it on 11 June 2024. So can I take it that Annex C is current, as is around that date, 11 June?

MR EDWARDS: As of that date.

FLTLT ROSE: So there could be more or less – there could be – slightly different now?

MR EDWARDS: Could vary slightly now, yes.

FLTLT ROSE: So the organisations that are in this list include Forces Command?

MR EDWARDS: Correct.

FLTLT ROSE: 16 Aviation Brigade?

MR EDWARDS: (No verbal reply).

FLTLT ROSE: Safran?

MR EDWARDS: Correct.

FLTLT ROSE: And Airbus?

MR EDWARDS: Correct. And those activities for the organisations are listed in the left-hand column.

FLTLT ROSE: What I'll do is, I'll take you to some specific aspects, not all of them. So they're not – the pages aren't numbered. But if you go to the fifth page – if you count through. Perhaps, actually, go to the fourth page because that's where it says, in the very left-hand top of the fourth page, "This is a Forces Command CAMO audit result".

MR EDWARDS: Yes, correct.

FLTLT ROSE: And the audit was on 27 to 30 April 2021?

MR EDWARDS: That is correct.

FLTLT ROSE: So then, if you go to the fifth page, and it's the second row, you can see that there's still an open finding?

MR EDWARDS: Correct.

FLTLT ROSE: So this is a Level 3 finding, I take it?

MR EDWARDS: That's a Level 3 finding.

FLTLT ROSE: Because it says so in the fifth column?

MR EDWARDS: Correct.

FLTLT ROSE: So if I just read out what it says in the sixth column, which is a description of the finding:

> *Ineffective logistics support arrangements to have caused a significant amount of cannibalisation (highest rate for a platform in the ADF) over the last 12 months: approximately 6.3 per hundred flight hours. This, when combined with a fragile CAMM2 build structure and tenuous cannibalisation process, increases the risk to airworthiness maintenance overflight. Cannibalisation, preparation and dispatch is also increasing the workload of the maintenance organisation.*

MR EDWARDS: Yes.

FLTLT ROSE: So that was an issue that was identified in around April 2021?

MR EDWARDS: That is correct.

FLTLT ROSE: And it's still open today?

MR EDWARDS: Yes.

FLTLT ROSE: So can you tell us what the cannibalisation refers to?

MR EDWARDS: So cannibalisation is a process by which – and it's a common process used in Aviation where, if you don't have the spares available immediately in your stores, that you can actually take them from another aircraft that might be in maintenance, and you can use those spares to render an aircraft serviceable, and so keep your fleet operating.

FLTLT ROSE: We have heard evidence from other witnesses to the Inquiry about the cannibalisation rate, in that they were having to potentially take parts from one aircraft which made that aircraft unavailable/unserviceable, and then there was a flow-on effect of that, because then you needed to make that one serviceable, so you took some from another one, and in effect it reduced the amount of aircraft available for Service.

MR EDWARDS: That can be an outcome.

FLTLT ROSE: And was this, I take it then, an issue that was identified by your team, or a previous team, that was in the Assurance Audit?

MR EDWARDS: I was lead of that activity.

FLTLT ROSE: Then that issue was identified, or notified to the – was it the Part 145 or the CAMO?

MR EDWARDS: To the CAMO.

FLTLT ROSE: To the CAMO.

MR EDWARDS: I'll just double-check. Yes, FORCOMD CAMO.

FLTLT ROSE: Yes. And then it would have – in terms of your process, you would have worked with the CAMO to try and come to a solution. They would make some suggestions about how they were going to rectify that.

MR EDWARDS: Yes, so with the Level 3 finding there's no obligation for them to come back, but we – that's one of the things we'll look at when we next visit, to see what they've done to try and improve. For example, in this case, to improve the supply of parts. What are they doing to try to rectify that? So in this particular case it was identified as a potential problem. They weren't necessarily non-compliant because you are able to cannibalise aircraft. It is an allowable process; a commonly-used process. But whenever you're starting to use cannibalisation, you're putting additional pressure on your maintenance workforce because it's not necessarily scheduled maintenance, and therefore you're increasing the likelihood that you have potential errors.

FLTLT ROSE: And, in fact, you did make that comment, that it's the highest rate of cannibalisation for a platform in the ADF.

MR EDWARDS: Correct.

FLTLT ROSE: That was a comment that you made in April 2021. Did it remain as the highest rate of cannibalisation across - - -

MR EDWARDS: I don't have that information.

AVM HARLAND: You've indicated that cannibalisation is both allowable and common. Is it desirable?

MR EDWARDS: It really would be a question that I think the operator would be best to answer because it does put additional pressures on your organisation.

AVM HARLAND: Would it be fair to say that it increases the workload pressure on the maintenance workforce?

MR EDWARDS: That's what we identified during this activity.

AVM HARLAND: Thank you.

FLTLT ROSE: If we turn then to pages – sorry, could I just ask, does that remain open even though the MRH-90 is permanently grounded? Is there a reason why it remains open on your system?

MR EDWARDS: It was open as of that date because the organisation still had the approval for that aircraft listed, so therefore they must still maintain those processes that would enable them, if required, to do maintenance on an MRH-90 aircraft. We have since removed that

approval, so they no longer have MRH-90. So I would assume that the appropriate team has closed that out.

FLTLT ROSE: If you would turn to the seventh page, and right at the bottom you'll see there's a finding for 16 Aviation Brigade.

MR EDWARDS: Yes.

FLTLT ROSE: As identified between 30 October and 3 November 2023.

MR EDWARDS: Correct.

FLTLT ROSE: And it's a Level 2 finding.

MR EDWARDS: Yes.

FLTLT ROSE: And it's open. And just without going into reading what it is, you will see that all of page 8, there's other findings; some at Level 2. There's one at Level 3 at the bottom, and then there's another Level 3. Two other Level 3 findings on page 9.

MR EDWARDS: Yes.

FLTLT ROSE: And they're all open.

MR EDWARDS: Correct, and they primarily relate to Chinook aircraft.

FLTLT ROSE: That's what I was going to ask, because I noted that also there was one that seems to be related on page 9, the third row, to Black Hawk. It says, "UH-60M".

MR EDWARDS: Yes.

FLTLT ROSE: So are any of these specific to MRH-90?

MR EDWARDS: No, not to my knowledge.

FLTLT ROSE: And even if they were, can I take it from your earlier evidence that because the approval is now no longer with 16 Aviation Brigade for MRH-90, that in effect they're closed?

MR EDWARDS: There may be some findings that were found when we were specifically looking at MRH-90 that might – because we issue approvals to organisations, and there can be common processes across the organisation that's used for different platforms, and in those cases we

would – for example, if it was the fabrication in the course of maintenance one I noticed in there, the FITCOM, that's a process that's used just not on any particular platform. So we would then probably keep that open because it's relevant to the other aircraft that's still on air approval.

FLTLT ROSE: I take it because this audit was conducted in late 2023, there probably wasn't much emphasis on auditing the MRH-90 by that stage, knowing that they were grounded.

MR EDWARDS: Correct.

FLTLT ROSE: Then finally, on the last page, page 13, there's two findings for Airbus. So the audit was on 8 to 12 April 2024. Can you see that?

MR EDWARDS: Yes.

FLTLT ROSE: And they're two Level 3 findings.

MR EDWARDS: Correct.

FLTLT ROSE: Does this relate to the MRH-90 or another platform?

MR EDWARDS: No, we targeted ARH.

FLTLT ROSE: ARH?

MR EDWARDS: Yes, on this particular activity.

FLTLT ROSE: Just to notice, it says "Active" rather than "Open". Is that just a new term that your unit is using, or is it interchangeable?

MR EDWARDS: It hadn't been issued at that stage. We had completed the oversight activity and it hadn't been issued.

FLTLT ROSE: And, essentially, your team is no longer tracking MRH-90 - - -

MR EDWARDS: No.

FLTLT ROSE: - - - for those particular organisations because they no longer have the approvals.

MR EDWARDS: They no longer have the approval.

FLTLT ROSE: Is that they no longer have the approval both as a CAMO and for the Part 145 MOs?

MR EDWARDS: I would have to check.

FLTLT ROSE: Nothing further.

MS McMURDO: Thank you. Any applications for leave to cross-examine? No?

AVM HARLAND: Yes, just a couple of questions.

MS McMURDO: I'm sorry?

MR O'MAHONEY: Just very quickly on behalf of Airbus.

MS McMURDO: Yes, all right. I think just AVM Harland has just got a few questions, but you're welcome to come up to the lectern.

AVM HARLAND: Just reflecting on paragraph 52 where you talk about two DASR Level 1 findings, 27 DASR Level 2 findings, and 41 DASR Level 3 findings or observations, in your experience is that kind of average, or is it an above average number of findings, or a below average number of findings?

MR EDWARDS: I don't know.

AVM HARLAND: You don't know? I'm just trying to get a sense because otherwise they're just really numbers; they don't really tell a story.

MR EDWARDS: Yes. So the Level 1s, we don't – haven't issued a significant amount of Level 1s overall, so it's probably a higher number of Level 1s. Level 2s, once again it depends on how many oversight activities you've done can give you a little bit different information. So I don't really know the answer to that without looking at the data.

AVM HARLAND: So a higher level, probably on the high side for Level 1s.

MR EDWARDS: Yes.

AVM HARLAND: Other than that, we don't know. At paragraph 46 you talk about things that may happen, which may include rating DASA findings, suspension or removal of DASA approval. Are you aware of

DASA approvals being removed, and were any removed with respect to MRH-90?

MR EDWARDS: No, we haven't removed any approvals.

AVM HARLAND: In total?

MR EDWARDS: In total.

AVM HARLAND: Okay. Thank you, that's all.

<CROSS-EXAMINATION BY MR O'MAHONEY

MR O'MAHONEY: Thank you. So my name is Greg O'Mahoney. I appear on behalf of Airbus. I just have a handful of questions for you. One is a question about the role of DASA in relation to Independent Review Boards. You were asked some questions about that by Counsel Assisting moments ago, and in that context you gave an answer that – I think I'm quoting you almost directly – that DASA would put in a submission on an annual basis. Do you remember saying that?

MR EDWARDS: Yes.

MR O'MAHONEY: Does that reflect the fact that, typically speaking, those Independent Review Boards convene on an annual basis?

MR EDWARDS: That's a question probably best answered by the DG because he's – I don't – my area of expertise is not within the Airworthiness Boards.

MR O'MAHONEY: I appreciate that, but just based on your experience?

MR EDWARDS: It depends on when the Airworthiness Board – how often they convene, and that can depend on a number of things, like in Service requirements, but we are required to put in a submission every time there's one convened.

MR O'MAHONEY: Am I right in thinking that sometimes, in your experience, they convene more often than on an annual basis?

MR EDWARDS: Yes, it varies.

MR O'MAHONEY: And sometimes less often than on an annual basis?

MR EDWARDS: That is correct.

MR O'MAHONEY: But what happens – tell me if this is right – is that each and every year DASA prepares a submission for the relevant Independent Review Board.

MR EDWARDS: Only when one is convened.

MR O'MAHONEY: Well, am I right in thinking that - - -

MR EDWARDS: But from my – sorry. I should answer, from a continuing evidence perspective, so our input that we have as our team, we only provide input to an Airworthiness Board when there's one convened and we're requested to do so.

MR O'MAHONEY: Do you sometimes learn that, after the submission is provided, that a decision is made to not proceed with that Board meeting?

MR EDWARDS: Not from my experience.

MR O'MAHONEY: I think you'll agree that – tell me if you agree with this – that DASA conducts robust assessments for the purposes of those submissions.

MR EDWARDS: We provide the information consistent with that, that has been requested.

MR O'MAHONEY: And, no doubt, that's the product of rigorous analysis and work.

MR EDWARDS: Well, from our oversight activities, yes.

MR O'MAHONEY: And is it the case that sometimes in those submissions there's a negative conclusion that is ultimately reached?

MR EDWARDS: Well, from our oversight activities, yes.

MR O'MAHONEY: And is it the case that sometimes in those submissions there's a negative conclusion that is ultimately reached?

MR EDWARDS: Once again, you'd be best to answer – the DG is the one who releases Airworthiness Boards.

MR O'MAHONEY: But am I right in thinking you play a role in the crafting of those submissions?

MR EDWARDS: We just provide the information that's relevant from a Continuing Airworthiness perspective, so what we've seen from our assessments of the 145 and the CAMOs.

MR O'MAHONEY: You were asked another question by Counsel Assisting – this is the last question I have for you – earlier, about the Independent Review Boards. And the question was what they were independent of, and I think Counsel Assisting asked you, "Were they independent of the ADF or DASA?", and you said, "That is a question better asked of someone else".

MR EDWARDS: Correct.

MR O'MAHONEY: Do you have a view based on your experience of the work you've done to work-up those submissions as to at least an opinion as to what those Review Boards are independent of?

MR EDWARDS: Not really. We provide our submissions. We're not part of that – our only part to that process is to provide the information that we've collected throughout the two-year period or 12-month period, depending.

MR O'MAHONEY: And am I right in thinking that from time to time in those submissions DASA ultimately concludes that an organisation has maintained acceptable levels of compliance and safety performance?

MR EDWARDS: I don't know from an airworthiness – well, the Airworthiness Board make their recommendations. They look at platform-specific for an organisational perspective. They're the sorts of recommendations we would make as part of our surveillance of an organisation.

MR O'MAHONEY: And is that more or less the most positive recommendation or finding that can be made by DASA in one of their submissions, that an acceptable level of compliance and safety performance has been maintained?

MR EDWARDS: If you're asking for the context of Airworthiness Board, I'm not the right person to answer. I can only answer - - -

MR O'MAHONEY: No, just for the context of the submission.

MR EDWARDS: I can only – from the submission? That's not my purview.

MR O'MAHONEY: I understand. No further questions. Thank you.

MS McMURDO: No other applications to cross-examine? Any re-examination?

Thank you, Mr Edwards. You're free to go.

MR EDWARDS: No worries. Thank you, ma'am.

MS McMURDO: Thank you for your assistance.

<WITNESS WITHDREW

MS McMURDO: Would you like to start the next witness – five minutes – or what do you think? What do you think, COL Streit? A very short witness.

COL STREIT: I seem to remember or recall my words earlier about difficulties in estimating times for witnesses. COL Reinhardt obviously was an important witness and people had a lot of questions for him. I did seek, whilst this witness was giving evidence, the views of the Head of Secretariat, remotely, as to whether we could go a little bit longer.

He indicated that 4.15 was achievable, but I note by the time the witness walks down the stairs and arrives, we literally would probably only have 10 minutes.

MS McMURDO: Well, we could have 20, just about.

COL STREIT: We could have 20. I'm prepared to start and - - -

MS McMURDO: Well, how long do you think you'll be?

COL STREIT: I think I would be anywhere up to 45 minutes with this witness.

MS McMURDO: Well, do you want to start or not? You've got your key witnesses to get through. It might help.

COL STREIT: I think if we could try to capture a little bit of time.

MS McMURDO: Okay, let's start. We'll sit till 4.15. I know we did promise we'd finish at 4, and I apologise about that, but we are getting a little bit short on time.

COL STREIT: So I call GPCAPT Chris Pouncey. Thank you. If it assists, Ms McMurdo, for planning purposes while the witness is coming to the hearing room, tomorrow, at 10 o'clock, we have CAPT Jackson. That's via video link. So he's fixed in time, subject to the video link working. I then propose to call D129, and then CAPT Goodridge. Their evidence is fairly narrow and I would anticipate that would be completed either before the end of the morning session or just at the completion of the morning session. And that would leave the afternoon to conclude this witness and AIRCDRE Medved, which I think, is achievable.

MS McMURDO: All right. We'll see how we go. Thank you.

COL STREIT: So there's - - -

MS McMURDO: Do we give up?

COL STREIT: We'll withdraw to a better defensive position for tomorrow.

MS McMURDO: All right then. Well, we'll adjourn until 10 o'clock tomorrow morning.

COL STREIT: Thank you.

MS McMURDO: Yes, thank you.

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FRIDAY, 9 AUGUST 2024 AT 1000