

JURISDICTION : SUPREME COURT OF WESTERN AUSTRALIA
IN CIVIL

CITATION : CIFUENTES -v- FUGRO SPATIAL SOLUTIONS
PTY LTD [2009] WASC 316

CORAM : MURRAY J

HEARD : 3 - 7, 10 - 14, 24 AND 25 AUGUST 2009

DELIVERED : 11 NOVEMBER 2009

FILE NO/S : CIV 1312 of 2008

BETWEEN : MALCOLM ANTHONY CIFUENTES
First Plaintiff

MICHAEL BRIAN KNUBLEY
Second Plaintiff

JULIE ANNE WARRINER
Third Plaintiff

JANET GRAHAM
Fourth Plaintiff

OZAN PERINCEK
Fifth Plaintiff

NAUTRONIX (HOLDINGS) PTY LTD
(ACN 009 067 099)
L-3 COMMUNICATIONS NAUTRONIX LIMITED
(ACN 009 019 603)
Sixth Plaintiffs

ALEC PENBERTHY
Seventh Plaintiff

AND

FUGRO SPATIAL SOLUTIONS PTY LTD
(ACN 008 673 916)
First Defendant

AARON BARCLAY
Second Defendant

ALEC PENBERTHY
Third Defendant

FILE NO/S : CIV 2279 of 2009

BETWEEN : FUGRO SPATIAL SOLUTIONS PTY LTD
(ACN 008 673 916)
Plaintiff

AND

AARON BARCLAY
First Defendant

CIVIL AVIATION SAFETY AUTHORITY
Second Defendant

ALEC PENBERTHY
Third Party

Catchwords:

Tort - Negligence - Crash of aircraft following failure of fuel pump - Crash caused by negligent design of part of pump and by negligence of pilot - Standard of care required of experts - Causation - No intervening cause

Negligence - Duty of care as to economic loss - Action includes claim for loss of services

Negligence - Apportionment of liability between tortfeasors

Contract - Incorporation of terms by reference - Course of dealing -
Incorporation of terms by implication - Warranties under the *Trade Practices Act 1974* (Cth), s 74

Legislation:

Trade Practices Act 1974 (Cth), s 74

Result:

In both actions -
Judgment for plaintiffs in claim for negligence
Liability apportioned 2/3 against first and third defendants, 1/3 against second defendant
Claim for breach of contract dismissed

Category: A

Representation:**CIV 1312 of 2008***Counsel:*

First Plaintiff	:	Mr M J McCusker QC, Mr B G Bradley & Mr A Golem
Second Plaintiff	:	Mr M J McCusker QC, Mr B G Bradley & Mr A Golem
Third Plaintiff	:	Mr M J McCusker QC, Mr B G Bradley & Mr A Golem
Fourth Plaintiff	:	Mr M J McCusker QC, Mr B G Bradley & Mr A Golem
Fifth Plaintiff	:	Mr M J McCusker QC, Mr B G Bradley & Mr A Golem
Sixth Plaintiffs	:	Mr M J McCusker QC, Mr B G Bradley & Mr A Golem
Seventh Plaintiff	:	Mr A A Nolan
First Defendant	:	Mr P C S van Hattem SC & Ms K J Levy
Second Defendant	:	Mr H J Langmead SC & Mr B J Morgan
Third Defendant	:	Mr P C S van Hattem SC & Ms K J Levy

Solicitors:

First Plaintiff	:	Bradley Bayly Legal
Second Plaintiff	:	Bradley Bayly Legal
Third Plaintiff	:	Bradley Bayly Legal
Fourth Plaintiff	:	Bradley Bayly Legal
Fifth Plaintiff	:	Dwyer Durack
Sixth Plaintiffs	:	Freehills
Seventh Plaintiff	:	Trewin Norman & Co
First Defendant	:	SRB Legal
Second Defendant	:	DLA Phillips Fox
Third Defendant	:	SRB Legal

CIV 2279 of 2009*Counsel:*

Plaintiff	:	Mr P C S van Hattem SC & Ms K J Levy
First Defendant	:	Mr H J Langmead SC & Mr B J Morgan
Second Defendant	:	Mr H J Langmead SC & Mr B J Morgan
Third Party	:	Mr P C S van Hattem SC & Ms K J Levy

Solicitors:

Plaintiff	:	SRB Legal
First Defendant	:	DLA Phillips Fox
Second Defendant	:	DLA Phillips Fox
Third Party	:	SRB Legal

Case(s) referred to in judgment(s):

Amaca Pty Ltd v Hannell [2007] WASC 158; (2007) 34 WAR 109
 Attorney General of Belize v Belize Telecom Ltd [2009] UKPC 10; [2009] 2 All ER 1127
 Balmain New Ferry Co Ltd v Robertson (1906) 4 CLR 379
 Barrymores Pty Ltd v Harris Scarfe Ltd [2001] WASC 210; (2001) 25 WAR 187
 Bennett v Minister of Community Welfare (1992) 176 CLR 408
 BP Refinery (Westernport) Pty Ltd v Shire of Hastings (1977) 180 CLR 266
 Breen v Williams (1996) 186 CLR 71
 Caltex Oil (Aust) Pty Ltd v The Dredge 'Willemstad' (1976) 136 CLR 529
 Chappel v Hart [1998] HCA 55; (1998) 195 CLR 232
 E v Australian Red Cross Society (1991) 27 FCR 310
 Fortuna Seafoods Pty Ltd v The Ship 'Eternal Wind' [2005] QCA 405; (2008) 1 Qd R 429
 Hawkins v Clayton (1988) 164 CLR 539
 Hedley Byrne & Co Ltd v Heller & Partners Ltd [1964] AC 465
 Jones v Dunkel (1959) 101 CLR 298
 March v E & MH Stramare Pty Ltd (1991) 171 CLR 506
 Oceanic Sun Line Special Shipping Co Inc v Fay (1988) 165 CLR 197
 Perre v Apand Pty Ltd [1999] HCA 36; (1999) 198 CLR 180
 Podrebersek v Australian Iron & Steel Pty Ltd (1985) 59 ALJR 492
 Roads and Traffic Authority v Royal [2008] HCA 19; (2008) 82 ALJR 870
 Rogers v Whitaker (1992) 175 CLR 479
 Rosenberg v Percival [2001] HCA 18; (2001) 205 CLR 434

South Australia v Ellis [2008] WASCA 200; (2008) 37 WAR 1

Swan v Williams (Demolition) Pty Ltd (1987) 9 NSWLR 172

Toll (FGCT) Pty Ltd v Alphapharm Pty Ltd [2004] HCA 52; (2004) 219 CLR 165

Wallis v Downard-Pickford (North Queensland) Pty Ltd (1994) 179 CLR 388

Woolcock Street Investments Pty Ltd v CDG Pty Ltd [2004] HCA 16; (2004) 216 CLR 515

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MURRAY J

MURRAY J:**Introduction**

1 On 11 August 2003, a Cessna 404C Titan twin-engine aircraft piloted by Mr Penberthy, crashed and burst into flames, in bushland just east of Jandakot Airport. Mr Penberthy was employed by Fugro Spatial Solutions Pty Ltd (FSS). If I should hold that Penberthy was negligent in causing the aircraft to crash, it is admitted that FSS would be vicariously liable for his negligence.

2 There were five passengers on board the aircraft. They were Mr Cifuentes, Mr Knubley, Mr Warriner, Mr Protoolis and Mr Perincek. All of those persons were employees of the sixth plaintiffs which, for present purposes it is sufficient to describe as Nautronix.

3 When the aircraft crashed and immediately was engulfed in fire, all the occupants except Mr Protoolis were able to make their escape through an emergency door. Mr Protoolis was trapped in the aircraft and died there. All of the other occupants of the aircraft suffered significant physical injuries by burns. Mr Warriner died as a result of his burns at Royal Perth Hospital on 4 November 2003. His widow and Ms Graham, the widow of Mr Protoolis, sue pursuant to the provisions of the *Fatal Accidents Act 1959* (WA). Mr Cifuentes, Mr Knubley and Mr Perincek sue for damages for their personal injuries. Their cause of action is in negligence, against all the defendants.

4 Their employer, Nautronix (Holdings) Pty Ltd (Nautronix), pursues a separate cause of action (by assignment), not only in negligence against all the defendants, but for breach of contract against FSS. I shall return to that in more detail. The pilot, Mr Penberthy, pursues a claim against Mr Barclay in negligence. So far as that claim is concerned, by consent on 3 August 2009, I adjourned it sine die. By consent, orders were later made to deal with that claim, to which I need not refer in these reasons.

5 FSS sues Barclay in respect of damage sustained as a result of the loss of the aircraft and pursues a similar cause of action in negligence against the Commercial Air Safety Authority (CASA). The claim against CASA is not to be tried by me. I am otherwise to try as preliminary issues the various questions of liability to which I have referred, including claims for contribution as between the various defendants.

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The occurrence of the accident

6 I heard evidence from two air traffic controllers working at Jandakot Airport in the control tower at the relevant time. They were Mr Schraven, who was the surface movement coordinator at the time and Mr Murray, who was controlling aircraft movement, their takeoffs and landings. He was in direct radio contact with the aircraft piloted by Mr Penberthy, the designation of which was VH-ANV. I had the benefit of a photomap of Jandakot Airport and its immediate surrounds (exhibit 135A). On a version of that map reduced in size (exhibit 135B) Mr Schraven and Mr Murray recorded their estimates of the position of the aircraft at significant points of its passage from its takeoff to its crash landing in the adjacent bushland. I also had available the benefit of Mr Murray's observations about a control tower transmission audio record (exhibit 103A) and the transcript (exhibit 103) the accuracy of which was generally established, although subject to some qualifications.

7 Their evidence was valuable because they were able to see what the aircraft was doing. That was not the position for those who were passengers who gave evidence before me. As I have mentioned, apart from the pilot Mr Penberthy, the other occupants of the plane were all employees of Nautronix. Mr Knubley was a project manager, in charge of the particular project which was the subject of the flight. He was seated on the right-hand side of the aircraft, immediately behind the seat of a co-pilot, but he could not see out because the windows had been closed so that light did not shine in and interfere with the use of computers and other electronic equipment which Nautronix had installed in the aircraft to be used in the work which constituted the purpose of the flight, which was to test communication systems for submarines and other underwater uses, which Nautronix proposed to sell to the Australian and American navies and to otherwise exploit in the oil and gas industries.

8 The other men who were passengers were all experts and specialists of various kinds. Mr Cifuentes was a computer software consultant for Nautronix and Mr Perincek was an electronics engineer. Mr Protoolis was an engineering director of Nautronix, a co-inventor of the technology being tested, and Mr Warriner was a project manager contributing particular skills and contacts derived from his military background.

9 Mr Knubley was used to flying in this or a like aircraft. During the preceding months he had been on a number of similar flights out of Port Lincoln in South Australia. There appeared to be nothing out of the ordinary in the preparation for or the takeoff of this flight, but after the

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aircraft had been airborne for about five to 10 seconds, he said, 'I heard a loud bang out of the right engine and the plane shuddered a bit.' (ts 166) The plane then commenced a left turn and banked to do so. Mr Knubley's sense of it was that it was a relatively gentle turn but he could not see where they were or what the plane was doing until he saw the trees and the ground coming up shortly before the crash.

10 He said that he had not previously encountered a noise of the kind that he heard from the right engine. It was not like the noise made by the retraction of the landing wheels. If his recollection is accurate, it must have been quite loud because Mr Knubley was, as were the other passengers, wearing noise-cancelling headsets which were designed to reduce the background noise made by the aircraft so as to better permit communication between those aboard.

11 The evidence given by Mr Cifuentes was not dissimilar in respect of the normality of the preparations for, and the takeoff. He was seated on the left-hand side of the aircraft behind the pilot, whereas Mr Knubley was seated opposite him, immediately behind Mr Warriner who was in the co-pilot's seat.

12 However, Mr Cifuentes' description of a noise he heard from the right engine about 10 seconds after takeoff was different from the evidence given by Mr Knubley, but not necessarily inconsistent with that evidence. Mr Cifuentes said he heard the engine, 'making a missing sort of noise as though it wasn't running properly.' (ts 175) To me he explained that the engine was 'sputtering' as if it was not firing on all cylinders.

13 Mr Cifuentes was uncertain, but thought the sound he heard occurred after the aircraft commenced to make one gradual left-hand turn or what was perhaps a series of left-hand turns. It is clear that he did not hear the noise of which Mr Knubley spoke. He thought that the noise he heard came from the right engine, not the left. There is nothing to suggest that it had anything to do with the feathering of the right engine after it failed. Mr Cifuentes could see no more of what was happening to the aircraft by looking out of it than could Mr Knubley.

14 It can be seen then that these witnesses were able to say little about how Mr Penberthy reacted to the emergency which arose and, as I say, Mr Schraven and Mr Murray, the air traffic controllers, were at least able to observe the behaviour of the aircraft after it became airborne, from their position in the control tower. The evidence of Mr Knubley and

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Mr Cifuentes provides no basis for a conclusion about what happened to the aircraft, having regard to what they heard.

Air traffic controllers were observers

15 Mr Schraven's account was incomplete. As the surface movement coordinator at the time he was not in direct radio contact with the aircraft VH-ANV. He was required to look away from the aircraft. He did not see the aircraft take off, but shortly afterwards he became aware that there was something wrong, when he heard a sudden change in the engine noise from the aircraft when it was about 10 to 15 feet above the ground.

16 The sound he heard was just like that made when one engine is throttled back as in a training exercise, leaving the aircraft to be flown by the use of the remaining engine, a process known as 'asymmetry'. When he looked back, the aircraft was well away from the airfield, making a slow left turn at a height above the ground of roughly 100 feet, with the right propeller virtually stopped. He could not say that the aircraft was then losing height, but it appeared to lose speed when the nose of the aircraft came up slightly. He then saw it disappear behind trees and immediately saw the fireball which resulted from the crash. He was able with some confidence to indicate the position where that crash occurred, but he was not otherwise able with any confidence to indicate on the photomap what the course of the aircraft was.

17 Mr Murray's evidence was a more complete account of what occurred to the aircraft from the point of view of an external observer. I accept his evidence as being generally accurate. He gave his evidence clearly and was firm in his recollection, at the same time making no attempt to state as fact more than he could honestly recall. The accuracy of his recollection is supported in particular by evidence, to which I shall shortly refer, given by a witness, Mr Steven Roberts. And so far as the exchanges between the control tower and the pilot of the aircraft VH-ANV are concerned, as I have said, the control tower transmission audio record and the transcript made is, I am satisfied, accurate, as to what was said, at least so far as the transmissions are decipherable.

18 The records give times of the various transmissions and there is no reason to suppose that those times are not accurately recorded. An issue arose as to the accuracy of the times recorded, but in my view the evidence provided no cause for concern about the reliability of the evidence concerning the transmission.

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19 Evidence was given by a Mr Harvey, an air traffic control manager employed by Air Services Australia. He explained that transmissions between pilots and air traffic controllers are recorded in audio form. Exhibit 103A is an example. A transcript may be made. The various versions of the transcript in this case are exhibits 103, 103C and 103D.

20 The person responsible for doing that, in relation to any relevant series of communications, is given a start time, described as GPS time, which I understand to refer to the global positioning system available by satellite. How that time is recorded seems to me to matter not at all. But, for aviation purposes, it is converted to what is described as UTC time. UTC stands for coordinated universal time. It is the foundation of all time zones, and was formerly expressed as GMT, Greenwich Mean Time. I note in passing that the evidence of the physicist, Mr Roberts, to whose evidence I will shortly refer, was that the radar data he used was similarly expressed in UTC time.

21 To fix the time of various transmissions, the transcriber simply counts on from the start time by the use of a computer which records the lapse of time. The time then ascribed to particular transmissions in the transcript made will be that elapsed time from the starting point, accurate to the second, and there is no suggestion that the computer count of elapsed time was significantly inaccurate. It is a simple process then to convert the UTC times into western standard time (WST) and to so express them, as was done in this case.

22 A document entitled 'Leap Seconds' became exhibit 142. Its content was proved by an astronomer, Associate Professor Dodson of the University of Western Australia, and its content was put to Mr Harvey. He knew nothing of the discussion contained in the document, which may have originated from the Time Service Department of the US Naval Observatory in Washington DC, USA. Using that document, Professor Dodson explained that UTC time is adjusted, from time to time, by very small amounts, to make allowance for the fact that the earth is slowing in its daily rotation. GPS time, which dates from 1980, was then synchronised to UTC time, but is not similarly adjusted. The result would be that as at 11 August 2003, it would strictly be wrong to directly translate GPS time into the equivalent UTC time. It would appear that by that date GPS time was ahead of UTC time by 13 seconds, given that according to Professor Dodson's evidence, which I accept, UTC time was last so adjusted on 1 January 1999.

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23 On the whole of the evidence, it seems likely that the times were appropriately adjusted on their conversion from GPS time to UTC time, in the radio transmission data and the radar surveillance data, but if the times are 13 seconds too fast, then they are all wrong to the same extent, and the error is immaterial for my purposes.

24 The aircraft took off on runway 24R which runs in a broadly north-east/south-west direction. The runway has that designation for aircraft taking off or landing from the north-east. That particular runway is designated as runway 06L for aircraft taking off or landing from the south-west. There is a parallel runway designated runway 24L for aircraft taking off or landing from the north-east and, unsurprisingly, designated runway 06R for aircraft taking off and landing from the south-west.

25 I received in evidence the report of the Bureau of Meteorology for the weather conditions at Jandakot Airport on 11 August 2003 between the hours of 3 pm and 4 pm. The records are maintained in the computer archives of the Bureau. They show that for the time period which is relevant, between 3.33 pm and 3.37 pm, the wind direction was generally from the south-west on a bearing of between 219° and 232° from true north. Conditions were relatively calm. The wind speed, averaged from minute to minute, was generally 9 knots, gusting between 8 knots and about 11 knots. The variation in wind speed would therefore have been barely noticeable.

26 Of course, I appreciate that the weather conditions recorded are those at the weather station on the ground at the airport. The point was made that both wind speed and direction might be different above ground level, but there is no evidence that that was the case, relevantly for this aircraft, which did not achieve a height above the ground of more than about 100 feet. At least there is no suggestion that the weather made a material contribution to the behaviour of the aircraft.

27 Across the south-west termination of the two runways to which I have referred, Jandakot airport provides a third runway at an angle to the two previously mentioned, so that this runway is aligned broadly east-west. For aircraft taking off and landing from the west it is designated runway 12. For aircraft taking off and landing from the east it is designated runway 30.

28 At about 3.33 pm VH-ANV was on taxiway Delta. That is the next one on from taxiway Charlie, which would give the maximum length of runway available. But taxiway Delta is, I was told, often used to provide

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access to runway 24R for an aircraft proposing to take off in the south-west direction. The pilot, Mr Penberthy, signalled to the control tower that he was ready to take off on runway 24R, proposing after the flight to return to Jandakot. Mr Murray told him to 'hold short'. He was not to enter the runway and he was not authorised to do so until about a minute later at 3.34 pm. Mr Murray told him to 'line up' - an instruction to position the aircraft at the start of its takeoff run on the runway. That instruction was acknowledged.

29 Shortly afterwards, at about half a minute past 3.34 pm, Murray told the aircraft it was cleared for takeoff and cleared to climb to 3,000 feet. This transmission was also acknowledged and Mr Murray watched the aircraft take off from the control tower about 400 m away. I would think it became airborne just after 3.35 pm. The aircraft took off near taxiway Golf, or between there and the next taxiway, which is designated Sierra. Immediately after takeoff, when the aircraft was about 10 to 15 feet above the runway, Mr Murray heard what he described as a distinct change in the pitch of the engine noise of the aircraft. To him, as to Mr Schraven, it sounded as if one engine had been throttled back to simulate an engine failure. He could not tell at that time which engine it was that had dramatically slowed in that way. Mr Murray watched for a short time, but he also had to divert his attention away from the aircraft VH-ANV because he had approved another aircraft to land on runway 24R from the north-east.

30 Having watched that aircraft land, Mr Murray returned his attention to the aircraft VH-ANV. When he looked, he said the aircraft was about a quarter of a mile off the end of the runway. Almost immediately Mr Penberthy, the pilot, made a transmission timed at about half a minute past 3.35 pm. He said, 'I've got an emergency thanks. I'm going to have to come around'. Mr Murray acknowledged that transmission by saying, 'Roger'.

31 Mr Murray said that at that time the aircraft was probably about 100 feet above the ground and it was commencing a left-hand turn, a shallow bank with the left wing tip down and the right wing tip up by about 15° to 20°. By then the right-hand engine appeared to have been feathered. The turn upon which the aircraft embarked appeared to Mr Murray to be a continuous one. Prior to that, when he heard the change in the engine noise, Mr Murray said that the undercarriage was down. It was not up and it was not in transit (ts 231).

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32 At 3.36 pm Mr Penberthy said, 'I'd like to land on the other one thanks.' Mr Murray responded, 'Which runway?' Mr Penberthy replied 'Ah, the 12 there thanks.' Mr Murray took this to be a reference to the runway to which I have referred as running broadly east-west. He understood that the pilot wished to land from the east, the direction in which his left-hand turn was taking him. To do that was to land on the runway, designated from that direction runway 30. Mr Murray said, just after 3.36 pm, 'Approved. Cleared to land.' About 40 seconds later, at about 3.37 pm Mr Murray saw the plane level out and lose altitude. The nose began to pitch up, more altitude was lost, there was a gradual descent, it disappeared behind the trees and then he saw the fireball, signalling that the aircraft had crashed after a total flying time of about two minutes.

33 Mr Murray said that the aircraft maintained a height of about 100 feet above ground throughout the time of its turn until shortly before it crashed. After the aircraft straightened out from the turn and commenced to fly roughly parallel to the runway 24R in a north-easterly direction, 'It began to lose altitude and pitched its nose up and then slowly what I call stalled in towards the ground' (ts 235).

There were other observers

34 Four people were called to give evidence about the behaviour of the aircraft from the time when it commenced its roll-up until it crashed. They were all positioned in hangars or other commercial premises at the airport, and it will be appropriate to deal with their evidence working from the north-east to the south-west, the direction of the take-off roll-up of the aircraft.

35 Mr Stevenson is a licensed aircraft maintenance engineer. He runs a business for the maintenance and repair of aircraft such as the C404 Titan. He is also an aircraft charter operator. He is used to hearing engines run, and to detecting anything which, the sound tells him, appears to be amiss. He has often heard C404 aircraft take off. The engines have a distinctive note. The best position relative to an aircraft to hear if there is something amiss by the sound of the engine or engines, is in front of it or to one side or the other, but in front of the engines. As the aircraft goes past you and heads away from you, it is more difficult to hear how the engine or engines are operating. It is also more difficult to hear how the engines are performing from inside the cockpit.

36 The evidence of this witness and the others who gave evidence about their observations on the afternoon in question, 11 August 2003, made it

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clear that this was a typically busy afternoon, with frequent aircraft movements and regularly competing sounds of aircraft engines. The hangar and associated offices which are Mr Stevenson's business premises are positioned between the taxiways Delta and Echo. As VH-ANV lined up on the runway and prepared for its take-off run, Mr Stevenson would have been about 350 metres away, using the scale on exhibit 135B. He would have been just forward of the right wing tip, but as the aircraft commenced its take-off run, it would soon pass him and commence to move away from his position in the doorway of his hangar, where he was speaking on the telephone.

37 He had been idly watching as the aircraft moved out along the taxiway, held there, and lined up on the runway. The engines 'came up to power', and his attention was attracted to the aircraft because, although the engines were brought up to full power for the take-off roll, 'it didn't sound correct' (ts 993). Mr Stevenson described how the engines of the C404, when they come up to full power, have a 'harmonic noise' - a distinctive resonance. His thought was that one engine appeared to be developing full power and the other seemed to him not to be making full power.

38 As Mr Stevenson watched the aircraft on its take-off run, until after a couple of hundred metres it disappeared behind buildings as it moved away from him, he thought it did not appear to be accelerating appropriately. The aircraft was still performing its take-off run when it went out of his sight at about taxiway Foxtrot.

39 Mr Stevenson thought there was a problem, 'of a serious nature' in that one engine, 'was probably making significantly less horsepower to the one that was serviceable' (ts 995). Although he said that he was concerned that the aircraft might not be able to take off, after it passed from his sight he paid no more attention to it and 'went back to other priorities' (ts 996). He continued with his telephone conversation. However, his evidence was that it struck him that the aircraft was having a problem of such severity that, had it sounded that way in his workshop, he would not have allowed it to leave without finding out what was wrong. It did appear to him, he said, that the aircraft was probably not in a safe condition to fly (ts 1004).

40 However, there is simply no evidence capable of confirming that as the aircraft performed its take-off run, there was any problem which emerged upon investigation, and it seems to me that it may well be that Mr Stevenson has revisited what he thought about the aircraft when he discovered that it had crashed. He then thought, and he now genuinely

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thinks, that the aircraft exhibited a problem as he saw it commence and perform the first part of its take-off run. But had his impression been that there was a problem of the severity which he now describes, I think it strange that, after the aircraft laboured out of sight, he would not have run out to see whether it did take off, but he simply returned to his telephone conversation.

41 Mr Firman is also a qualified aircraft mechanical engineer of some considerable experience. He is familiar with the engines of the C404 aircraft. On 11 August 2003, he was working in the workshop of his employer, which is a little further to the south-west from where Mr Stevenson was. It is just short of taxiway Foxtrot for aircraft taking off in the south-westerly direction, and from his vantage point in the workshop, he too could see the runway from about taxiway Delta almost to Taxiway Golf. As the aircraft passed his position, it would be about 250 metres away.

42 It appears that it was the sound made by VH-ANV as it passed that attracted his attention, and he did not know where the take-off run had originated. He thought the aircraft must have been at about its maximum weight. As it continued its roll-up past his position, he could hear the engines and, 'To me they did not sound as if they were running at full power.' He said there was a distinctive sound which can be heard when they are at full power and, 'I don't recall hearing it' (ts 1011 - 1012).

43 Mr Tull is a licensed aircraft maintenance engineer. He had never worked on a Cessna 404, but he said that he had often heard that type of aircraft take off, and was familiar with the sound that it made. Mr Tull was standing at the front of a hangar which is between taxiway Golf and taxiway Sierra. It is virtually opposite taxiway Sierra, and he could see the runway from about halfway down its length, at taxiway Echo, until it ended. He saw the final part of the take-off run by VH-ANV. His attention was attracted to it when it was at about taxiway Foxtrot, and he confirmed that it became airborne roughly halfway between Golf and Sierra.

44 His attention was attracted to the aircraft by its sound, which was not the normal high-pitched noise made by the engines when developing full power. It sounded 'flat', as if the propellers were out of synchronisation, but he could not say whether it was one or both of the engines which were not making full power. He watched the take-off. The rate of climb of the aircraft once it became airborne was 'very low' (ts 1020) compared to the rate of climb which he had previously observed after take-off in that type

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of aircraft. Then one engine stopped, the propeller stopped, the undercarriage completed its retraction, the aircraft 'climbed out marginally' and then commenced a left turn. He watched it complete that turn until it was heading in approximately the opposite direction to that in which it had been travelling when it took off. The angle of attack increased, and the aircraft descended, with an increasing angle of attack, into the bush.

45 When cross-examined, Mr Tull said that he could hear the sound of the engines quite clearly while the aircraft was on the tarmac. He attributed what had attracted his attention to the propellers being out of synchronisation (ts 1023). He was reluctant to estimate the height above ground achieved by the aircraft after take-off and after the engine stopped, but before the aircraft commenced its turn. Nonetheless, when pressed, he said that his best rough estimate, of which he was not sure, would have been 250 feet to 300 feet above the ground, a much greater height than the aircraft in fact achieved.

46 A further difficulty in relation to accepting Mr Tull as an accurate witness is the fact that, having described the sound he heard, to which I have referred, and having given evidence that he saw one of the engines stop and the propeller stop, Mr Tull said that he could not recall any change of sound in the aircraft engine noise at that point. He heard nothing like the sound of an engine failure or an engine being shut down as the aeroplane went past him and took off (ts 1034). And yet, of course, that is what he saw happen.

47 Finally in this category of witness there is Mr Chambers, again a licensed aircraft maintenance engineer with some considerable experience, including work on Cessna 404 aircraft, which he described as having a very distinctive engine noise, and which he had often seen taking off and landing at Jandakot airport where he worked.

48 On 11 August 2003, he was at the doorway of the hangar which was his workplace, very close to the position where Mr Tull was. He saw the aircraft ANV as it became airborne. He watched it take off. Mr Chambers thought that the aircraft was probably airborne by the time it passed Foxtrot, certainly before Golf. That, I think, is not right, and Mr Chambers said it was difficult for him to fix the point of take-off with any certainty, although he was in the hangar doorway at the time. He had actually been working on the sister aircraft to ANV, owned by FSS, the C404 designated VH-WGS.

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49 Mr Chambers' attention was attracted to the aircraft, VH-ANV, because he thought there was something unusual about the right-hand engine. He thought possibly it was slowing. There was something different about the noise, perhaps a little quieter than he would have expected (ts 1039 - 1040), but he could not, beyond that, identify the difference. When the aircraft took off, Mr Chambers did not notice an unusually slow rate of climb. He said the aircraft has a relatively slow rate of climb after take-off, in any event.

50 Shortly after the aircraft became airborne, it commenced to turn to the left, and as it turned he noticed, above the fuselage, that the propeller on the right engine appeared to have been feathered. As I understand Mr Chambers' evidence, he did not notice any change in sound as the right-hand engine shut down, and he did not see the process of feathering the right propeller commence. Before that, he had simply noticed that the aircraft appeared to climb slowly until it achieved a height above the ground of somewhere between 100 feet and 150 feet. Later, when cross-examined, he suggested that the aircraft may have achieved a height of between 150 and 200 feet, but he readily conceded that it was difficult for him to make an estimate of the height achieved by the aircraft with any degree of accuracy.

51 When saying that he had heard no sudden change in the engine sound, as if one engine shut down, Mr Chambers said there was a lot of other noise around where he was; aircraft taxiing, noise from the workshop, radios and the like. Not only did he not hear a change in the engine noise of that kind, the engines of the aircraft did not appear to him to be running rough, and the sound was not that of an aircraft whose propellers were out of synchronisation.

52 There are clear differences between the accounts offered by these four witnesses; from that of Mr Stevenson at one extreme, to that of Mr Chambers at the other. To my mind, Mr Chambers' evidence is not inconsistent with the description of what was seen and heard, given by the witnesses Schraven and Murray, the air traffic controllers, although he heard nothing at the time of take-off which was reminiscent of one engine being shut down. Each of these witnesses was quite obviously doing his honest best to describe what occurred, and their observations were made over a very short space of time.

53 I do not find it surprising that there were substantial differences between their accounts, but to my mind, of the witnesses on the ground, the most reliable was Mr Murray, supported in part by the account of

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Mr Schraven, and also by Mr Chambers. I am not prepared to rely otherwise on this evidence to support a finding that the emergency which occurred to the aircraft was of some unexplained kind adversely affecting its performance, which the pilot ought to have noticed before it took off, and which ought to have been evident upon his instrumentation, so that the error he made was in persisting with the take-off, and in failing to abort the flight in a timely manner, before take-off.

The behaviour of the aircraft between roll up and the crash

54 Apart from the evidence of eyewitnesses and that given by the pilot, Mr Penberthy, I had the advantage of expert evidence given by Mr Steven Roberts, a physicist, with degrees in physics and geophysics. I need not detail his qualifications and expertise. His specialty is radar and flight data and cockpit voice recorder analysis and he uses an interactive computer program to assist in the presentation of his reconstructions of flight paths taken by aircraft and of their behaviour. He is a Canadian. I received his evidence by video-link from Ottawa and he presented a substantial report which, together with its annexures, I received in evidence as exhibit G. His expertise in his particular field was unchallenged.

55 He presented his final analysis and reconstruction of the flight path of the aircraft and its behaviour plotted onto a Google map which was figure 4 in his report, but in enlarged more readable form was received in evidence as exhibit 136. Incorporated in that reconstruction is the radar data received from the surveillance radar at Mount Kalamunda, as the radar survey institution in Kalamunda is known. Mr Roberts also received radar track data generated by Air Services Australia with respect to the particular flight. He plotted the path of the aircraft, having regard to both sets of data. He determined that the Mount Kalamunda radar data was 'the most appropriate'.

56 By that, as I understand it from his evidence, he means that in his expert opinion, the Mount Kalamunda data provides the most accurate reconstruction of the probable flight path of the aircraft. Indeed, there is not a great difference between the aircraft flight paths recorded by applying the program to both sets of data until at the very end of the flight, just before the crash, when the Air Services Australia data shows what would appear to be an attempt to turn the aircraft further to the left to align it with runway 30 for a landing on that runway from the east. On the other hand, the Mount Kalamunda radar data suggests that immediately before the crash the aircraft was flying roughly parallel to the original

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runway 24R/06L and its companion 24L/06R. For present purposes therefore, that divergence in the flight path has relatively little significance in respect of the decision of the issues which arise in this litigation, but the Mount Kalamunda data appears to be more consistent with where the aircraft crashed.

57 Nor is there much significance in the fact that the true path of the aircraft at any given point would be located in what are shown on the map as radar confidence blocks. In his report, Mr Roberts describes these as radar tolerance boxes drawn at plus or minus a single azimuth code pulse, the measurement of which is 1 over 4,096 of a 360° field or just under .09 of a degree. That is a high degree of accuracy, although of course the actual distance on the ground will differ according to how far away from the object being sensed by radar the tracking station is located. Further, so far as the range is concerned, the accuracy was plus or minus 0.05 of a nautical mile, about 90 m. As I understand it, the range accuracy parameter will apply to each of the radar tracking points uniformly, and so whatever the degree of error is in fact, that would not distort the plotted flight path.

58 Quite how precisely accurate the plotted flight path is, seems to me to be of relatively little moment. The important thing is to be able to see depicted, in terms which I am satisfied are sufficiently accurate, the flight path of the aircraft. As to that, I have mentioned that it is plotted on a Google map. There is some debate about the accuracy of that depiction which is by way of aerial photograph, but I am satisfied that it is sufficiently accurate. Indeed, I agree with senior counsel for Mr Barclay, that some comfort may be taken in that regard from seeing that, during what is evidently the roll up of the aircraft immediately prior to takeoff, the flight path has been located over the depiction of runway 24R, after some adjustment, with the result that shortly before the crash the aircraft is shown to be heading for the place where that occurred.

59 The computer software incorporates a process of 'smoothing' the flight path. The concept is explained in detail in Mr Roberts' report. I need not discuss it at length here. It involves a process of eliminating extremes of possible aircraft positions so as to result in the achievement of the most probable flight path. A further point should be made about the smoothing process. The radar data provided to Mr Roberts records positions at timed intervals. Mr Roberts' report explains the process. I need not repeat that information here, but as he says, the result is to give the aircraft, at various points, a three-dimensional position in space, along with the identification of the aircraft and the time of the determination,

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subject to the limits of the accuracy of the process to which I have referred.

60 But the raw data itself does not provide a clear picture of the aircraft's flight path because the aircraft does not proceed in a straight line from one point to the next, and then change direction instantly to proceed in a straight line to the next point of information. As I understand the smoothing process applied by the computer program devised by Mr Roberts and others, the computer models the flight path by predicting the nature of the curve which encompasses the points of information provided by the radar sensor at the known time intervals. Of course, if the aircraft is in fact flying in a straight line, one would expect the radar tracking process to enable a visual depiction of that fact, and the smoothed flight path depicted on exhibit 136 shows both when the aircraft was flying straight and when it turned to the left.

61 When the aircraft is at particular points along its flight path they are recorded in the data supplied and noted on exhibit 136, together with the computed air speed of the aircraft at those points and the recorded height in feet above mean sea level. The computed air speed I was told, would not be materially different from that able to be observed by the pilot on his altimeter in the cockpit of the aircraft. A calculation has been done which shows what difference there would probably be, having regard to prevailing weather conditions, particularly wind force and direction, during the short flight. In addition, Mr Roberts was supplied with the transcript of relevant recorded transmissions between Mr Murray in the control tower and Mr Penberthy in the aircraft. Their times are given and Mr Roberts has plotted them on exhibit 136.

62 The aerodrome at Jandakot Airport is generally given as almost exactly 100 feet above mean sea level, although at the 06L end of runway 24R it may be about 5 feet less. I accept the evidence that the areas immediately surrounding the airport and particularly those traversed by the aircraft in this case, would vary little in height from the airport itself. As I have mentioned, the airport provides three runways. That designated 24R/06L is 1,392 m in length. That designated 24L/06R is 1,150 m in length and that designated as 12/30 is the shortest, being 990 m in length. But all offered ample length for this particular aircraft to take off and land with safety.

63 The radar plot confirms that the aircraft commenced its takeoff roll up at the taxiway designated Delta, having lined up there at about 3.34 pm. As I have mentioned, Mr Murray cleared the aircraft for takeoff

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about half a minute later. The aircraft is said to be at a height of 109 feet above mean sea level while it was evidently still on the ground, performing the roll up prior to becoming airborne. Again, exhibit 136 would appear to confirm that the aircraft became airborne after passing the taxiway Golf and before reaching the next taxiway, Sierra.

64 The radar data shows that the aircraft was probably then travelling at a computed air speed of about 100 knots. This is consistent with Mr Penberthy's evidence about how the aircraft typically behaved during take-off (ts 806). It does not appear to have materially exceeded that air speed during the initial takeoff and certainly not after it commenced to turn to the left.

65 Initially the aircraft seems to have gained height normally. By the time it left the formal boundary of the airfield, a distance of about 300 m from the point of takeoff, it had achieved a height of about 100 feet off the ground, 209 feet above mean sea level. By the formal boundary of the airfield, I mean that part of the airfield which is cleared adjacent to the runways, and is vegetated by cut grass. There appears to be a section of airport land immediately surrounding this area which I was told, and which appears from the aerial photo maps, exhibits 135A and B and 136, to be vegetated by trees.

66 Shortly afterwards, perhaps another 150 m on into the flight, and about 10 seconds later, while the aircraft was maintaining straight flight, Mr Penberthy made his transmission indicating that he had an emergency and would need to 'come around'. A matter of about 10 seconds after that the aircraft commenced to turn left.

67 Thereafter it achieved no more height, although according to the computer modelling presented by Mr Roberts, it was able to maintain a height of about 100 feet above the ground or 212 feet above mean sea level. However, during the left-hand turn, which was not, even according to the smoothed track, entirely uniform, but which saw the aircraft turn about 180°, the computed air speed fluctuated marginally between about 96 knots and 90 knots, sometimes increasing a little, only to marginally fall away, until by the time the turn was generally completed, by making a somewhat more pronounced turn to the left, and the aircraft appears to have endeavoured to straighten up, its air speed decayed to the dangerously low level of about 85 - 87 knots.

68 Of course at this point, nearly at the end of the flight, the aircraft would be experiencing a relatively gentle tail wind, but a tail wind

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nonetheless. It is no doubt for that reason that the ground speed calculated by Mr Roberts increases and commences to exceed the air speed, a circumstance which would help not at all to prevent the air speed of the aircraft decaying to a stall speed, leading to the behaviour of the aircraft witnessed by observers when the nose came up and the aircraft lost height more quickly until it disappeared behind the trees and crashed. The final stage of the flight is not depicted on exhibit 136, no doubt because of the interference of the trees with the radar sensor.

69 It is possible, having regard to the smaller version of the photo map exhibit 135B, to make a rough calculation of how far ahead of the aircraft the major obstruction of the powerline to the south of the airport would have been from the aircraft at the point when it commenced the left-hand turn. Had it not done so, but had it maintained the line of flight following the takeoff, the distance is about 1,900 m to a pylon numbered 199, the height of which is given as 227 feet above mean sea level.

70 Had the pilot turned onto a heading to the pylon numbered 198, the height of which is given as 231 feet, the change of direction involving a turn to the left of about 10°, the distance to the pylon would reduce to a little over 1,700 m. Pylons further to the left, or to the east, would be marginally closer to the point where the turn was commenced. But in any event, as can be seen, the distance involved is considerable.

71 At an air speed of 100 knots, on the heading of the aircraft immediately before the left turn commenced, Mr Roberts calculates that, before the left turn commenced, having regard to the headwind then affecting the aircraft, the 'smoothed' ground speed was a little over 90 knots. At that speed, if it was maintained and conditions remained the same, it would take about 40 seconds to cover 1,800 m. If the air speed increased to give a ground speed of 100 knots it would take about 35 seconds to travel that distance. I note that the witness Lovegrove, to whose evidence I will shortly refer, made similar calculations.

72 I have said that the turn was commenced a matter of seconds after Mr Penberthy made the transmission that he was confronted with an emergency. I calculate that the turn was commenced about 15 seconds after the aircraft took off. At no point after the turn was commenced, on my calculations, did the aircraft get closer to the powerlines than about 750 m. The closest pylon would probably have been that numbered 195, the height of which is given as 240 feet above mean sea level, but by that time the aircraft had been brought around to a heading virtually aligned with the east-west alignment of the powerline.

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73 Referring to exhibit 136, the turn to the left appears to have been commenced at about the boundary of the airfield depicted between the radar confidence blocks 6 and 7. The left-hand turn then appears to me to be almost a complete semicircle until, between the radar confidence blocks 17 and 18, the aircraft appears to have turned about 180 degrees. There then appears to be a straightening up, which would take the aircraft more to the east, and further to the east of the end of runway 30. Then, at the point where the radar confidence blocks 20 and 21 are depicted, there is a sharper turn to the left, consistent with the aircraft being caused to turn more towards the cut grass areas of the airfield.

74 I note that when the flight path straightens, the computed air speed appears to increase by, perhaps, five knots, before falling off sharply as the aircraft again turns left.

75 The relationship between this part of the flight path and the evidence of the pilot, Mr Penberthy, will become clear when I discuss his evidence. But it is at this point, where a more pronounced left turn is involved, that the radar detected that the speed of the aircraft through the air decayed dangerously, although the height of the aircraft above the ground appears to have been maintained, at least until the point where the radar data ceases to be available, a matter of no more than 10 seconds, I would judge, from the point where the aircraft finally came to rest.

The evidence of the pilot

76 Mr Penberthy's evidence was, of course, of crucial importance. His evidence was tested by putting to him statements which he had made in January and May 2004, during the course of the investigations into the crash of the aircraft and the deaths of, and injuries to, the occupants. Mr Penberthy had himself been seriously injured in the crash. He had spent some time in intensive care. I am not at all satisfied that what he said in the statements put to him, to the extent that there were inconsistencies and to the extent that he adopted what he had previously said, would provide a more accurate and reliable account of what occurred than his evidence given to me.

77 As to that, I think he genuinely attempted to give to the court his best recollection of what had occurred. He was an honest witness, but one would have to have some reservations, as I do, about the reliability of his account. He conceded that apart from his participation in the investigations conducted, he has, over the intervening years, thought about what occurred almost daily. He conceded that there had been some things which he thought had occurred, but which he accepted he had been

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wrong about when it had been put to him that the evidence was to the contrary. He conceded that he now cannot separate in his mind what are genuine recollections of what happened from what may be reconstructions of events, where imperfect recollection has been supplemented by information provided by others. In what follows I will endeavour to state what, in my view, may be accepted as a genuine recollection, particularly having regard to the extent to which Mr Penberthy's evidence was supported or contradicted by other evidence.

78 When I put to Mr Penberthy what seemed to me to be the core of his evidence about his decision-making process when the emergency of which he spoke arose, he said that the evidence he had given about those matters was recollection rather than reconstruction. He did not, however, resile from the proposition previously exposed in cross-examination that he was unsure now how much of what happened was 'honest reconstruction', as distinct from an actual memory of what went through his mind.

79 Mr Penberthy was born on 10 February 1943. As at the date of the accident he was therefore 60 years of age, but he was fully fit to fly and highly qualified. He had been involved with aircraft since he joined the Navy in April 1962. This accident, some 40 years later, marked the end of his career. He has never flown again. In the early 1970s, having left the Navy, he became a commercial pilot in a variety of different roles, including passenger commuter work and freight carriage. He became a flying instructor, and a chief flying instructor. He tested others for their competence. He was a licence issuing authority for the Commercial Air Safety Authority. His logbook showed that his total flying time over his whole career as a pilot was the incredible amount of some 16,700 hours.

80 Mr Penberthy was very experienced in and knowledgeable about the Cessna 404 Titan, and twin-engined aircraft generally. But for commercial pilots, no matter how experienced, no matter how eminent, there is no grandfather clause. They are tested regularly, two or three times a year, by another senior pilot, for their knowledge and for their capacity to deal with an emergency which may arise. For a twin-engined aircraft, that involves testing for unexpected engine failure. Prior to the accident with which these proceedings are concerned, the last occasion upon which Mr Penberthy was tested was on 6 May 2003, some three months earlier.

81 The testing officer was effectively Mr Penberthy's senior officer with FSS, Mr Hillier. It goes without saying that he also was a very

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experienced commercial pilot, and he was responsible, in this case, for checking Mr Penberthy's current qualifications and capacities as a pilot. His evidence was that Mr Penberthy's performance was 'near perfect', and the currency of his qualifications was therefore maintained.

82 In fact, Mr Hillier was originally proposed to be the pilot who would carry out the flight in question here, but his commitments changed and it was he who asked Mr Penberthy to step into the breach. In my opinion, there can be no suggestion that that was not an entirely appropriate decision, and there can be no suggestion that Mr Penberthy was other than fully qualified to carry out the purpose of the flight and to deal with any eventuality which might arise.

83 Mr Penberthy gave evidence of a variety of incidents, which I would describe as emergencies, which had occurred over the 30-year period between the mid 1970s and the date of this accident. His evidence that he coped effectively with all of those incidents was unchallenged. Prior to this incident, he had not had an accident with an aircraft which involved any damage to property, or loss of life, or injury to any person. As I have said, in this accident, not only was Mr Penberthy himself injured, together with the injuries and deaths which occurred to his passengers, but it ended his career.

84 Having been informed that he was to be the pilot on the fateful flight, well before the plane was due to depart Mr Penberthy made the usual checks. He was in a position to undertake the flight personally, and the aircraft was established to be fit to fly. Prior to the flight, Mr Penberthy carried out what is described as a 'self-brief'. By this is meant that the pilot must run through a checklist of matters to be planned for as occurrences which will or might affect the flight. For example, one of the decisions to be made is to determine a 'decision speed'. If an engine malfunction occurs before the aircraft attains that speed during the take-off process, the flight must be aborted unless the process of take-off has been completed, by which is meant that the aircraft is airborne and the landing gear is retracted or in the process of retraction.

85 The decision speed for this type of aircraft is stipulated in the aircraft operating manual to be 91 knots. Mr Penberthy said that because the aircraft, with the passengers and their equipment, was very close to its maximum all-up flying weight, he chose a decision speed of 109 knots. Of course, that is air speed, not ground speed, and in fact, as has been seen, the aircraft never got close to this speed throughout the whole of the flight, and its take-off speed was about 100 knots.

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86 Having completed the self-brief, which appears to me to have been carried out in appropriate terms, the pilot, before taxiing out to commence the flight, undertook the usual checks of the aircraft according to the checklist in the cockpit. Those checks included bringing the engines up to the 1,500 rpm required, checking that the engines were running smoothly, and checking that the magnetos were operating correctly according to the instruments. There is no suggestion that Mr Penberthy did not carry out the appropriate checks or that they did not establish, as he says they did, that the aircraft was fit to fly.

87 He taxied to the runway, using taxiway Delta. He appreciated that if taxiway Charlie was used, that would enable the aircraft to be positioned at the commencement of the runway. That would have added 145 m to the available runway length. But I accept Mr Penberthy's evidence that many used taxiway Delta, from which there was ample runway to enable the aircraft to take off safely, and to enable a flight to be aborted safely if a problem requiring that to be done occurred before takeoff.

88 Delta was used frequently and the evidence was that the extra length had been added to the runway to accommodate jet aircraft. In my opinion, the evidence does not establish that an operative cause of the crash was a decision that the take-off had to be pursued, although the appropriate course would have been to abort the flight, because at the point where the difficulty with the aircraft arose there was insufficient acceptable ground ahead of the aircraft to enable the flight to be aborted safely.

89 Mr Penberthy positioned the aircraft on the runway when he was told by Mr Murray, in the tower, to line up. When he was cleared for take-off he commenced the roll-up, increasing the engine revolutions, releasing the brakes and smoothly applying power to both engines. I do not think he recalls precisely what happened during the take-off roll up, because he often used the phrase, 'I would ...' to describe his actions. But I am equally satisfied that nothing untoward occurred, and that power built adequately in both engines, despite the impression of some observers on the ground, to whose evidence I have referred.

90 Finally, in relation to take-off, Mr Penberthy firmly rejected the proposition that one engine was running rough and that power was not developing normally in the engines before take-off. He denied that the aircraft took longer to achieve take-off than it ought to have done. He said there was nothing wrong with the aircraft on the take-off roll. Had there been, I accept that he would have aborted the take-off.

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91 As the air speed increases, the first step towards becoming airborne is described as 'rotation', by which is meant simply that the nose wheel comes off the ground shortly before the other wheels come off the ground and the aircraft becomes airborne. Mr Penberthy said that he would guess that he became airborne at 100 knots. The radar surveillance data would support the view that that was a good guess. Lift off having been achieved, the speed continued to build. At about 105 knots on the air speed indicator, Mr Penberthy reached for the undercarriage selector to bring the undercarriage up, or at least to commence that process, which takes a few seconds to complete.

92 I accept Mr Penberthy's evidence that to that point there was no noticeable difficulty in the performance of either engine, and by then, of course, although the air speed does not appear to have achieved the selected decision speed, the point had passed at which the take-off would be required to be aborted, and the time had arrived when the pilot was required to undertake a different set of procedures, upon the failure or other difficulty arising in respect of one or both engines.

93 In his evidence-in-chief at ts 806 - 807, Mr Penberthy described what then occurred. Without referring to hearing anything different in the note of either engine, he said that he felt a pressure on his left foot on the rudder pedal. That would indicate some difficulty with the right engine, because there would be a corresponding decrease in pressure on the right rudder pedal. Pilots have a phrase which describes the difficulty: 'dead foot, dead engine'. It is not necessary to completely describe the phenomenon which occurs. It is sufficient to say that when the right engine fails, the aircraft will immediately yaw to that side.

94 It will tend to move to that side because, the right engine having lost power, the drag on that side of the aircraft is increased, and increases quite quickly. The pressure on the left rudder pedal has to be increased to counteract that drag and maintain, as best the pilot is able, the heading of the aircraft. As I understand the evidence of the expert pilots who were called by the parties, on an aircraft of the type of VH-ANV, a failure of one engine would be expected to be immediately signalled by substantial increased foot pressure on the opposite rudder pedal.

95 One would expect then that the description of what Mr Penberthy felt and experienced would be consistent with that process, but he said that he felt a 'slight' pressure. He surmised that 'it appeared to be a slow, not an instantaneous, loss of power' (ts 806). Initially, he said, it was not a strong pressure (ts 807). But as I understand his evidence, the pressure

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very quickly became substantial and he said that the sensation was one which he had experienced many times when he was tested by one engine being shut down, and in a previous incident which had occurred by accident. The only difference, he said, was that, 'This one appeared to be slower than normal.'

96 When cross-examined he confirmed that the loss of power appeared to be slower than normal. It took perhaps a couple of seconds (ts 842). In that way, unlike a simulated engine failure, it was not an instantaneous engine failure occurring in 'zero seconds', but 'close enough to it' over a period of a couple of seconds (ts 845). Mr Penberthy would not accept that what he experienced was a reduction in engine power, but not a total engine failure.

97 The observation is, of course, a subjective recollection of a sensation, and I am not prepared to conclude, on the basis of that description, that what occurred was other than the failure of the right engine, particularly when one has regard to what was heard and seen by the air traffic controllers, Messrs Schraven and Murray, and others. Certainly, it is clear that Mr Penberthy commenced immediately, as he was obliged to do, to follow the procedure laid down in the manual to enable a pilot to cope with a loss of engine power on one side.

98 The procedure is invariably applied. It is designed to be an automatic response. In this aircraft it was to be followed, provided the air speed indicated on the dial was above 91 knots. I accept that it was about 100 knots. In addition, at the time of the engine failure, the landing gear must be up or in transition to up, and that was the case. The selector had been put in that position. For take-off, the propeller pitch levers will be fully forward, as will the throttles, and the fuel mixture levers will also be fully forward, as rich as possible.

99 The engine in difficulty being identified by the dead foot, dead engine indication, that throttle is immediately closed, the mixture is selected to the idle, or cut-off position, and the particular propeller is feathered so as to reduce the drag created by an inoperative propeller which is simply 'windmilling' in the air. The feathering process equalises the forces on the various surfaces of the propeller to reduce the drag.

100 Then, immediately, the aircraft is banked five degrees towards the operative engine, ie, in this case the left wing is dropped and the right wing raised. The air speed of the aircraft is set to what is regarded as the best single engine rate of climb, with the flaps in the take-off and

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approach position. For this aircraft, it would be sought to achieve an air speed of 109 knots, with the flaps up. This was never achieved.

101 The aircraft having been positioned correctly, and the inoperative engine having been identified correctly, the fuel to that engine is cut off, both in respect of the engine-driven fuel pump and the auxiliary fuel pump. The magneto is switched off and the alternator is switched off. The process is designed to deprive the engine of fuel and electricity, and to prevent fire. The manual concludes the process by advising the pilot to land, 'as soon as practical'.

102 The evidence supports the conclusion that Mr Penberthy quickly carried out these procedures designed to give the aircraft the best chance of climbing to a safe altitude of between 500 feet and 1,000 feet above the ground, to enable it to be manoeuvred so as to improve its capacity to return to the airfield and land safely, or to land on some other suitable open ground.

103 The process of coping immediately with the loss of power in one engine which I have described above is referred to as 'cleaning up' the aircraft. I am satisfied that the procedure was appropriately carried out by Mr Penberthy. As to what he did then and why, it is instructive to refer to his evidence-in-chief. He said:

I'm looking outside, and inside the cockpit the vertical speed indicator is showing nothing much at all. I'm looking outside. I see the powerlines and I have to make a decision. The aircraft is not climbing and I think to myself, 'I've got to make a decision quickly. What am I going to do?' On the self-brief it's to continue straight ahead, but under these circumstances I considered that that wasn't an option and I had to make a decision, a very quick decision in a matter of seconds, or fractions of a second, to pick an alternative. I can't turn to the right because of the build-up of houses in Leeming, so the option was to turn to the left (ts 808).

104 Having made the decision and, in my view almost exactly at the time when the turn was commenced, Mr Penberthy made the transmission, 'I've got an emergency, thanks. I'm going to have to come around.' As I have said, in my view the evidence is that the turn was commenced about five seconds after that transmission, and at about the time when it was acknowledged by Mr Murray in the tower. Mr Penberthy gave evidence that he said he had an emergency and commenced to turn to the left. He added:

If I left it any later, I would have been too close to the powerlines which would have meant that I would have had to increase the bank angle, which

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then would increase the G-loading, which would then lose part of the lift on the aircraft (ts 808).

105

It is certainly correct, as I understand the evidence, that the sharper the turn the more the aircraft's capacity to climb, using the power of the one remaining engine, is compromised. Mr Penberthy said that despite making his turn a gentle one, he could not achieve any appreciable rate of climb, and it was then that he told the tower that he needed to land. When he came to the point that he would need to turn more sharply to the left to line up with runway 30, it was clear to him that the consequence would be such a loss of altitude that it was unlikely that he would reach the runway. He therefore aimed for a grassy area near the weather station and, as I have said, there is a sharper left turn plotted between the radar confidence blocks 20 and 21, which is consistent with that effort, unsuccessful though it was.

106

In the very last seconds of the flight, at about the time when the second turn was completed and the aircraft was straightened up again in an attempt to combat the loss of height, Mr Penberthy thought the left engine was running rough. If that was so, he attributed it to an ignition problem, probably a lead or a spark plug breaking down because the engine was overheating as the airspeed was low. If that was so, it is clear that it was not detected by Mr Penberthy at any time before the terminal stage of the flight. It was no part of the emergency which initially arose.

107

At the end of the flight, Mr Penberthy effectively lost the capacity to fly the aircraft out of trouble, even maintaining the straight heading. He agreed that the loss of power and the loss of speed meant that altitude could not be maintained. The aircraft was so low to the ground that he could not lower its nose to increase speed and he could not reduce power, on the good engine, to assist the rate of climb.

108

When cross-examined, Mr Penberthy accepted that, having cleaned up the aircraft and reduced the drag at the point where it had achieved a height of about 100 feet above the ground, at which time the aircraft was achieving a rate of climb, if that was maintained, then, if the aircraft was flown straight ahead 'theoretically' it may have achieved a height of 300 feet above the ground, a height sufficient to enable it easily to clear the powerlines. He did not agree that he had turned left prematurely before a reasonable attempt had been made to see if that could be achieved. He emphasised that the time to make the decision was very short, and he added that under the stress of the moment a pilot's brain

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might 'turn to glue' (ts 828). There was no time for calm and orderly thought. It was an emergency.

109 Mr Penberthy said that he was not familiar with the use of parallax to aid a judgment about whether the aircraft might clear the powerlines. As I understand it, that refers to the fact that, the powerlines being closer to the pilot than the horizon, if, as the aircraft flew towards them they remained in the same position relative to the horizon, the likelihood was that the aircraft would hit them. If, on the other hand, as the aircraft flew towards the powerlines, they dropped below the horizon, the obstacle would be cleared. Finally, if, as the aircraft flew towards them, the powerlines projected further above the horizon, then it would be certain that the aircraft would hit the powerlines or have to fly under them.

110 When cross-examined by Mr McCusker QC, Mr Penberthy relied upon the speed with which he had to make the decision to fly on or turn left. He considered that his rate of climb, if any, was inadequate to clear the lines. He therefore turned left and, he said, although he did not have 'gethomeitis', he tended to agree that he did not think, at the time, that he might fly parallel to the lines, even if for 20 kilometres or so, to achieve a safe height, but his split-second decision was to endeavour to return to the airfield and land on a runway (ts 875 - 876).

The assessment of the pilot's conduct

111 Four pilots were called and asked questions about the handling of the aircraft when confronted with an emergency of the kind with which Mr Penberthy was faced. I have mentioned one of them, Mr Penberthy's senior pilot, Mr Hillier. He confirmed that Mr Penberthy had behaved correctly to clean up the aircraft. He then agreed that the climbing performance of the aircraft at about maximum take-off weight, with one engine feathered, would be marginal, but he also agreed that by executing a turn there would be a substantial loss of the rate of climb. He accepted that the turn to the left was a high-risk manoeuvre, but he made the obvious point that whether it was a necessary manoeuvre depended upon what other options the pilot had.

112 But Mr Hillier did agree that the aim was to achieve a safe height of about 500 feet above the ground, or more. Only then would it be regarded as practical to endeavour to turn the aircraft to return to the airport because to turn the aircraft would inevitably involve a loss of speed and would compromise the rate of climb. He was prepared to accept that if a turn was necessary to avoid an obstacle, the pilot should turn to the least extent possible. When it was put to him that the best option would then

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be to fly parallel to the powerlines in an endeavour to gain height, Mr Hillier said that this would be 'an option' but, he said, the pilot could not assume that the good engine would continue to operate at full power.

113 For my part, it would seem to me that the pilot should take the safest course to deal with the emergency on the basis that one engine was continuing to operate properly. Of course, that response might have to be abandoned if, indeed, the remaining engine did fail, an event which, as I understand it, would leave the pilot no option but to glide to a landing on the clearest ground which was immediately available. But I cannot see the justification for taking a course which inevitably compromised the aircraft's capacity to fly and gain height on the basis that some further emergency might occur by the loss of the remaining engine, on top of the emergency with which the pilot was already confronted.

114 The plaintiffs called a Mr MacGillivray. He was both a very experienced pilot, fully familiar with the Cessna 404 aircraft, and an aeronautical engineer. I shall return to this witness later in respect of his engineering expertise, but for the moment it is sufficient to refer to his evidence as an expert pilot. As he was the first such witness, some considerable time was spent with him in adducing evidence which was designed to give me an understanding of the processes involved in flying an aircraft, and how the performance of a twin-engine aircraft is affected when one engine fails. I have drawn on that evidence already.

115 He also gave evidence about what must be done, quickly and effectively, to clean up the aircraft and compensate for the failure of one engine. I need not discuss those matters here. I have already said that, having regard to this evidence and the evidence of other like witnesses, Mr Penberthy behaved completely correctly as soon as he was confronted with an engine failure at and about the time of take-off, with the aircraft exceeding the decision speed of 91 knots, and the landing gear retracted or in the process of retraction at the time of the engine failure.

116 Mr MacGillivray confirmed that, having cleaned up the aircraft, the object was to maximise the rate of climb, so far as that was possible, because the failure of one engine severely limited the aircraft's capacity in that regard. He agreed that a 'safe altitude' at which it might be regarded as practical to endeavour to turn the aircraft and return to the airfield was no less than 500 feet above the ground.

117 He explained that the reason for that was that, as the aircraft was turned, the rate of climb and the capacity to maintain airspeed was

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inevitably compromised, and so one needed some margin, by the time the aircraft was lined up for a landing, to regain some lost speed and hold height, to ensure that the landing was achieved safely. Loaded as it was, Mr MacGillivray said this aircraft would not climb unless the air speed was about 100 knots or more. The aircraft's stall speed would be 83 knots. At 105 knots, the aircraft would be enabled to achieve its best angle of climb in the circumstances, in an effort to clear any obstacle ahead of it.

118 For reasons I have already given, I do not propose to discuss the views of this witness or other witnesses about whether Mr Penberthy was prudent to commence the take-off run opposite the taxiway Delta, rather than at the downwind end of the runway, at taxiway Charlie. As I have said, it is not a material consideration, in my view, in relation to the issues before me.

119 Mr MacGillivray was of the view that having taken off, having encountered the problem, and having cleaned up the aircraft by the time he achieved a height of about 100 feet above the ground, Mr Penberthy's best option was to fly straight on and, in all probability, Mr MacGillivray thought he would comfortably clear the powerlines. Mr MacGillivray took a helicopter flight around the area which broadly encompassed the supposed track of the aircraft. He said that, having now performed that visual inspection, although he wisely did not attempt to reconstruct the flight of VH-ANV, he thought that, at about the point where the aircraft would have been cleaned up, at 100 feet above the ground, the pylons did look 'fairly high'.

120 My impression was that at that point, Mr MacGillivray conceded, the powerlines might present as a rather daunting obstacle in front of the aircraft. Mr MacGillivray made the valuable point that it is, after all, a matter for the judgment of an experienced pilot. The decision needs to be made relatively quickly, and although the accepted practice, for reasons which I have already mentioned, is to eliminate all unnecessary manoeuvring following an engine failure, if an obstacle must be avoided, in the judgment of the pilot, then a turn will be required. In that event, the manoeuvring of the aircraft should be kept to a minimum, at least until the relatively safe height of 500 feet about the ground is reached, because of the inevitability that the turn would reduce the rate of climb.

121 Mr MacGillivray suggested that a minor turn to the left would have enabled the pilot to clear the powerlines at the midpoint between two towers, where the powerline would be at its lowest. But he also said that

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the pilot should work on the basis that the obstacle should be cleared by a minimum of 50 feet, to give an acceptable margin of safety. Mr MacGillivray seemed to be more confident about the capacity of the aircraft to fly safely on a course parallel to the powerlines. He detected no significant obstacles if the flight path was extended out to 15 kilometres, by which time, Mr MacGillivray thought, the aircraft should have achieved a safe altitude and a shallow turn could have been commenced to position the aircraft for a return to Jandakot airport and, no doubt, a landing on runway 30.

122 All of that was, however, predicated upon the proposition that the aircraft could be trimmed appropriately and, as Mr MacGillivray thought possible, at an air speed of 105 knots, the best single-engine angle of climb speed was achieved. Indeed, Mr MacGillivray thought that an airspeed of 96 knots, which was certainly, at one point, achieved by the aircraft even during its left turn, would have enabled a slow, but steady, rate of climb.

123 Mr MacGillivray agreed with Mr Langmead SC that in the circumstances which confronted Mr Penberthy, a positive rate of climb was a very precious commodity, easily squandered by a turn, which was therefore something of a last resort. The parallax process was discussed with him. Mr MacGillivray thought that was something which all experienced pilots would use. Specifically so far as this case was concerned, Mr MacGillivray thought Mr Penberthy's decision to turn was made too early, when the probability was that if he continued in a straight line, the obstacle of the powerlines would have been cleared comfortably (ts 489).

124 Mr MacGillivray was very cooperative in the process of cross-examination. He certainly agreed readily with the propositions that Mr Langmead put to him. In the end, his opinion is perhaps encapsulated by the propositions that Mr MacGillivray could 'half forgive' the pilot for the first turn because, 'as a pilot myself, those powerlines do look pretty high, I've got to say' (ts 571). However, Mr MacGillivray readily agreed that the second turn was 'absolutely unforgiveable' because it made the crash inevitable. Further, at ts 571, Mr MacGillivray said he would have delayed the first turn. He would have got closer to the powerlines before making that decision.

125 The second defendant, Mr Barclay, called Mr Chew. Again, he is an enormously experienced and full qualified commercial pilot. He has been licensed since 1980 and has performed a variety of roles, including as an

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instructor and testing officer for other pilots. He has accumulated a total flying time of about 17,600 hours in the nearly 30 years he has been flying. Over 6,000 hours flying time have been in Cessna 400 series aircraft, including the C404.

126 His evidence as to the steps to be taken if there was a reduction or loss of power on take-off, the run-up process having been completed, because the aircraft has become airborne, the air speed of 91 knots has been achieved and the landing gear has been retracted or is in the course of retraction, was generally the same as other witnesses. There were marginal variations only. For example, Mr Chew said specifically that the best rate of climb speed for the aircraft was 102 knots with the flaps in the take-off and approach position, climbing to 108 knots with the flaps up. Mr Chew said that if the right engine failed just after take-off, there would be a distinct yaw to the right which would itself be noticeable, he thought, in the aircraft, by passengers as well as the pilot who would, of course, also be aware of the problem by the dead foot, dead engine phenomenon.

127 Mr Chew thought, as I think did Mr MacGillivray, that if the engine failure occurred at take-off and the aircraft achieved the height of 100 feet above the ground while the pilot was in the process of cleaning up the aircraft, there was no reason why that rate of climb could not be maintained on one engine once the correct configuration for the aircraft had been achieved.

128 He did not, however, appear to me to be as sanguine about the prospect of clearing the powerlines as was Mr MacGillivray, although he said that in the self-brief he would not expect the pilot to take the powerlines into consideration, having regard to where they were in relation to the airport. He made a calculation which enabled him to conclude that the gradient required to clear the obstacle with safety, adding a margin of 100 feet, would have been just under 2%, but even so, in his report, exhibit M, Mr Chew said:

After becoming airborne and experiencing an engine failure with the aircraft at an altitude of around 200 feet a turn away from the obstacle was necessary. This turn should have been the minimum necessary to avoid or to parallel the powerlines. Continued straight flight would then have maximised any climb available and got the aircraft to a safe height of 500 to 1,000 feet in order to commence a return to Jandakot.

129 A question was put to Mr Chew about what the pilot's decision ought to be in the situation which confronted Mr Penberthy, 'when he had doubts, but not confirmed incapacity to clear the powerlines.' Mr Chew

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answered that it was, 'a very hard decision' (ts 1075). He said it was certainly better to turn to the left when the right engine had failed, and he explained why. He then gave the following evidence:

In terms of the wisdom of any turn at all, as you have done a rough calculation and formed the view that he would have cleared the powerlines, let me ask you a prior question. When an aircraft is approaching something like a powerline, does the pilot have any means of ascertaining visually whether he is likely to clear it or not?---There is an illusion, I guess, when you're flying that you can look like you're going to hit it and you actually miss it by a considerable amount.

But is there a point at which there is still room to turn away if you are going to hit it that you could approach the powerlines and form a clearer view of whether you are going to clear them or not?---I think that's a bit difficult to quantify really. If you are 100 feet there and you're aware of those powerlines being another 100 feet above you, there is the temptation to turn away from them initially (ts 1075).

130

Mr Chew was then asked to what degree the aircraft should have been turned. He firmly expressed the opinion that once the aircraft had turned away from the obstacle presented by the powerlines and was on a heading which did not present any further obstacle for some kilometres, the best choice was to fly the aircraft straight ahead to allow its marginal climb performance of 200 - 300 feet a minute to establish itself, once the performance of the aircraft had been maximised, until a safe altitude was achieved.

131

Mr Chew gave evidence and did some calculations to demonstrate how there would have been added capacity to abort the flight and pull up the aircraft if the whole of the runway had been used for the take-off run, and there had been a noticeable loss of power or reduction in power in one engine prior to the point of take-off, or indeed even shortly thereafter, but as I am not prepared to find, on the balance of probabilities, that the problem with the right-hand engine did occur at that stage, I will not discuss this evidence.

132

Certainly Mr Chew agreed, and all the evidence was one way, that if the problem emerges at or after the point of take-off when, as I find in this case, the aircraft is airborne and the landing gear is at least in the process of retraction, the first seconds after the emergency arises are critical. The pilot is trained to follow the procedures in the manual. He is not then to carry out a process of troubleshooting in an endeavour to fix the problem. He must immediately clean up the aircraft and position it correctly so as to

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restore, to the extent possible, the capacity of the aircraft to gain speed and height, which capacities will have been severely compromised.

133 On the other hand, a pilot who acted in the manner required, quickly and decisively, could reduce the degree of the yaw which would be caused by the failure of the engine and could more quickly restore directional stability to the aircraft. For this aircraft, loaded as it was, Mr Chew said that a speed of 102 knots would be a 'performance speed'. The plane would be able to be flown and could achieve a meaningful rate of climb on one engine once the retraction of the landing gear and flaps had been achieved.

134 The first and third defendants called Mr Lovegrove. Again, he is highly qualified and has a very great wealth of experience, not only as a professional pilot, but as a flight instructor and tester of others. He has flown in airline operations, charter work, coastal surveillance, corporate jet work, aerial survey work, aerial mustering, aerial ambulance and international medical evacuation operations. During a career which spans 44 years, he also has accumulated the enormous amount of 16,000 flight hours, of which in excess of 1,700 hours have involved the 400 series Cessna aircraft, including the C404.

135 Mr Lovegrove was also taken to the question of starting the take-off run at Delta rather than Charlie. While he agreed that it was a counsel of prudence to use all the available runway in case the take-off had to be aborted before it was completed, as I read his report he is of the opinion that what is known as the 'accelerate stop distance', the distance which is the maximum required to bring the aircraft to a halt if the flight has to be aborted as the aircraft approaches the decision speed, was less than the distance available on runway 24R when the roll-up was commenced from taxiway Delta.

136 However, as I have said a number of times, in my view, the evidence does not support the conclusion that the loss or reduction of power in the right-hand engine was or ought to have been experienced prior to the point when the take-off was completed and the aircraft was in flight. In any event it would appear, again, that although a counsel of prudence was to start the roll-up at taxiway Charlie, on any view of the evidence, failure to do so did not adversely affect the capacity to bring the aircraft to a halt while it was still on the ground.

137 Mr Lovegrove was asked to address the question whether Mr Penberthy erred by not flying ahead once the aircraft had been cleaned

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up, in an endeavour to clear the powerlines. He severely doubted whether the aircraft could meet what he calculated to be the required average rate of climb to clear the obstacle safely. He doubted that, regardless of Mr Penberthy's skills, 'he would have been able to configure the aircraft at optimum lateral and longitudinal attitudes within the time it took to cover the distance to the obstacle.' As has been seen, that was certainly Mr Penberthy's reaction.

138 Mr Lovegrove made some calculations, which I must say I found a little difficult. I can follow him in his reasoning that from the point where the loss of power in the right-hand engine was experienced, to the point where the aircraft was cleaned up, would have been that initial part of the flight during which the aircraft achieved a height of about 100 feet above the ground. I agree with Mr Lovegrove that it appears, having regard to all the evidence, that the aircraft commenced to turn left almost immediately after that point was achieved. Mr Lovegrove says that at that point the aircraft was 1,950 m from the powerlines. On my calculations, it would have been 1,900 m to the pylon which is numbered 199.

139 Mr Lovegrove says that the 'spot height' is given as approximately 246 feet above mean sea level, but on the evidence of the photomap, the height would be 227 feet above mean sea level. Given that at the runway threshold the height is calculated to be 94 feet above mean sea level, that would place the top of the pylon 133 feet above the elevation of the runway threshold. If that is right, the aircraft had only to achieve an increase in its altitude of some 33 feet, plus the 50 feet which is generally agreed by the witnesses to be the appropriate safety margin. If one rounds that off to 100 feet, that appears to be about the increase in altitude calculated by Mr Lovegrove to be required, using figures different from those which appear to me to apply.

140 However that may be, Mr Lovegrove's doubt appears substantially to be a doubt that anything like the initial rate of climb could be maintained by the aircraft, once it was cleaned up and positioned appropriately to reduce the drag to the extent possible, and optimise the rate of climb. A substantial ground for that doubt appears to be the age of the aircraft, VH-ANV having been manufactured in 1981 and registered as at 1 June 1981, leading to a degree of streamlining impairment and performance degradation. In addition, Mr Lovegrove refers to the undoubted fact that the aircraft would appear to have been modified and additional aerals fitted.

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141 When these matters were put to other witnesses, the proposition attracted no support, and I must say that the proposition that the aircraft's performance capacity would have been materially reduced, having regard to the matters mentioned, does not seem to me to be a proposition which should be accepted.

142 Further, Mr Lovegrove says that in his view there is another reason why it cannot be supposed that, having been cleaned up, the aircraft would be capable of achieving the rate of climb demonstrated in the first period of straight flight between take-off and the almost simultaneous failure of the engine, and the point where the left turn was commenced. During that period, he says, the aircraft, despite the fact that the drag and yawing occasioned by the failure of the engine would be at its greatest, would have the advantage of what he describes as a component of initial inertia. By that I understand him to mean that the aircraft would have a tendency to move forward at the take-off speed and angle of attack even though the thrust of the engines in total would have been severely reduced by the failure of one of them.

143 This was not a proposition, as I recall it, put to Mr MacGillivray, but when it was put to Mr Chew he disagreed with it and, for my part, I think the proposition is not demonstrated to have merit. As I have said, at the point of initial failure of the engine, the aircraft's forward thrust and its capacity to climb is at its worst until the pilot, over the course of about 10 seconds, follows the procedures which are mandated to reduce the drag and position the aircraft so that it has the best chance of achieving an appropriate speed and rate of climb, relying only upon one engine. That point having been reached, I can see no reason why an experienced pilot, such as Mr Penberthy, having achieved an optimal configuration of the aircraft, may not be able to rely upon its admittedly severely compromised capacity to climb, using the power of the one remaining engine.

144 However, in a real sense this is a debate about the wrong question. The matter for my decision is the reasonableness of the decision to turn left and, having done so, the extent to which that turn should have been pursued, or whether it should have been abandoned and straight flight resumed, at the latest when the aircraft was brought to a heading which enabled it to fly parallel to the powerlines.

145 As to that, in his report, exhibit K, Mr Lovegrove summarises his conclusion in the following way:

It is quite possible that on completion of the initial left turn the pilot recognised the inevitable requirement to trade height for speed and realised

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the only avenue available was to attempt a landing on the flat ground on, or adjacent to the airport runways.

It is my opinion that the pilot was confronted with unusual circumstances and was presented with the unenviable position of having to decide the best option available to him in a situation where the circumstances encountered were not as predicted or prescribed.

In the situation as described in the transcripts of statements and subsequent cross examination, Captain Penberthy's actions, although not standard, were an alternative to a set procedure which was clearly performance challenged and in the circumstances could be considered the best option.

146 When cross-examined, however, Mr Lovegrove made certain important concessions. He agreed that having reached the point where the aircraft could fly parallel to the powerlines, the prudent course was to fly straight ahead and seek to climb, before attempting to land. He said, 'It would be the course that I would have thought that a professional pilot would have taken' (ts 941). He agreed the pilot should have just flown straight at that point, to see if he could attain a safe altitude, even if it took 10 to 20 kilometres to get there (ts 942). That would be the course to be taken unless the appropriate speed could not be achieved and the aircraft continued to descend. The question was debated with the witness at some length, using exhibit 136, the map upon which Mr Roberts had plotted the flight path of the aircraft and its speed and height - see ts 944 et seq.

147 Ultimately, I think it remained the case that the witness agreed that the best prospect of increasing the speed of the aircraft, and therefore of increasing its capacity to climb, was if the turn was ceased and the aircraft was straightened up. Where that appeared to have occurred, to a very minor extent, it appeared that the speed of the aircraft through the air did increase somewhat. Mr Lovegrove finally remained of the view that there was some indication that the aircraft retained the capacity, marginal though it was, to climb in straight flight, and that appeared not to have been adequately tested.

An investigation is conducted

148 There was, of course, an immediate investigation into the crash of the aircraft. It was conducted by officers of the Australian Transport Safety Bureau, the ATSB. It commenced on 11 August 2003, subject to the provisions of the *Transport Safety Investigation Act 2003* (Cth), which contains various secrecy provisions which limit the disclosure in court of restricted information, which is widely defined in s 3 of the Act. Such information may, however, be disclosed in civil proceedings where the

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ATSB issues a certificate stating that the disclosure is not likely to interfere with any investigation: s 60(5). Various certificates of that kind were issued in relation to this investigation, and various types of restricted information.

149 In addition, before disclosure may be made, the court must order such disclosure. It may do so under s 60(6):

[i]f the court is satisfied that any adverse domestic and international impact that the disclosure of the information might have on any current or future investigations is outweighed by the public interest in the administration of justice, ...

It is sufficient to say that in this case I was so satisfied, and ordered the disclosure of all relevant restricted information.

150 The evidence establishes that the engine and other parts of the aircraft were transported from the crash site to a building at the airport. No doubt that was a process which may have involved some shaking about of the right-hand engine. Having been stored for a fortnight in that building, on 25 August 2003 the right engine was carried by forklift to a workshop at Jandakot airport, to be stripped down and examined. It was disassembled under the supervision of Mr C Roberts, a senior transport safety investigator with the ATSB.

151 Much of the work was done by a Ms Feaver, a licensed aircraft maintenance engineer. She gave evidence. While she recalled generally that she dismantled the right engine-driven fuel pump, having removed that item from the right engine, she did not remember specific detail of the process.

152 In particular, although she believed she would have secured the pump to a test bench, and although she believed she would have attempted to move the spindle using a screwdriver, she did not recall whether she was able to turn the spindle to any degree. She remembered saying, 'My test bench will not move this pump,' but she thought that was probably a prediction as to what might happen, rather than a statement about her failure to move the pump, a matter about which she had no recollection. Her evidence was of no assistance in determining what happened.

153 Mr Roberts had a better recollection of the process which was carried out under his supervision. But before I deal with that, it is necessary to understand something about the nature of an engine-driven fuel pump. Each of the twin engines has such a fitting, mounted on what I would

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describe as the back of the engine, opposite the propeller boss. In addition, each engine is fitted with an auxiliary fuel pump which is not driven by the engine, but driven electrically. That pump on this aircraft is, as I understand it, ordinarily kept in the low position because otherwise, if operating fully at the same time as fuel is being supplied to the engine by the engine-driven fuel pump, the total fuel supply may be too rich and the engine caused to be in difficulty because it is flooded with fuel.

154 However that may be, the ordinary fuel pump is, as I have said, engine-driven by gears operating off the crankshaft. The component parts are secured to the engine housing by bolts. The crucial part, which causes the pump to operate by rotating a spindle, is called a drive pin. It is square at each end and for most of its length, but is divided in the middle by a narrower, drumlike segment, which is the sacrificial point of the drive pin, designed to break and so stop the pump operating when the torsional resistance, for some reason, exceeds 20 - 24 foot pounds of force.

155 The end of the drive pin toward the engine fits into a housing in a rotating cog, imparting rotation to the pin. The other end of the pin fits into a corresponding housing in the pump shaft or spindle. All being well with the operation of the pump, it can be seen that the operation of the engine is transmitted into the pump by the link between the engine and the pump shaft, which is supplied by the drive pin. The sockets into which each end of the drive pin fit are so engineered that the fit is not completely snug. There is some play to accommodate different rates of expansion when the pump is in operation.

156 The spindle shaft is supported by a sleeve-bearing mounted in the body of the pump. Again, there is designed to be some play between the shaft of the spindle and the bearing which supports it. That is because the pump is lubricated at this point, which is sealed off from the provision of engine oil, by the fuel which is pumped through the pump. The auxiliary pump is used to prime the engine-driven fuel pump with the intention of minimising wear in that pump when the engine is started, until fuel is pulled into the engine-driven fuel pump and that pump commences its ordinary operation. As I have said, the auxiliary pump is operated at the low setting during take-off and is to be turned off during a flight. It is operated manually. As I understand it, if there is a fuel failure during take-off, as distinct from during the flight, the auxiliary pump is not of itself to be used to restore fuel to the engine in question and enable it to restart.

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157 As to the play which the design incorporates between the shaft of the spindle and the sleeve, the tolerances are small, and if reduced for any reason, the capacity of the fuel to provide effective lubrication will be reduced, friction will be increased and it may be that the pump will seize, the drive pin will fracture at the sacrificial point and the pump will cease to operate, immediately depriving the engine of fuel, causing immediate loss of power and the effective failure of the engine. That may also occur without seizure of the pump if the frictional resistance to its operation increases the torsional resistance to the point between 20 and 24 foot pounds where the drive pin is caused to fracture.

158 Ordinarily, the pump operates by the work done by sliding blades or vanes which fit into slots in the head of the spindle, or pump shaft, in such a way that they may move backwards and forwards in the slots, at right angles to each other, within the eccentric chamber of the fuel pump, so as to cause the fuel to be pushed out under pressure by the pump into fuel lines, directing it through throttle and mixture controls via the engine manifold to the cylinders of the internal combustion engine. I add finally that, over the head of the pump shaft, there is an end plate secured to the pump housing by the bolts to which I have referred, indirectly by the pressure those bolts exert in securing this end of the pump to the part of the engine which incorporates the fuel lines through which the fuel flows.

159 I hope that description of the fuel pump and its operation enables an understanding of the crucial importance to the proper operation of the engine which the effective operation of the fuel pump has. If the drive pin fractures at the sacrificial point, there is an immediate loss of fuel to the engine and it stops. The propeller will continue to rotate relatively slowly - the process I have previously referred to as windmilling. As I have pointed out, that will increase the drag which will inevitably be felt by the aircraft until the propeller is feathered, which, as I understand it, will reduce the drag, but will not of course eliminate it, because of the loss of thrust by the affected engine. In what I have written above, I have found it convenient to draw heavily upon the evidence of Mr MacGillivray, who is a qualified aeronautical engineer, as well as being a highly qualified commercial transport pilot with many years experience. He was fully familiar with the Cessna 404 Titan aircraft.

160 I return then to what occurred, so far as it can be ascertained, in the workshop during the process of investigation of the right engine of VH-ANV, and the disassembly which took place in the workshop in 25 August 2003, under the supervision of Mr C Roberts. In the first place, the engine was mounted onto a work stand by its propeller boss. That

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would cause the fuel pump to be uppermost on the engine. It is not known to what extent the engine may have been shaken up when it was transported from the crash scene to the storage building, from thence to the workshop and when it was mounted on the propeller boss.

161 The engine was then physically rotated while the fuel pump was still attached. The reason why that was done does not matter, but the effect would be to impart a rotational movement through the drive pin to the spindle shaft of the pump. If the spindle shaft was, at that time, seized in the sleeve or otherwise in the pump housing, it would be expected that the drive pin would break. The rotation which occurred was somewhere between one and six revolutions. If there was resistance in the pump it would be unlikely to be felt, in my view, because of the weight of the engine. That number of rotations of the engine would rotate the spindle shaft the same number of times, if it was still connected to the engine by the drive pin.

162 The pump was then removed from the engine, and when that was done it was seen that the drive pin was fractured. Half of it was in the pump and half remained in the drive gear of the engine. When the connecting piece was removed and inverted, this half of the pin dropped out. There was nothing, upon visual examination, to establish when the drive pin may have broken.

163 Mr Roberts' statement of evidence says this:

Ms Feaver attempted to rotate the EDFP (engine drive fuel pump) by hand as part of her examination by using a gear in the workshop and an intact drive pin (not the fractured drive pin belonging to the EDFP). Ms Feaver was observed to be experiencing resistance while attempting to rotate the EDFP and was only able to gain a small amount of movement of the spindle shaft of about 5 to 10 degrees.

164 When cross-examined, Mr Roberts conceded that he was unable to confirm either that there was resistance to rotation of the spindle shaft from within the pump housing, or that Ms Feaver was able to overcome the resistance to the degree described, but it is of no moment, I think, because the important thing, for my purposes, is that, by then, the drive pin was found to have fractured and both halves of it had been removed. If there was resistance to the rotation of the spindle shaft, and if, despite that, the shaft was rotated to some extent, that would not be unexpected, but it does not help me decide when the drive pin fractured, which, at the latest, must have been during the rotation of the engine on the mounting,

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if the drive pin was not already fractured as a result of a mishap on take-off.

165 The pump was then disassembled and the process was photographed. It is very evident that in the interior of the pump, in the end plate port, but not in the chamber itself, where the head of the spindle holding the vanes rotates, and under the end plate which covers that area, there was blackened and burned material. Mr Roberts took possession of it. He said that it was not metal, and indeed it was later established by an analysis performed by a metallurgist, Dr Romeyn, to be what he described as carbonaceous material, the chemical composition of which was consistent with it having originally come from the flexible hoses which were joined to the fuel pump to provide fuel into the pump and which, when burnt in the fire, were capable of causing material of that kind to be introduced into the pump chamber. In addition, the gasket under the end plate had been entirely destroyed in the fire.

166 If that material provided resistance to the rotation of the spindle and the vanes before or after the pump had been removed from its housing, it might be consistent with a degree of movement before the resistance to rotation became sufficient to fracture the drive pin. Of course, the carbonaceous material could only have been introduced into the pump at the time of the fire after the crash.

167 Dr Romeyn performed some experiments, introducing abrasive paper into a pump chamber and catching it between the vanes and the eccentric chamber walls, and between the top of the spindle and the end plate. He was able to establish that the resistance provided by material of that sort in that general location was capable of either stopping the rotation of the spindle, or increasing the resistance to rotation sufficiently to require a torsional force of 20 - 24 foot pounds, sufficient to fracture a drive pin. In other words, it is possible that the debris of that character in the pump chamber could produce sufficient resistance to rotation to fracture the drive pin. But, of course, that is not to say that it happened in that way.

168 As to that, when the pump was dismantled by removing the end plate, exposing the pump chamber and the reciprocating vanes, the vanes could be manipulated by hand and moved quite freely. When the pump was inverted, the vanes dropped out. Mr C Roberts made no reference to any material being caught up between one or more of the ends of either vane and the eccentric wall of the pump chamber.

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169 However, the spindle itself did not fall out. But it came out easily when it was tapped out. To me that does not suggest that there was any substantial resistance to rotation of the spindle at that point. But what resistance there was must have been between the shaft of the spindle and the sleeve inside the pump chamber, or between the head of the spindle and that section of the eccentric pump chamber which is closest to it. The latter seems improbable to me.

170 One other occurrence should be noted. In the pump housing there is a locator pin which serves to position the end plate properly over the chamber. If that is regarded as the position of 12 o'clock on a clock face, the photographs of the end plate, through holes in the plate, and of the head of the spindle with the vanes in place when the end plate was removed, appear to me to show the vanes in the positions 2 o'clock, 5 o'clock, 8 o'clock and 11 o'clock. I am unable to see that the vanes have moved in the process of removing the end plate.

171 After the end plate was removed, Dr Romeyn noticed that on the underside of the plate which, when the pump was assembled, would be immediately adjacent to the head of the spindle and the upper surface of the vanes, there are what are described as 'witness marks'. These are marks lighter in appearance, where the underside of the end plate does not appear to have been discoloured by the burning of carbonaceous material in the fire after the accident. The marks correspond with the upper surface of the vanes, and so they represent the position of the vanes immediately after the crash, when the fire occurred.

172 Again, taking the locator pin as the position of 12 o'clock on a clock face, the witness marks appear to show that at that time the vanes were positioned 3 o'clock, 6 o'clock, 9 o'clock and 12 o'clock. Comparing the position of those marks to the position where the vanes were ultimately observed, shows that after the fire and before the end plate was removed, the spindle and the vanes were rotated 60° if the spindle was rotated in a clockwise direction and 30° if the spindle was rotated in an anticlockwise direction. As Dr Romeyn noted, there was evidence in the way of carbonaceous staining on the underside of the end plate which suggested that the rotation which occurred was not a full rotation, but only a partial one.

173 All of that evidence seems to me to be consistent with the following. When, while the pump was connected to the engine, the engine was rotated some six times and therefore when, if the drive pin was intact, the spindle would be rotated up to six times, the evidence would suggest that

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the spindle was not rotated for even one full turn or there would be smearing of the carbonaceous material around the whole of the inner surface of the end plate. That is consistent with the fact that, as was the case when the pump was removed, the drive pin which was originally installed, was by then fractured, or that it fractured almost immediately after the start of the first rotation.

174 When that drive pin was removed and the pump was removed, and a new drive pin and gear was inserted, the spindle may have been rotated a partial revolution, although there was resistance from the carbonaceous material deposited at the time of the fire. It may be that partial rotation which accounts for the different position of the vanes from the position revealed by the witness marks, but that has nothing to do with the process by which the drive pin was fractured.

175 Mr Blyth is a senior transport safety investigator with the ATSB. I note his evidence that in the course of his examination of the fractured drive pin, which, like the other component parts of the fuel pump, had a light coating of oil on the surfaces, he cleaned both halves of the pin in an ultrasonically agitated bath, initially in a petroleum spirit solution and finally in an acetone solution. I may need to return to the significance of this process, which involved no rubbing across the surface of either half of the fracture of the drive pin.

The replacement of the sleeve bearing

176 A further step in the investigation of the crash was the consideration of the sleeve bearing mounted in the pump housing and supporting the rotating spindle shaft. It does not matter, for present purposes, why attention was directed to that particular component of the pump, but it is here that the defendant, Mr Barclay, should be introduced. He is an aeronautical engineer employed by Aeronautical Engineers Australia Pty Ltd.

177 In that capacity he was appointed by CASA as a person authorised, within the meaning of the *Civil Aviation Regulations 1988* (Cth), to perform a wide variety of maintenance work on aircraft and their component parts, including the replacement of parts. In addition, under reg 35 and reg 36, relevantly to this case, Mr Barclay was authorised to approve the design of a modification or repair of an aircraft component part, and to authorise the making of the modification or repair of an aircraft component and its fitting to a particular aircraft. Mr Barclay was authorised to approve an aircraft component to be a replacement for another aircraft component.

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178 It is admitted by all defendants that in July 2000, in the course of the maintenance of the aircraft, Mr Barclay, through his corporate employer, was engaged to advise whether the sleeve bearing within the fuel pump in question could be replaced by a bearing which was locally manufactured. Mr Barclay advised that it could be replaced locally, and that he could design the replacement sleeve bearing, which he then proceeded to do. He drafted the appropriate engineering order, which included a design drawing for the replacement sleeve bearing, and specified that it was to be manufactured in aluminium bronze. The original sleeve bearing manufactured by the maker of the aircraft was made of high-leaded tin bronze, not aluminium bronze.

179 The engineering order did not specify the type of finish required for the internal surface of the sleeve bearing. Mr Barclay, then in his role as an authorised person under the *Civil Aviation Regulations*, approved his engineering order and design.

180 That was provided to the company performing the maintenance work on the aircraft which commissioned the manufacture of the aluminium bronze bearing in accordance with the engineering order, but with a coarse honed finish on the internal surface of the bearing, as opposed to the smooth finish of the original bearing. The manufactured bearing was then installed in the fuel pump which, on 18 October 2000, was fitted to the right-hand engine of the aircraft. By the time of the accident on 11 August 2003, the pump had been operating with this bearing for some 1,353 hours without causing any concern or malfunctioning in any way.

181 For the plaintiffs, two expert witnesses were called to give evidence about the suitability of the replacement sleeve bearing. One was a Mr Barton, an aeronautical engineer and the holder of a BSc in aerospace engineering. He is highly qualified and has very great experience with the engine of the Cessna 404 twin-engine aircraft. He was formerly, for many years, employed by the American company which designed and manufactured the engine. He became vice-president of engineering and chief technology officer of the company. He gave his evidence by video-link from Mobile, Alabama, in the USA.

182 He confirmed that the original sleeve bearing was made of high-lead bronze, and he expressed the opinion that aluminium bronze would not be a proper substitute material. The difficulty, as I understand his evidence, is that the aluminium bronze component would be too hard and would have a reduced capacity to absorb into the material any foreign metallic substance. That would create the risk of galling of the surface of the

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bearing, by which, as I understand it, is meant the adhesion of foreign material on the metal surface, creating small ridges or lumps. That reduces the clearance between the sleeve bearing and the shaft of the spindle, and reduces the capacity of the fuel in the pump to lubricate the bearing.

183 Ultimately, that may lead to increased friction and resistance to the rotation of the spindle shaft. Finally, the shaft may seize in the bearing, but whether or not there is, at least momentarily, seizure of the pump, the friction may cause torsional resistance sufficient to cause the drive pin to fracture and to disable the pump and the engine. In addition, not only is the leaded bronze softer, with better capacity to embed foreign material in it, but it has a higher capacity to self-lubricate, a quality which tends to prevent wear and tear and frictional resistance in the initial period of operation of the pump before the fuel is sufficiently introduced into it to act as a lubricant. Finally, the roughness of the surface of the sleeve bearing, compared to the highly honed finish of the original article, would itself have the capacity to increase the friction in the bearing.

184 The leaded bronze bearing was designed to remain serviceable for a minimum of 1,600 hours and, in any event, the manufacturer's specifications for the pump would require its overhaul and probable replacement after a period of 12 years. As I have mentioned, the bearing in this pump, which was installed to the design and with the approval of Mr Barclay, did not meet the minimum standard of serviceability. But Mr Barton did not say in evidence that the aluminium bronze bearing would inevitably fail within the period, or that it could not meet the standard of serviceability specified. His evidence focused upon the characteristics which the aluminium bronze bearing had, but the leaded bronze bearing did not, which increased the chance of failure, and which I am satisfied an experienced aeronautical engineer having the CASA certification which Mr Barclay had, should have known.

185 Similar evidence was given by Mr MacGillivray, calling upon his experience as an aeronautical engineer. He observed that an engineer in the position of Mr Barclay, called upon to give the advice and provide the design, as he was, would firstly have determined, if necessary by seeking expert metallurgical advice, what the composition of the original sleeve bearing was. It is only if that was known that the engineer would be able to determine whether the proposed substitute would have the qualities which would enable the new component to function in a manner equal to or better than the original part, with an expected life at least equal to the original part.

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186 I accept that evidence as to the approach which Mr Barclay should have adopted. It is evident that either he did not properly investigate what was the nature of the alloy from which the original sleeve bearing was made, or, if he did appreciate that he was specifying the use of a different alloy, he did not ensure that it had the properties of the original design to increase the efficiency of lubrication, reduce friction in the bearing, and increase its reliability by reducing the risk of failure. I was told that Mr Barclay was available, but he was not called to give evidence.

The consideration of expert evidence

187 The evidence in this case was, as has already been seen, given substantially by persons who were experts in various fields. I am now about to embark upon the consideration of yet another matter upon which the court was informed by expert evidence, and that is the metallurgical investigation which was undertaken in relation to various aspects of the right engine-driven fuel pump and its component parts, particularly, of course, the broken drive pin.

188 The principles to be applied are clear. There was no argument about them before me, and I therefore do not consider it to be necessary to discuss these matters in detail, and to support that discussion by the citation of relevant authority. However, I should state the principles shortly, before commencing to discuss the metallurgical evidence, where there was a considerable divergence of views.

189 In the first place, I note that none of the expert witnesses, whatever be their field of expertise, were effectively challenged in relation to their possession of the relevant expertise. I include Mr Penberthy in that regard, although, as will be seen, there is an aspect of the pleaded case against him which will require me to return to this question when ultimately discussing questions of liability.

190 By and large, the witnesses were permitted, in the ordinary way, to adduce their evidence-in-chief in the form of expert reports. Where that occurred, there was no substantial challenge to the admissibility of the documents in question, although, of course, the weight to be attached to them and to the opinions expressed was often a matter of controversy before me. In each case, the expert witness who adduced evidence in that way had, in my view, constructed the report appropriately, informing me of the sources of information provided to them, and the assumptions they had made about the primary facts before they ventured relevant opinions.

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191 The witnesses generally stopped short of the expression of an opinion about the ultimate factual issues. That was, in my view, even the case in respect of the evidence of the expert pilot witnesses, Hillier, MacGillivray, Chew, Lovegrove and Penberthy, who, apart from usefully instructing me in relation to aerodynamic matters and the skills required to fly an aircraft, were permitted to express views about what they thought would be a prudent course for an expert pilot to adopt in particular factual circumstances, without intruding into the question of the relevance of such views to the ultimate issue whether Mr Penberthy had been guilty of such a breach of his duty of care as to constitute negligence.

192 The evidence of external observers of the flight, the air traffic controllers, Messrs Murray and Schraven, and the licensed engineers, Messrs Stevenson, Firman, Tull and Chambers, was, to a degree, a body of expert evidence. I approached the assessment of their evidence and what conclusions might be drawn from it upon the basis that these were, to a greater or lesser degree, witnesses familiar with the particular type of aircraft, familiar with engine noise and likely to have a capacity to assess whether the aircraft in question was operating correctly during and immediately after its take-off run. The position of the air traffic controllers was not dissimilar, having regard to the familiarity they acquired, as a result of their occupation, with various types of aircraft and aircraft behaviour. Subject to the physical limitations derived from their points of view, the evidence of these witnesses deserved to be assessed against that background of familiarity. I have done that. I have expressed my conclusions generally, and I will summarise them again in due course.

193 The evidence of Mr Steven Roberts and his computerised reconstruction of the flight path of the aircraft was subject to considerable challenge, not upon the ground that he lacked the expertise to undertake the exercise he did, but upon the basis that the information with which he was working was subject to such inaccuracy, including inaccuracy of time, as to substantially detract from the utility of the conclusions which might be drawn from his evidence.

194 I have examined those matters in the course of discussing that evidence, and I have expressed the view that, in my opinion, Mr Roberts' evidence survived that challenge by FSS and Penberthy. I consider the evidence to be sufficiently reliable and accurate, within the limitations in that regard inherent in the raw data, to make the conclusions expressed by the witness useful supporting indicators of the reliability of the evidence of eyewitnesses, particularly Murray and Schraven, and the reliability of the evidence of Mr Penberthy as to the behaviour of the aircraft.

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195 Then there is the evidence which I have just finished discussing, that given by Mr Barton and Mr MacGillivray in particular, in relation to the metal composition of the sleeve bearing, and the significance in relation to the operation of the pump which those matters have. One of the metallurgists, Mr Dunning, whose evidence I am about to discuss, also gave similar evidence in relation to that matter. I have not found it necessary to add references to his evidence to the discussion by Barton and MacGillivray of the different properties imparted to the sleeve bearing by the use of leaded bronze, as opposed to aluminium bronze.

Metallurgical investigation of the failure of the fuel pump

196 An important question of fact raised in the proceedings is the question of the cause of the failure of the fuel pump and, in particular, the drive pin. If that cause can be ascertained, that will answer the question whether the failure of the pump stopped the right-hand engine and presented Mr Penberthy with the emergency which ultimately led to the crash of the aircraft, or whether there might have been some other cause for the emergency which presented itself to Mr Penberthy, and the fracture of the drive pin might have resulted from the rotation of the engine on the mounting at the preliminary stage of the Air Transport Safety Board investigation.

197 In the end, as will appear, I think there are pointers available from the expert evidence upon this issue as to how the drive pin was caused to break, and this has an important bearing upon the facts as I will ultimately find them to be, relative to the questions of negligence and contribution which arise on the pleadings.

198 I have mentioned Mr Dunning. He is a consultant metallurgist in private practice. I have no doubt about his qualifications. He was briefed by the plaintiffs to undertake an investigation into the left and right fuel pumps of the aircraft. His credibility was tested in cross-examination.

199 I was not persuaded that I could not rely upon the views he expressed, at least to the extent to which I shall refer to them below.

200 I will commence with a brief reference to his investigation of the pump sleeve bearing and spindle performed by both visual examination and scanning electron microscopy. There was wear on the right-hand pump sleeve which corresponded to wear on the spindle, a result of the abrasive process removing material from the surfaces which was referred to as galling.

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201 Mr Dunning analysed the pump components to give an indication of their metallic composition. It was evident that while there was an appreciable lead content in the left-hand sleeve bearing, no such element was present in the right-hand sleeve bearing. On the other hand, the right-hand sleeve had an aluminium content which the left-hand sleeve did not. This analysis provides the ground for the expert comparison of the properties of the leaded bronze bearing and the aluminium bronze bearing, which was the particular expertise contributed by Mr Barton and Mr MacGillivray and, in fact, as I have mentioned, confirmed by Mr Dunning.

202 His testing for hardness showed that the right-hand bearing was over three times harder or, put another way, had three times less capacity to embed foreign material, than the left-hand bearing. Mr Dunning tested the surface roughness of the two bearings. Without descending to the detailed results, a fair description is that the right-hand bearing was about five to five and a half times rougher than the surface of the left.

203 Mr Dunning reviewed the dimensional measurements of the diameter of the spindle and the bore of the sleeve for both the left-hand and the right-hand pump. It was established that, in the right-hand pump, the average radial clearance from the sleeve bearing along the length of the shaft of the spindle was less than a quarter of the clearance available between the equivalent components in the left-hand pump. Mr Dunning said, and I accept, that that would significantly affect the capacity to properly lubricate the spindle in its rotation in the bearing and would significantly increase the temperature of these component parts in operation, and the consequent wear and tear.

204 As I understand Mr Dunning's evidence, he measured the increases in diameters which would be likely to result when the pump was operating at what might be regarded as an ordinary operating temperature. He discovered that there was a measurable difference in the expansion of the aluminium bronze bearing and the high leaded bronze bearing, the latter providing a greater capacity to expand under heat. The relative lack of that capacity in the right-hand bearing would further decrease the efficiency of the lubrication process, and therefore would increase the tendency for the right-hand pump, in operation, to develop the galling process which I have previously described, and the tendency to increase the friction by a combination of lack of or reduction in the lubrication, the reduction of the gap between the spindle shaft and the bearing, and the thermal expansion of the spindle in the bearing.

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205 Mr Dunning was of the opinion that there was observable damage to the right-hand spindle and bearing, caused when the two surfaces came into contact during the operation of the pump. The spindle shaft showed galling, the adherence of particles which had clearly come from the sleeve. There was corresponding indication of the removal of material from the internal surface of the bearing.

206 Mr Dunning described the process which would occur as the galling slowly built up during the 1,353 hours of operation of the pump. Given the evidence of the galling due to the use of the aluminium bronze sleeve bearing, the process would slowly reduce the capacity of this part of the pump to self-lubricate, and would slowly reduce the tolerance gap between the shaft of the spindle and the sleeve. There would be increasing torsional resistance to the rotation of the spindle. Eventually the spindle would seize against the bearing, or the torsional resistance would otherwise become sufficiently great so as to cause the fracture of the drive pin at its sacrificial point.

207 Mr Dunning supported his conclusion that this was the process by which the pump failed, by his examination, at high magnification under a microscope, of the fracture surfaces of the drive pin. That showed, he said, that the drive pin failed as a result of torsional overload, and there was smearing of the metal on the fracture surface of the pin, produced, he said, towards the outer circumference of the pin, by the contact made at high speed between the two surfaces once the pin had fractured, over the short period of operation of the engine before the failure of the pump starved it of fuel and caused it to stop.

208 In addition, on these surfaces of the fractured pin he was able to detect staining, aligned with the smearing, which, upon analysis, contained bromine and lead. Bromine and lead are additives or contaminants in aviation fuel, and it will be recalled that, in this area of the pump, it is the aviation fuel itself which would provide the lubricant. The staining must, of course, have occurred after the pin was fractured, and it was sufficiently adherent that it was not removed by the cleaning process undertaken by Mr Blyth, to which I have already referred.

209 On the other hand, when Mr Dunning examined the vanes in the right-hand pump, he said he could detect no evidence of damage which would not be regarded as normal wear. In particular, he saw nothing to support the view that the drive pin fractured because of the torsional resistance created by debris being lodged in some fashion between the tips

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of the vanes and the walls of the pump chamber and/or between the head of the spindle and the adjacent end plate.

210 Finally, Mr Dunning referred to the appearance of the fracture surfaces of the drive pin. As he put it, the fracture surfaces demonstrated a topography typical of a ductile torsional overload. There was a central section which represented the final point of failure, and then externally to that and towards the circumference of the drive pin, there was observable smearing consistent with contact between the two surfaces of the fracture, as I understand it, while the fracture was occurring and afterwards. It is in this area that the lead and bromine particles were embedded. On the fractured drive pin, the final point of failure was centrally placed.

211 On the other hand, Mr Dunning, as also did Dr Romeyn, performed a test to determine the torsional load which could be accepted by the sacrificial point of the drive pin before failure. As I have said previously, the result of Dr Romeyn's tests were to establish failure by an applied torque of 20 to 24 foot pounds.

212 Both metallurgists tested the torsional load by using a calibrated digital torque wrench, while the pin being tested was held in a vertical position in a vice. In other words, one half of the pin was secured in the vice and the torque wrench was applied to the other half, and pressure exerted manually. In that case, the final fracture point or area of the drive pin being tested was seen to be rather off-centre, leading to the suggestion that the appearance might be different when the drive pin was fractured when both ends were held in the pump, in the orifices of the gear and the spindle, where the fracture would occur by rotation at speed, from when the fracture occurred slowly by the application of the torque wrench.

213 I mention this now to express the view that, in my opinion, the differences in the appearance of the fracture surfaces provides no indication of whether the fracture occurred while the drive pin was in place in the pump and being rotated at speed, or whether it was being subjected to the relatively slow application of torsional force by a torque wrench while one half of the pin was held in a vice on a work bench in the laboratory. The difficulty in relation to the application of force in the latter testing process is that it is not possible, it seems, to ensure that the force applied by the torque wrench is at right-angles to the alignment of the drive pin. Despite the care no doubt taken by the testing metallurgist there will, I think, inevitably be some unevenness of pressure, some pressure downwards or upwards in the alignment of the drive pin which may distort the final point of fracture.

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214 In the end, I think it is fair to summarise Mr Dunning's views as being that although the different cause of fracture of the drive pin, specifically the turning of the engine on the mounting during investigation, was possible, he was satisfied that the probable cause of the torsional resistance which caused the spindle to seize in its bearing, or produced sufficient torsional resistance to cause the drive pin to fracture without seizure, was not a build-up of carbonaceous material of the kind favoured as the cause by Dr Romeyn, but was the failure of the fuel pump in operation before the crash. In that context, the failure was attributed to the failure to use the high lead bronze sleeve which had been the original engine component, and its replacement by the unsatisfactory aluminium bronze sleeve.

215 There was evidence, Mr Dunning said, that galling had occurred. It will be recalled that this is the process whereby material is transferred from sleeve to spindle shaft, building up minute peaks, but sufficient to critically reduce the already reduced clearance between the shaft of the spindle and the surface of the bearing. Over the numerous hours of the pump's operation, Mr Dunning considered that the clearance would be so reduced that the combined effects of the galling and thermal expansion would reduce the capacity to properly lubricate the spindle shaft and cause seizure, at least in the sense of momentary adhesion of the two surfaces, or more generally would increase the torsional resistance provided by the bearing to the rotation of the spindle shaft, until it finally reached the point of torsional overload sufficient to cause the drive pin to fracture at its sacrificial point.

216 Mr Dunning said, and I accept, that there was evidence in the smearing of the metal on the surfaces of the fracture and in the embedding into those surfaces of lead and bromine particles, to show that the fracture occurred while the drive pin was in place in the pump while it was in operation. Whilst I am not impressed by the evidence of the eccentric fracture point during the torque test as compared with the central fracture point of the failed drive pin, I think there is evidence, which I accept shows what may be described as intermittent contact between the two fractured surfaces during the relatively brief period when one half of the drive pin continued to revolve at high revolutions before the engine stopped.

217 That was not a view accepted by the expert metallurgist, Dr Romeyn, who was called by the second defendant, Mr Barclay. He is also a metallurgist, with impressive qualifications. His Doctorate of Philosophy in Metallurgy was obtained from the University of New South Wales in

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1981. His professional experience has, over the years, been very substantially concerned with airworthiness, aviation safety and aviation accident investigation. As I understand it, he is now in private practice as a consultant. There was no challenge to his expertise, and I received into evidence reports that he had made. Both Dr Romeyn and Mr Dunning commented upon each others work.

218 They were both of the view, of course, that the drive pin fractured, not as a result of fatigue over the life of the part, but as a result of torsional resistance suddenly reaching the point where it exceeded the torsional shear strength of the pin. Dr Romeyn also conceded that his investigation was unable to determine, with any certainty, when this occurred. He thought that it was a reasonable hypothesis that the failure occurred while the pump was in use, at or about the time that the aircraft took off, but he considered that it was somewhat more probable that the fracture occurred as a result of the torsional resistance derived from the build-up of carbonaceous material between the eccentric chamber walls and the ends of the vanes, and between the head of the spindle and the adjacent end plate.

219 As I have already indicated, if the fracture occurred by that mechanism it would have to be during the rotation of the engine with the pump attached, as part of the Air Transport Safety Board investigation, because the manipulation of the pump after its removal from the engine, to the extent that that may have affected the position of the spindle, occurred after the broken drive pin had been removed.

220 Further, in relation to the question of the timing of the fracture, Dr Romeyn appears to have been unpersuaded that the right-hand engine of the aircraft was not developing maximum power for take-off. If the failure of the pump occurred during the flight, it was therefore to be attributed to the interruption of the supply of fuel to the pump or the reduction of the clearance between the spindle shaft and the sleeve bearing, with the consequent reduction in the lubricating capacity of fuel in the pump.

221 Dr Romeyn was not impressed with the evidentiary value attributed by Mr Dunning to the presence on the fracture surfaces of the drive pin of particles of lead and bromine. I have discussed Mr Dunning's views about that. Dr Romeyn pointed out that these were additives, in the sense of contaminants, probably as a result of lead/bromine compounds contained in the engine oil escaping past the piston rings in the combustion chambers in the engine by a process known as 'blow by'. I confess that I

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do not understand why, under those circumstances, the compounds would not be expelled in the gases produced by the process of combustion of the fuel, but would end up back in the fuel pump.

222 But the proposition is that they might be included in the fuel as contaminants or, remaining in the oil, the compounds might have been smeared on the surface of the fractured drive pin when it was handled by persons with oil on their hands during the investigation process overseen by Mr C Roberts. If it occurred in that way, Mr Dunning said, one would not find the particles adhering to the fracture surfaces in the way observable under the microscope, but, he thought, such contamination would have been removed by the process of washing the part in the cleaning process employed by Mr Blyth. I must say that for my part that seems more probable than that the particles, deposited by handling the pin, would have resisted that process and remained microscopically visible in the way that they are.

223 Dr Romeyn noted that there did not appear to have been a seizure which would fall into the category of a permanent bonding together of the surfaces of the bearing and the spindle shaft. He pointed to the fact that the spindle could be removed with relative ease after the process was commenced by tapping it, rather than by applying force of any substance to break a weld between the two parts. Dr Romeyn did not suggest, however, that the fracture could not be caused by the required amount of torsional resistance resulting from the galling, short of a weld by that process. He was cross-examined about that in relation to the relevant passage on page 6 of his report, exhibit O, at ts 1157 - 1160.

224 When one adds the further analysis set out in some detail in his report, exhibit Q, it is abundantly clear that Dr Romeyn, although not excluding an increase of torsional resistance while the aircraft was in flight and the pump in operation, as a cause of its failure, thought that was less likely because there was no satisfactory evidence of seizure of the pump or cold welding, and resistance to rotation of sufficient magnitude to fracture the drive pin would require what he described as a major change in the operation of the bearing during the flight. However, by such a change, he made clear, he would include a rapid loss of the clearance between the spindle and the bearing immediately prior to the fracture of the drive pin.

225 On the other hand, Dr Romeyn clearly favoured the hypothesis that the carbonaceous material generally evident in the pump as the result of the fire might have caused the required degree of torsional resistance. I

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have referred to his experiments carried out to demonstrate that possibility.

226 Finally, as I have already mentioned, not only did Dr Romeyn find inconclusive the evidence of the lead and bromine particles on the fracture surfaces of the pin as providing evidence that the fracture occurred prior to the fire and the impact, but he did not consider the evidence of deformation of the fracture surfaces, the 'smearing' described by Mr Dunning, to point towards intermittent contact between the two fracture surfaces at high speed during the final short period of the operation of the engine after the fracture of the drive pin. Dr Romeyn thought that the appearance of the fracture surfaces exhibiting this characteristic was simply consistent with the process of fracture by torsional shearing.

227 In summary, and I hope without doing any injustice to the clear and effective communication of his views in Dr Romeyn's reports and in his oral evidence, I think he and Mr Dunning were of the same mind that there was evidence of galling, and their views about the effect of that process were expressed in similar terms. Dr Romeyn was firmly of the view that there was no evidence of actual seizure of the spindle shaft in the bearing, but he did not exclude the effect that the galling process might ultimately have to finally increase the torsional resistance within the pump to the point of fracture by the shearing mechanism affecting the drive pin at its sacrificial point.

228 Mr Dunning was of the view that this was what had occurred while the aircraft was in flight, and in his view that conclusion was supported by the evidence of the deformation, particularly towards the circumference of the fracture surfaces of the drive pin, the smearing of the metal, and the presence of stains aligned with that smearing containing particles of lead and bromine apparently adhering in a way which was resistant to their removal by the cleaning process which was subsequently undertaken.

229 On the other hand, Dr Romeyn did not find the evidence in the metallurgical examination of the fractured drive pin, the spindle shaft and the sleeve bearing sufficient to persuade him that the failure of the pump as a result of galling and increased torsional resistance in flight could be elevated above a mere possibility so that it became the more likely explanation for the emergency situation with which Mr Penberthy was confronted. He therefore sought an explanation in the effect of increasing the torsional resistance in the chamber of the pump derived from the presence of carbonaceous material. As to that, I have sufficiently

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discussed the lack of evidentiary value in the different positions of the vanes before and after disassembly, and in the evidence of the witness marks.

230 There is, of course, as I have said, affirmative evidence that on the head of the spindle and under the end plate some material, no doubt carbonaceous material of the sort removed by Mr Roberts, had burned in the fire, but there is no evidence to show that the material which remained after the fire would have provided sufficiently increased torsional resistance by the end plate sufficient of itself to fracture the drive pin on the rotation of the engine with the pump attached.

231 As to the companion notion that such material may have increased friction between the vane tips and portions of the eccentric chamber wall, or might have been lodged between a vane tip and the narrowest part of the gap between the spindle and the chamber wall, I note that the material removed by Mr Roberts was not in the chamber in a position which might have impeded the movement of the spindle. In other words, although Dr Romeyn relies on 'scoring' on the surfaces of the vanes, I think there is a lack of evidence to support this hypothesis, and I note that the spindle itself was able to be removed without undue difficulty by tapping it, and the vanes dropped out of their guides in the spindle when the pump was inverted.

232 After careful consideration of the metallurgical evidence, I think it supports the conclusion that it was probably an increase in torsional resistance caused by the galling process which finally amounted to 20 - 24 foot pounds and caused the drive pin to fracture without there being an actual seizure of the pump, at least not of a permanent kind or of more than transitory effect, but sufficient to break the drive pin. There is no doubt that if the pump failed in that way it was a failure directly attributable to the use of the wrong alloy of aluminium bronze in the sleeve bearing causing the process of galling to occur and the torsional resistance to increase, a process of adhesive wear contributed to by failure to specify a smoothly honed bearing surface and by the reduction in the clearance available between the spindle shaft and the surface of the bearing, so impeding the lubrication process.

233 Finally in this regard, I have referred to the fact that the spindle came out fairly easily when it was tapped, and I am rather inclined to agree with the proposition advanced by counsel for the first and third plaintiffs that that rather suggests that the tapping removed the spindle shaft from the area, evident on examination, where there were bands of galling and wear

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on the shaft and corresponding bands on the sleeve bearing. It may be that the tapping removed the shaft from the position where there was a degree of adherence short of seizure between the two surfaces.

My conclusion as to the cause of the emergency

234 The metallurgical evidence and the expert engineering evidence of Barton and MacGillivray does not exist in a vacuum. In my view, it is supported by the conclusions to which I would come as to the evidence of the eyewitnesses on the ground and the evidence of Mr Penberthy, as supported by the reconstruction of the flight path by Mr S Roberts.

235 I have said that I do not accept the evidence of Messrs Stevenson, Firman, Tull and Chambers as providing a consistent account which would, of itself, support the conclusion, unsupported by any other evidence, that there was some unexplained problem with one, or perhaps both, of the engines of the aircraft which prevented it from developing full power, and led to the emergency developing in the way described by Mr Penberthy, and I do not accept that his evidence of the way in which the emergency developed should be taken as supporting the conclusion that what occurred was something short of a failure of the right-hand engine by way of fuel deprivation upon the failure of the right-hand engine-driven fuel pump.

236 Indeed, it seems to me that Mr Penberthy's evidence was consistent only with there not being a sudden and complete deprivation of fuel to the right-hand engine such as would occur during an asymmetry simulation if the fuel was completely shut down. It was explained to me that that would have the effect of immediately depriving both the fuel pump and the engine of any fuel. On the other hand, upon the failure of the engine-driven fuel pump, for a short time there may have been a little fuel provided to the engine by the auxiliary pump, even at its low setting, linked separately, as it was, to the fuel control unit for the right-hand engine, and the manifold distributing fuel to the cylinders. This may be the explanation for what Mr Penberthy experienced in the first couple of seconds after the emergency developed.

237 Mr Penberthy experienced no difficulty and no loss of power during the take-off run. I accept that power was developing normally in both engines at that time. Mr Chew said that if there was a failure of the engine on one side during roll-up, the aircraft would be immediately pulled towards the engine which had failed. This would be immediately noticeable to the pilot, who would be able to confirm that there was a problem by looking at the instruments in the cockpit.

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238 If the difficulty occurred during the take-off run, I would have to conclude that Mr Penberthy, despite his experience, did not notice it, or that he did notice it and decided to ignore it and continue the take-off. Why he would do such a thing defies explanation. If he did that, his evidence before me was deliberately false. On the contrary, I think it is clear that if any such thing occurred during the take-off roll-up, Mr Penberthy would have aborted the take-off and brought the aircraft to a safe halt.

239 I have said that this hypothesis would require me to hold that I am not satisfied about the explanation proffered to explain the broken drive pin in flight, but I would nonetheless be satisfied that there was some unexplained difficulty with the right-hand engine, short of a failure of the fuel pump, which caused Mr Penberthy to shut it down immediately after the aircraft became airborne. Such a view of the evidence is, in my opinion, frankly ridiculous.

240 There is evidence to support the conclusion that the right-hand engine failed virtually immediately after the aircraft became airborne. That conclusion is supported by the evidence of Murray and Schraven which, as I have said, I accept; particularly that of Murray, which is the more complete account. Their account of what occurred as external observers, is supported by my acceptance of the evidence of Mr Penberthy and, in general terms, by the evidence of the plaintiffs Knubley and Cifuentes, who both describe difficulties, albeit in somewhat different terms, shortly after the aircraft apparently completed its take-off. All of this evidence supports the conclusion that it was then that the right fuel pump failed because the drive pin broke.

241 There is metallurgical evidence by Dr Romeyn that it is possible that the pump failed at this point, and by Mr Dunning that it was probably the case that the pump failed while the aircraft was in flight before the crash.

242 I reject the view that the pump failed because the drive pin broke as a result of the torsional resistance created by carbonaceous material created by the fire and trapped in the chamber of the pump. On the view I take of the probable cause of the emergency arising, Mr Penberthy's initial reaction was not only that dictated by the manual, but was self-evidently appropriate. He 'cleaned up' the aircraft and, at that initial stage, gave it its best prospect of maintaining flight and gaining height.

243 I make no comment at this stage upon what he did after that. But if the pump did not fail and the engine did not stop because it was deprived

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of fuel, Mr Penberthy's behaviour lacks any explanation. There is no evidence to suggest what else might have happened which Mr Penberthy might have mistaken for an engine failure.

Negligence: the claims

244 I have mentioned these matters very generally in my introductory remarks, but having now completed a review of the evidence and made various findings of fact, I need to refer to the claims in more detail, and to the nature of the defences, before arriving at final conclusions.

245 As pleaded, the claim made against the defendants by the first five plaintiffs is a claim in negligence of a conventional kind. I am not required, as I have said, in these proceedings to assess damages. But I note that Mr Protoolis was killed instantly in the crash, and Mr Warriner died later as a result of the injuries he suffered. The third and fourth plaintiffs exercise a cause of action in negligence under s 4(1) of the *Fatal Accidents Act 1959* (WA). The first, second and fifth plaintiffs suffered damage by way of their burns and other severe physical injuries, for which they sue in negligence.

246 So far as Nautronix is concerned, it has a twofold claim as a result of the damage to its property sustained in the crash, and for economic loss which it pleads resulted from the accident. It will be recalled that Nautronix had its equipment installed in the aircraft, and its claim for economic loss is, if I may put it in summary form, based on the death and injury of its employees and the harm it suffered, so it alleges, in the pursuit of its commercial interests. Again, in relation to that, I am not required to make an assessment of damages, but I simply note the nature of the loss or damage which the sixth plaintiff is said to have sustained, or which is the claim Nautronix affirms was assigned to it by the second-named sixth plaintiff. Nautronix is, in that way, making a claim for damages for negligence.

247 These plaintiffs rely upon the alleged negligence of Mr Penberthy. Paragraph 25 of the consolidated statement of claim in CIV 1312 of 2008 particularises that negligence in the following terms:

25. The crash was caused by the negligence of Penberthy.

Particulars of Penberthy's negligence

Penberthy was negligent in that he:

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- 25.1 commenced the roll-up for take-off in the Plane on runway 24A at the intersection of taxiway Delta instead of from the north-eastern end of the runway, thus depriving ANV of 145 metres of runway for take-off purposes in case further runway was needed in the event of an aborted take-off;
- 25.2 failed to abort the take-off when the Plane had not reached an air speed of at least 95 knots by taxiway Golf and at rotation;
- 25.3 failed to ensure that lift-off occurred at a point on the runway when it was still practicable to abort the take-off if an engine failure occurred at or shortly after take-off;
- 25.4 failed to set the wing flaps in the UP position when this was required in the prevailing conditions by the Cessna 404 Operator's Manual;
- 25.5 having, after the failure of the right engine, elected to proceed with the take-off, and having carried out procedures to reduce drag and achieved an air speed of 105 knots, failed to follow the appropriate procedure of flying straight ahead with a 5 degree bank to the left wing, so as to permit the Plane to climb to a safe altitude;
- 25.6 having made an initial turn of the Plane to the left to an easterly course, failed to fly straight head with a 5 degree bank to the left wing, so as to permit the Plane to climb to a safe altitude;
- 25.7 attempted from an unsafe altitude to return to the airport for landing, by making a series of left turns, when it was impossible in the circumstances for the Plane to reach and safely land at the airport;
- 25.8 failed to land the Plane in a cleared area away from the airport, when various suitable off-field areas were available for emergency landing;
- 25.9 failed, in preparation for the flight, to take into account the risk of engine failure at or shortly after take-off, or to predetermine the capacity of the Plane, in that event, to climb over the powerlines located to the south west of the airport;
- 25.10 failed, in preparation for the flight, to take into account the presence of the powerlines to the south west of the airport, and to plan for dealing with such obstacle in the event of an engine failure after take-off;
- 25.11 failed, whilst the Plane was making its roll up on the runway, to monitor its gauges and instruments so as to ensure that its engines were operating with full power and smoothly; and

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25.12 failed to notice that one or both engines of the plane were not achieving full power, which should have caused him to abort the take-off.

248 As to FSS, the same negligence is relied upon, FSS being the employer of, and alleged to be vicariously liable, for Penberthy's negligence. So much is admitted by FSS.

249 As to the second defendant, Barclay, the claim in negligence made by the first to sixth plaintiffs is formulated a little differently. It is alleged that Barclay should have known about FSS and the business it carried on at Jandakot Airport, in the provision of commercial air charter services. A rather more material allegation is that Barclay should have known that the aluminium bronze alloy was unsuitable for the manufacture of the replacement sleeve bearing, and its use would create a risk that the engine-driven fuel pump would fail and that the aircraft would crash, an event likely to lead to loss of life and injury to passengers in the aircraft, as well as loss and damage to persons or entities who chartered the aircraft for commercial purposes.

250 Any deficiencies in the pleading of the plaintiffs' case against Barclay were covered by the way in which the issues were developed and argued by the parties at trial. In the final analysis, the case against Barclay in negligence brought by all the plaintiffs is that he was negligent:

- (1) in approving and incorporating into the engineering order the use of aluminium bronze for the manufacture of the sleeve bearing,
- (2) in failing to establish what alloy was used in the manufacture of the original sleeve bearing,
- (3) in failing to obtain a metallurgical report on the original part,
- (4) in failing to specify, in the engineering order or otherwise, that the internal bearing surface was to be a smooth finish,
- (5) in failing to test the suitability of aluminium bronze as an alloy to be used in the manufacture of the sleeve bearing, and
- (6) in failing to finally examine the bearing as manufactured, before approving its use in the fuel pump fitted to the aircraft.

251 I put to one side, at this stage, the contractual claim made directly against FSS by Nautronix.

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252 By their defence, FSS and Penberthy deny that Penberthy was negligent. They say that his decisions to turn the plane to the left away from the powerlines, to attempt to land the plane on runway 30, and thereafter to attempt to land the plane off that runway, were reasonable in all the circumstances. They say that the loss and damage incurred by the plaintiffs was not caused or contributed to by Penberthy's negligence, but by the conduct of Barclay.

253 So far as Barclay is concerned, apart from denying that he was negligent, he puts directly in issue that any conduct of his caused the loss and damage relied upon by the plaintiffs. He denies that the right-hand engine failed, and asserts that it was shut down by Penberthy. He pleads what is essentially reliance upon the evidence of Stevenson, Firman, Tull and Chambers, and asserts that Penberthy should have aborted the take-off before the aircraft became airborne. He pleads directly that the engine-driven fuel pump on the right engine did not fail.

254 Barclay has made contribution claims against the first and third defendants. Against FSS, Barclay relies, in this regard, upon the vicarious liability of FSS for the negligence of Penberthy.

255 As against Penberthy, by par 19 of the statement of claim in the contribution proceedings, Barclay particularises the allegations of negligence in the following form:

Particulars of negligence of Penberthy

Penberthy was negligent by:

- a) commencing the take-off run in the Aircraft on runway 24R adjacent to the point where it intersects with taxiway Delta rather than from the north-eastern end of the runway thus depriving the Aircraft of the benefits of 145 metres of runway for take-off purposes and in case it became necessary to abort the take off and use the balance of the runway to stop;
- b) failing to abort the takeoff by reason of one or more of the following features which were or which should have been evident to Penberthy during the takeoff roll before the Aircraft left the ground:
 - (1) the unusual noise the Aircraft engines were making and continuing to make from the commencement of the takeoff run;

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- (2) the engine instrument indications that one engine was producing reduced power, including but not limited to fuel flow and manifold pressure;
 - (3) the fact that the Aircraft was accelerating at a slower rate than it should have with normal power in the prevailing conditions and at the weight of the Aircraft on the day of the Crash;
 - (4) the fact that the Aircraft used up much more runway than it should have before getting airborne;
 - (5) the yawing tendency of the Aircraft while it was on the ground taking off;
 - (6) rough running of one engine;
- c) failing to abort the take-off while the Aircraft was still on runway 24R because of the reduced power being provided by one engine;
 - d) failing to abort the take-off when the Aircraft had not reached an air speed of at least 95 knots by taxiway Golf;
 - e) continuing the take-off when the Aircraft had not reached take off safety speed before the point at which the take off should have been aborted;
 - f) failing to ensure that lift-off was attained at a point on the runway when it was still practicable to abort the take-off if an engine failure occurred at or shortly after take-off;
 - g) failing to set the wing flaps in the UP position when this was required in the prevailing conditions by the Cessna 404 Operator's, Manual;
 - h) shutting down the right engine without first identifying whether it had failed or whether it or the left engine was merely supplying reduced power;
 - i) shutting down the right engine when it had not failed and was still delivering power;
 - j) after shutting down the right engine, having elected to try to keep flying, and having carried out procedures to reduce drag and having achieved an air speed of 105 knots; failing to follow appropriate procedures by flying straight ahead with a 5 degree bank to the left wing to permit the Aircraft to climb to a safe altitude;
 - k) having made an initial turn of the Aircraft to the left to a south easterly course, failing again to fly straight ahead with a 5 degree

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bank to the left wing so as to permit the Aircraft to climb to a safe altitude;

- l) his attempt from an unsafe low altitude to return to the airport for landing by making a series of left turns when he knew or ought reasonably to have known that it was impossible in the circumstances for the Aircraft to maintain safe airspeed and return and safely land at the airport if he engaged in such left turns at a low altitude and at the low airspeed of the Aircraft;
- m) performing a series of turns in the vicinity of the airport when he knew or should have known that if height was to be maintained, each turn would result in a reduction in airspeed which would take the Aircraft closer and closer to the airspeed where its wings would stall and cease to produce sufficient lift to maintain a height. and/or to sustain further flight;
- n) failing in preparation for the flight to take into account the risk of engine failure at or shortly after take-off and to pre-determine the capacity of the Aircraft in such event to climb over the powerlines located to the south west of the airport;
- o) failing in preparation for the flight to take into account the presence of the powerlines to the south west of the airport and to plan for such obstacle in the event of an engine failure at or shortly after take-off.

256 It only remains to observe, in relation to questions of negligence, that for FSS and Penberthy, issue is joined in the contribution proceedings and, in my view, although there is no corresponding notice by the first and third defendants against Barclay, the issue of contribution as between defendants is squarely raised on the face of the proceedings.

257 There is another action to which I should refer at this point, and that is an action brought by FSS against Barclay and CASA. So far as the action is against CASA, it will be recalled that the question of liability is not being tried by me as a preliminary issue in that action. However, in that action, FSS otherwise sues for the damage it sustained upon the loss of the aircraft, quantified in par 9 of the statement of claim in the sum of just over \$910,000. In addition, a claim is made to be indemnified in respect of the claims made against FSS in the main action.

258 Barclay is said to owe a duty of care, 'to a class which includes all passengers, crew, owners and users of aircraft into which [the fuel pump] might be installed': par 29. And of course, it is pleaded that FSS and Nautronix are members of that class. Again, the claim is made in

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negligence particularised in terms not dissimilar from those employed by the plaintiffs in the main action, as follows:

- (a) Barclay did not sufficiently appreciate the risk of galling and the consequent failure of the fuel pump;
- (b) Barclay did not sufficiently appreciate the need for good lubrication of the spindle within the sleeve bearing to avoid the risk of galling and the consequent failure of the fuel pump;
- (c) Barclay did not obtain information or advice on which he could reasonably rely as to the functionality of fuel pumps with the part number '646210', when a prudent person proposing to approve the engineering order under CAR 35(2) would have done so and would thereby have gained a sufficient appreciation of the need for good lubrication of the spindle within the sleeve bearing to avoid the risk of galling and the consequent failure of the fuel pump;
- (d) Barclay did not know the composition of the material from which the original sleeve bearing had been manufactured;
- (e) Barclay treated the proposed modification as a 'like-for-like' replacement, but did not obtain information or advice on which he could reasonably rely as to the material from which the original sleeve bearing had been manufactured, when a prudent person proposing to approve a 'like for like' design would have done so and would thereby have ascertained that the original sleeve bearing was made from leaded tin bronze;
- (f) Further, although Barclay treated the proposed modification as a 'like-for-like' replacement, he did not obtain information or advice on which he could reasonably rely as to the finish applied to the internal (bearing) surface of the original sleeve bearing, when a prudent person proposing to approve a 'like for like' design would have done so and would thereby have ascertained that the original sleeve bearing was manufactured with a fine, uniformly honed finish to its internal (bearing) surface;
- (g) Barclay did not obtain information or advice on which he could reasonably rely as to the suitability of aluminium bronze as the material from which the new sleeve bearing was to be manufactured, when a prudent person proposing to approve the engineering order under CAR 35(2) would have done so and would thereby have ascertained that aluminium bronze was not a suitable material;
- (h) Barclay did not consider the use of any material other than aluminium bronze as a material from which the new sleeve bearing might be manufactured, when a prudent person proposing to approve the engineering order under CAR 35(2) would have done

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so and would thereby have ascertained that leaded tin bronze was a suitable material;

- (i) Barclay did not require that the engineering order be amended so as to specify leaded tin bronze instead of aluminium bronze, when a prudent person proposing to approve the engineering order under CAR 35(2) would have done so;
- (j) Barclay did not consider the finish to be applied to the internal (bearing) surface of the sleeve bearing, when a prudent person proposing to approve the engineering order under CAR 35(2) would have done so and would thereby have ascertained that a fine, uniformly honed finish would have promoted lubrication of the spindle and reduced the risk of galling;
- (k) Barclay did not require that the engineering order be amended so as to specify that a fine, uniformly honed finish be applied to the internal (bearing) surface of the sleeve bearing, when a prudent person proposing to approve the engineering order under CAR 35(2) would have done so;
- (1) Barclay decided to approve the engineering order without first obtaining information and advice on which he could reasonably rely in relation to matters of the design which were outside his knowledge, training and experience.

259 That claim is defended, including by a denial that Fugro and Nautronix are members of any class to which Barclay owed a duty of care, but principally upon the basis that Barclay was not negligent, and that the fuel pump did not fail, but the aircraft developed problems during take-off, of an unidentified kind, and the allegation is made that the aircraft crashed because of the negligence of Penberthy, for which Fugro is vicariously liable. Those allegations are, of course, repeated directly against Penberthy by way of a third party notice, thereby completing the contribution proceedings by which there may be an apportionment of liability between Barclay and Penberthy in both actions.

Negligence: duty of care

260 I have said that the negligence claims before me are of a conventional kind. But before discussing them briefly, I should observe that it is admitted that FSS was, at all material times, the holder of an Air Operator's Certificate issued by CASA under the *Civil Aviation Act 1988* (Cth) in respect of the aircraft which was, as I understand it, part of a fleet by which FSS carried on the business of an air operator at Jandakot Airport, in which business was included the provision of air charter services for commercial purposes.

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261 It was in that capacity that Nautronix chartered the aircraft, VH-ANV, and, as I have observed, it was for commercial purposes that the flight which resulted in the accident on 11 August 2003, which was to originate from and return to Jandakot Airport, was undertaken, with the aircraft being piloted by Mr Penberthy, and with the employees of Nautronix, Mr Cifuentes, Mr Knubley, Mr Warriner, Mr Protoolis and Mr Perincek, as passengers.

262 It is necessary to consider the potential application of the *Civil Liability Act 2002* (WA) to the claims to which I have referred. It came into operation effectively on 1 January 2003 (Government Gazette 17 December 2002, p 5905), but, under s 3A, various Parts of the Act do not apply to damages or to claims for or awards of damages under the *Civil Aviation (Carriers' Liability) Act 1961* (WA). That is the first reason why the Act does not apply in this case.

263 The *Civil Aviation (Carriers' Liability) Act 1961*, s 5, specifies the carriage to which that Act applies. It applies to the carriage of a passenger where the passenger is carried on an aircraft, 'being operated by the holder of an airline licence or a charter licence in the course of commercial transport operations under a contract for the carriage of the passenger'. It is intra state carriage of that kind to which the Act applies, and the purpose of that Act is to apply provisions of the *Civil Aviation (Carriers' Liability) Act 1959* (Cth). The relevant provisions are those contained in Pts IV and IVA of the Commonwealth Act.

264 Part IV deals generally with the carriage to which the Commonwealth Act applies. By s 27, it applies to the carriage of a passenger in precisely the circumstances to which reference is made in s 5 of the State Act. By s 26, an 'airline licence' has a meaning which includes an Air Operator's Certificate. That certificate also falls under the definition of a 'charter licence'; and 'commercial transport operations' are, by s 26, 'operations in which an aircraft is used, for hire or reward, for the carriage of passengers or cargo'.

265 There would seem to be little doubt, therefore, that although the provisions of the *Civil Aviation (Carriers' Liability) Act* of WA, particular the implied provisions in Pt IV of the Commonwealth Act, do not impinge upon the issues which I am to try, they would apply to this aircraft and the particular flight with which the trial of issues is concerned. It is therefore the case that the nominated parts of the *Civil Liability Act* would not apply. In particular, I should refer to Pt 1A, dealing with certain principles of liability for harm caused, 'by the fault of a person'.

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266 Potentially relevant provisions would also not apply, in any event, because the date of the accident was before 1 December 2003: s 5A(3). That is the second reason why the Act does not apply in this case. It therefore remains the case that all of that legislation can be put to one side, and the matter dealt with in terms of the common law. That was the approach the parties took.

267 In that regard, I am content to adopt the submissions of senior counsel for FSS and Mr Penberthy. He relied upon the succinct statement of the law of negligence by Steytler P and McLure JA in *Amaca Pty Ltd v Hannell* [2007] WASC 158; (2007) 34 WAR 109:

The respondent claims against the appellant in negligence. In order to succeed he had to establish that the appellant owed him a duty of care, had breached that duty and that there was a causal connection between the damage sustained and the breach of duty (175) [296].

268 As to the existence of the duty of care owed by the defendant to the plaintiff, it is convenient, I agree, to quote the observations of McHugh J in *Perre v Apand Pty Ltd* [1999] HCA 36; (1999) 198 CLR 180, at 208 where, under the heading, 'The demise of proximity as a unifying theme', his Honour said:

Where a defendant knows or ought reasonably to know that its conduct is likely to cause harm to the person or tangible property of the plaintiff unless it takes reasonable care to avoid that harm, the law will prima facie impose a duty on the defendant to take reasonable care to avoid the harm. Where the person or tangible property of the plaintiff is likely to be harmed by the conduct of the defendant, the common law has usually treated knowledge or reasonable foresight of harm as enough to impose a duty of care on the defendant [70].

269 Of course, *Perre* was a case concerned with what was described by the judges as 'pure economic loss', and I shall need to come to that in due course, but the general rule, as set out by McHugh J, was applicable, he made clear, to cases where the plaintiff sustained economic loss arising out of injury to the person, or loss of or damage to property. This has a relevance to the claim made by FSS against Barclay.

270 The figures do not matter because I am not to assess damages, but the loss or damage allegedly sustained by FSS is said to consist of the loss of the aircraft, the imposition consequentially of increased insurance premiums, the cost of modifying another aircraft which could be used in place of VH-ANV, and loss of profit from the date of the accident until a suitably modified replacement aircraft was available. In other words, the

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loss or damage sustained is said to be the loss of the property of FSS, the aircraft, and the loss consequently incurred, having regard to the commercial nature of the asset lost and its use in the business of FSS in the way described in the evidence.

271 I emphasise that in this connection, because I am trying the issues of liability as preliminary issues and I am not required to assess the damages to be awarded, if any, I am concerned with loss or damage sustained by a plaintiff as an element of its cause of action in negligence, rather than the damages to be awarded to compensate for that loss or damage.

272 As to the existence of relevant duties of care, I note that FSS and Penberthy admit the plaintiffs' allegations in pars 23, 24 and 27 of the statement of claim. In other words, they admit that they owed the plaintiffs a duty of care and that FSS is vicariously liable for the negligence of its employee Penberthy. However, they deny any breach of the duty and plead that any loss or damage sustained by the plaintiffs was caused, not by the negligence of Penberthy, but by the negligence of Barclay.

273 By par 30 of the consolidated statement of claim, the plaintiffs allege that Barclay owed them:

a duty to exercise reasonable care, skill and diligence in drafting, preparing, issuing and approving the Engineering Order and to ensure that the replacement sleeve bearing was fit, proper and safe for the purpose for which it was to be used.

That is an allegation which Barclay denies, and so he puts the existence of a duty of care in issue.

274 The same issue arises in the action brought against him by FSS in respect of the loss of the aircraft and its exposure to the plaintiffs' claims in the main action. As I have said, by par 29 of its statement of claim, FSS pleads that 'Barclay owed a duty of care, to a class which includes all passengers, crew, owners and users of aircraft into which [the fuel pump] might be installed'. That is an allegation which is denied by Barclay.

Barclay's duty of care

275 There is no need to deal with the question of the existence of a duty of care by Penberthy, for the breach of which FSS will be vicariously liable, in relation to any of the plaintiffs. The first five plaintiffs were, or in the case of Ms Warriner and Ms Graham, represent, persons who were passengers in the aircraft who suffered loss and damage when they were

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injured and, in the case of Cifuentes, Knuble and Perincek, consequential loss and expense. Ms Warriner and Ms Graham, of course, pursue the statutory cause of action secured to them by the *Fatal Accidents Act*. Nautronix was, to Mr Penberthy's knowledge, the employer of the five men who were his passengers, and it was the owner of the electronic equipment with which the aircraft was fitted out. The commercial purpose of the flight was known to him, and it was reasonably foreseeable that if the aircraft crashed, all those plaintiffs would suffer loss and damage of various kinds.

276 So far as Mr Barclay is concerned, I have discussed his role in the replacement of the sleeve bearing in the right-hand engine-driven fuel pump. He was clothed with the authorities provided by CASA in his capacity as a qualified aeronautical engineer and an authorised person under the Regulations. He was engaged as the engineering manager for Aeronautical Engineers Australia Pty Ltd by a company performing maintenance work on the aircraft, VH-ANV, for FSS, to advise whether the sleeve bearing could be manufactured locally. He advised that it could, and drew the relevant engineering order, approving his own work and issuing the order specifying the manufacture of the sleeve bearing from aluminium bronze, without specifying the finish to be applied to the internal surface of the bearing.

277 The very purpose of this exercise was to provide a bearing which could be installed by way of repair or modification in a fuel pump which, in its turn, would be fitted to an aircraft, in all probability an aircraft which would be used for commercial purposes such as this aircraft was.

278 It was reasonably foreseeable that if the alloy used was unsuitable and did not match that originally used in the manufacture of the bearing, and if the finish applied to the internal surface was unsatisfactory and increased the risk of the failure of the bearing at any time during the period for which it might be expected to be used in the fuel pump, then the failure of the pump would have an effect upon the operation of the aircraft, by shutting down the engine which it served. It was reasonably foreseeable that such an occurrence, if it happened while the aircraft was in flight, would expose the pilot, any other crew member and passengers to an increased risk of injury, and might lead to property damage and other loss being sustained to the aircraft owned by FSS, and the equipment it carried, owned by Nautronix.

279 I am satisfied that Barclay owed a duty of care, in relation to the manufacture of the sleeve bearing, to an owner of an aircraft into which it

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was fitted, particularly if that was an aircraft used for commercial purposes, as VH-ANV was, to a corporation or other entity which might charter such an aircraft and to the pilot, crew and passengers who might fly in the aircraft at a time when the bearing was used in a fuel pump fitted to an engine attached to the aircraft. Barclay owed that duty to take reasonable care to ensure that the sleeve bearing was safe and effective to use, and he owed that duty in this case to the five employees of Nautronix who were passengers in the aircraft, to Mr Penberthy the pilot, to Nautronix who chartered the aircraft, at least in relation to its property, and to FSS who owned and operated it.

280 It is urged upon me by all plaintiffs that there is evidence before the court from which I should infer that, by the end of August 1999, Barclay would have known that the company instructing it was the maintenance contractor for FSS, that he was being asked to undertake design and approve work in relation to modification of the aircraft for Nautronix specifically, that Nautronix was in the business of the developing and testing of new technology and products, and so, by July 2000, when Barclay was working on the fateful engineering order and when he approved it, he should be taken to have known that the maintenance work involving the modification of the fuel pump was specifically for an aircraft to be chartered by Nautronix, although the project was not put to him in those terms and the nature of the modification to be made was not specific to the particular aircraft which is, in one sense, the subject of this litigation.

281 Further, it is urged that there is evidence that between the date of Barclay's involvement with the engineering order and the date of the accident, there were occasions when Barclay was reminded of the maintenance contractor's connection with the aircraft VH-ANV, that that might have been an aircraft in which the modified fuel pump had been installed, that it was an aircraft with which Nautronix was connected, and that he should have, but did not, warn the maintenance contractor, FSS or Nautronix that the modified fuel pump had been installed and that there was consequently an increased risk associated with the use of the plane.

282 Barclay's absence from the witness box is relied upon to strengthen the court's capacity to draw the inference, if it is otherwise open on the evidence: *Jones v Dunkel* (1959) 101 CLR 298. It is, of course, the case that the absence of a witness who might otherwise have been expected to give evidence cannot be relied upon where there is a deficiency in the evidence. I do not propose to discuss the evidence in detail. It seems to me to be inadequate to support the inferences I am asked to draw. But in

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any event, as I have observed, it is not necessary to support my conclusion that Barclay owed the relevant duty of care that he should have known that an aircraft, into which the modified fuel pump might be installed, was an aircraft owned by FSS and chartered by Nautronix.

283 For a duty of care to be established, the defendant does not need to know of the existence of the particular plaintiff who sues. He needs to reasonably foresee that if he is negligent, harm might be caused to an identifiable class of persons, of which the plaintiff is a member.

284 I should also note that so far as a duty to warn is relied upon, in my opinion that is not fairly pleaded against Barclay by any plaintiff.

Negligence: breach of duty

285 Having arrived at the conclusion that Penberthy owed a duty of care to the first six plaintiffs, including Nautronix, in relation to his conduct as the pilot of the aircraft, and that FSS is vicariously liable for any breach of that duty which caused loss or damage to the plaintiffs, and having arrived at the conclusion that Barclay owed a duty of care to all the plaintiffs, including FSS (as claimed in its action) in relation to his involvement in the replacement of the sleeve bearing in the engine-driven fuel pump, it then becomes necessary to consider whether there has been a breach of that duty in either case. For that purpose, it is necessary to have a clear understanding about the ambit of the duty of care, the standard of care to be applied, given that in the case of each of Penberthy and Barclay the alleged breach arises out of their performance of functions for which they had special qualifications and training.

286 It is as well to commence with the oft-cited and regularly applied remarks of Mason J in *Wyong Shire Council v Shirt* (1980) 146 CLR 40, at 47 - 48:

In deciding whether there has been a breach of the duty of care the tribunal of fact must first ask itself whether a reasonable man in the defendant's position would have foreseen that his conduct involved a risk of injury to the plaintiff or to a class of persons including the plaintiff. If the answer be in the affirmative, it is then for the tribunal of fact to determine what a reasonable man would do by way of response to the risk. The perception of the reasonable man's response calls for a consideration of the magnitude of the risk and the degree of the probability of its occurrence, along with the expense, difficulty and inconvenience of taking alleviating action and any other conflicting responsibilities which the defendant may have. It is only when these matters are balanced out that the tribunal of fact can confidently assert what is the standard of response to be ascribed to the reasonable man placed in the defendant's position.

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The considerations to which I have referred indicate that a risk of injury which is remote in the sense that it is extremely unlikely to occur may nevertheless constitute a foreseeable risk. A risk which is not far-fetched or fanciful is real and therefore foreseeable. But, as we have seen, the existence of a foreseeable risk of injury does not in itself dispose of the question of breach of duty. The magnitude of the risk and its degree of probability remain to be considered with other relevant factors.

287 Because the defendants whose conduct is in question in this regard professed to exercise special skills, the standard of care they were to apply was to be related to their expertise. *Rogers v Whitaker* (1992) 175 CLR 479 was a significant decision in this area. It is the leading case. Rogers was an ophthalmic surgeon. The question was the standard of care he was to apply in warning a patient that an operation on an eye in which she had little sight would carry a risk that she might, as a consequence, not only not achieve an improvement in the sight of that eye, but might suffer impairment of sight in her good eye. The court departed from the statement of the law which had previously been thought to apply, that the standard of care to be employed was that followed or supported by a responsible body of opinion within the relevant profession or trade.

288 The majority, at 487, said:

In Australia, it has been accepted that the standard of care to be observed by a person with some special skill or competence is that of the ordinary skilled person exercising and professing to have that special skill. But, that standard is not determined solely or even primarily by reference to the practice followed or supported by a responsible body of opinion in the relevant profession or trade. ... [T]he courts have adopted the principle that, while evidence of acceptable medical practice is a useful guide for the courts, it is for the courts to adjudicate on what is the appropriate standard of care

Barclay was in breach of his duty of care

289 I have discussed the facts in relation to the replacement of the sleeve bearing and Mr Barclay's involvement in that process, and I have found, having regard to the evidence particularly of the witnesses Barton and MacGillivray, supported by the evidence of the metallurgist Dunning, that the aluminium bronze alloy specified by Barclay in the relevant engineering order was unsuitable for use in this application. It lacked the properties of the leaded bronze alloy which had originally been used in the sleeve bearing.

290 Mr Barclay should have been aware that the shaft of the spindle which was supported by the bearing would revolve at high speed,

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lubricated by the aviation fuel drawn into the chamber of the pump. Mr Barclay should also have been aware that the tolerance involved in the clearance between the shaft and the sleeve bearing was a fine one, and if it was compromised to any degree, that could critically increase the potential for friction to occur and to build, interfering with the temperature at which this section of the pump operated, and affecting the expansion of the spindle shaft within the sleeve.

291 Mr Barclay should also have been aware that friction in this area of the pump would promote the galling process which I have described. If that process led to the transfer of material from the shaft to the sleeve bearing, that would further compromise the capacity to properly lubricate the pump, and would increase the torsional resistance. The leaded bronze alloy had a quality described by the witnesses as embedability. By that they meant that material transferred from the shaft to the sleeve would effectively be taken into the metal out of which the bearing was made if the leaded bronze alloy was used. The aluminium bronze alloy did not have the same capacity, and would therefore promote the difficulty attendant upon the galling process.

292 Again, Mr Barclay should have specified in the engineering order a highly honed finish to the internal surface of the sleeve bearing. That would have assisted the reduction in the degree of friction attendant upon the operation of the pump. The failure to specify such a finish, or to check that it was properly done, created the risk that the manufacturer of the replacement bearing might not understand what was required and might apply a more roughly honed surface, as indeed was the case here.

293 If properly made, the bearing should have been capable of accommodating the spindle shaft revolving at high speed for the minimum of 1600 hours specified. This bearing was not up to the task. As I have found, it failed after 1353 hours of operation, and failed because the specification for its manufacture provided in Mr Barclay's engineering order permitted a higher level of risk of increased torsional resistance than ought to have been the case. The point finally arrived just after VH-ANV had taken off, that the torsional resistance increased beyond the torsional load which the drive pin was capable of sustaining and caused the pin to fracture at the sacrificial point, as it was designed to do, producing the obvious consequence that the pump failed, the engine shut down, and the capacity of the aircraft to fly was at least severely compromised, this being a twin-engined aircraft.

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294 Mr Barclay assumed responsibility for the design which he had specified in the order. In addition, he approved it, knowingly participating in that way in a process which was designed to give the comfort that an expert engineer had turned his mind to what was required in the manufacture of the component part, having regard to its operating capacity and the important safety considerations. Mr Barclay should have known that he was specifying a different metallic substance. If he did not know, he was negligent in not finding out. The evidence before me was that at low cost he could have subjected the existing worn bearing to metallurgical analysis, which would have enabled him to specify an alloy which would replicate the original bearing and allow its properties to be reproduced.

295 If Mr Barclay was going to make a change, he had to bring his expertise as an aeronautical engineer to bear, and the change had to be one which would make the sleeve bearing as good as that originally manufactured. Further, as I have said, I am driven to the conclusion that the failure to specify the highly smoothed surface of the bearing must simply have been a careless oversight.

296 While in a number of respects, the evidence does not carry me to firm conclusions as to what Barclay did or did not do, within the framework of the highly particularised allegations made by FSS, I am satisfied that, by his acts or his omission to act in the ways that I have discussed above, Barclay's negligence is clearly established. While I think it might reasonably be said to be the case that the risk which eventuated might be regarded as of a low order of magnitude, Barclay's failures were central to the exercise of his expertise as an aeronautical engineer, and central to his role as an approving authority. The evidence suggested that it was a simple task to avoid the risk which was created, at low cost. It will be evident that I am satisfied that there was a clearly foreseeable risk of the kind which developed which was simply not attended to. Mr Barclay's negligence is established at the suit of the various plaintiffs, and at the suit of FSS.

Penberthy was in breach of his duty of care

297 I have discussed the evidence about the way in which the flight developed, and Mr Penberthy's conduct, at some considerable length, and I have made various findings of fact. It remains now to draw that material together in relation to the central thrust of the evidence which was designed to examine the conduct of Mr Penberthy as an expert, hugely

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experienced pilot, when he was confronted with the failure of the right-hand fuel pump.

298 Mr Penberthy was a highly-qualified and very experienced pilot, with many hours of commercial flying to his credit. He was fully familiar with the C404 Titan aircraft. On 11 August 2003, when he was to undertake this flight, he was fit and fully competent. His self-brief procedure was appropriate. It had the necessary content, including fixing upon a decision speed. His checks of the aircraft were appropriate to establish that it was fit to fly. All the evidence was that he was not obliged to pay regard to the existence of the powerlines as an obstacle to be avoided on take-off.

299 I have found the allegations about the use of taxiway Delta as the point of commencing the take-off run to be causally irrelevant, and as failing to demonstrate a lack of care. I have found that the take-off run was properly handled by Mr Penberthy, the aircraft developed power normally, there was no indication of any problem, rotation occurred appropriately, the aircraft became airborne at an appropriate speed with the flaps in the right position, and Mr Penberthy then, in the normal course of events, proceeded to retract the undercarriage. No occasion arose to abort the take-off run before the aircraft became airborne.

300 The evidence supports the finding which I make, that almost immediately after the aircraft became airborne, the right-hand engine-driven fuel pump failed, causing the right-hand engine almost immediately to lose power completely. Mr Penberthy reacted quickly, and he followed the procedure to make the aircraft safe and to clean it up, as dictated both by his experience as a pilot and by the aircraft manual.

301 By the time that was achieved and the aircraft was stabilised, having achieved a height of in the region of 100 feet above the ground, and having achieved an adequate airspeed, Mr Penberthy looked up, saw the powerlines ahead and, although they were nearly 2 kilometres away, and although there was in fact every prospect that, if he flew the aircraft straight ahead or made a minimal deviation to the left, the aircraft would have cleared the powerlines with room to spare, certainly an appropriate safety margin of 50 feet or so, Mr Penberthy instantly decided that he had to turn to the left to avoid this potential obstacle.

302 He was aware that to do so would rob the aircraft of its already substantially compromised capacity to gain airspeed and climb. But he appreciated that, handled carefully, the aircraft apparently had still a

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limited capacity to climb out of danger. Nonetheless, when he informed the tower of the emergency, he did so by saying he had to 'come around'.

303 The turn he undertook was relatively gentle, but nonetheless demonstrated that, while turning, the aircraft in its then state, with one engine out, could not climb, and might indeed lose height and airspeed. The closest to the powerlines that the aircraft came was a considerable distance of about 750 metres. Mr Penberthy could reasonably have waited so that he might see more clearly what the capacity of the aircraft to climb was, and how real a danger the powerlines represented. There was in fact time available to do so.

304 However, his decision to turn the aircraft to the left was, in my view, not unreasonable. The expert pilots who gave evidence were themselves inclined to excuse this decision. But I think that the aircraft's demonstrated lack of capacity to climb and increase its speed in the course of the turn caused Mr Penberthy, not to panic, but to develop what he denied; a case of 'gethomeitis'. He became focused on the need to return the aircraft to land at the airport. Indeed, when, having made a shallow left-hand turn of about 90°, he transmitted to the tower that he would 'like to land on the other one'. He was making a statement which revealed his mindset.

305 It seems that his original plan was to make a 360° turn and land on runway 24R, from which he had taken off. But I think it became clear to him that the performance of the aircraft in the turn was so degraded that he could not adhere to that plan, and he then sought to get back to the airport by the shortest possible route, which involved landing on runway 30. As he straightened the aircraft and flew it more towards the east to give it the clearance required to enable a landing on runway 30, it gained airspeed marginally. Nonetheless, as soon as the left turn was resumed, in an endeavour to reach runway 30, airspeed was dangerously reduced and the capacity of the aircraft to maintain height was seriously compromised. Mr Penberthy then decided to aim for cleared areas of the airport to bring the aircraft back onto the ground with relative safety. As we have seen, even that proved to be impossible.

306 In my opinion, Mr Penberthy's negligence lies in his failure to take advantage of the aircraft's residual capacity to climb and gain speed, if not before, then once he achieved a heading when he could fly the aircraft in an easterly direction, generally parallel to the obstacle, as he perceived it to be, presented by the powerlines. On that heading, as Mr Penberthy himself conceded, the aircraft was presented with no obstacle ahead for

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some kilometres and, as Mr Penberthy appreciated, to fly it straight would in all probability allow the aircraft its best chance to gain height and speed until it reached a safe height of somewhere between 500 feet to 1,000 feet above the ground, at which point it could be turned and flown back to the airfield, with a good chance that it could be aligned with a suitable runway and landed safely.

307 Of course, it is one's instinct, when presented with an emergency of the kind which beset Mr Penberthy, to get the aircraft back on the ground as soon as possible and a pilot is instructed to do as soon as is practicable. But, as Mr Penberthy well understood, that was an obligation to take the steps which were best designed to enable the aircraft to be landed safely, and this he did not do. He did not decide against flying parallel to the powerlines because he perceived some obstacle in the way of doing so. He did not give that course proper consideration or, indeed, any substantial consideration. It was in that way that he breached the duty of care he owed to his passengers and their employer, Nautronix.

Negligence: causation

308 As I have observed, Penberthy, for whose negligence FSS is admittedly vicariously liable, and FSS, plead that Penberthy was not negligent, but that the loss or damage sustained by the plaintiffs was caused by the negligence of Barclay. That proposition requires no discussion. I have found that Penberthy was negligent and, as a matter of fact, it is abundantly clear that the loss or damage sustained by all the plaintiffs was caused, at least in part, by that negligence, putting to one side any issue as to the nature of the loss or damage which may be claimed: the question of the claim by Nautronix for economic loss. To the extent that it is necessary to express that conclusion more amply, I would do so in what follows.

309 A more pointed issue of causation is raised by Barclay who, of course, also denies that he was negligent. He raised the issue of causation by his pleading, and amplified the case at trial by presenting the argument that the facts supported the conclusion that any negligence by Barclay was not causatively related to the harm suffered by the plaintiffs, which was caused by the negligence of Penberthy. In other words, Barclay's case is that Penberthy's negligence intervened in the process of causation and became the sole cause of the harm sustained by the plaintiffs, which was in no way related to any negligence of Barclay in the manufacture of the sleeve bearing in the right-hand fuel pump which failed if, contrary to his

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case, as I have found, he was negligent in his involvement in that regard, and the fuel pump did fail.

310 There has been much written about the question of causation in negligence in various cases decided by the High Court over recent years. But a good starting point remains the case of *March v E & MH Stramare Pty Ltd* (1991) 171 CLR 506. In that case it will be recalled that March was the driver of a car which ran into a truck which had been negligently parked, straddling the centre line of a six-lane road. The accident happened at night, and the truck's parking and hazard lights were operating. March was considerably under the influence of alcohol and was driving too fast. The question therefore was whether the negligence of the driver of the truck was overtaken by the subsequent negligence of the plaintiff so as to break the causal connection, or whether both the plaintiff and the truck driver remained causatively responsible for the plaintiff's injuries, thereby leading to an apportionment of liability. The judgment of the trial judge to that effect was restored.

311 The court held that causation in negligence was properly to be treated simply as a question of fact, informed by notions of commonsense and policy considerations as to when one party should be held to be responsible for the harm suffered by another. Only McHugh J considered that the application of the 'but for' or causa sine qua non test of causation was, or might now be regarded as, an exclusive test of causation, although the other members of the court considered that the 'but for' test would be a useful tool or guide in the vast majority of cases. Treated in that way, their Honours held, the law did not preclude the conduct of parties being regarded as concurrently causing the harm for which the plaintiff sued. So in relation to any such party, his conduct would be regarded as causatively linked to the harm suffered if it made a material contribution to that harm: Mason CJ at 515 - 516.

312 As to the issue of a supervening cause, or novus actus interveniens, Mason CJ said:

The fact that the intervening action is deliberate or voluntary does not necessarily mean that the plaintiff's injuries are not a consequence of the defendant's negligent conduct. In some situations, a defendant may come under a duty of care not to expose the plaintiff to a risk of injury arising from deliberate or voluntary conduct or even to guard against that risk (517).

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313 At 518 - 519, his Honour added:

As a matter of both logic and commonsense, it makes no sense to regard the negligence of the plaintiff or a third party as a superseding cause or novus actus interveniens when the defendant's wrongful conduct has generated the very risk of injury resulting from the negligence of the plaintiff or a third party and that injury occurs in the ordinary course of things. In such a situation, the defendant's negligence satisfies the 'but for' test and is properly to be regarded as a cause of the consequence because there is no reason in commonsense, logic or policy for refusing to so regard it.

314 The reference to the plaintiff's harm or injury being sustained in the ordinary course of things should be noted. That does not mean, as the submissions for the second defendant imply, that the negligence of the defendant must be regarded as producing a situation such that in the ordinary course of things, the plaintiff or a third party would be caused to act negligently so as to result in the plaintiff suffering harm. It means that the injury must be one which occurs in the ordinary course of things. It must be of a kind which might be anticipated as following from negligence by the defendant and the intervening plaintiff or third party.

315 Of the case of *March*, Deane J, at 521 - 522, said:

Expressed in terms of causative fault, the effective causes of the appellant's injuries were the negligence of the second respondent in creating a hazard for a careless and inattentive driver and the negligence of the appellant in being such a driver. In these circumstances, it is not possible to isolate the fault of either the appellant or the second respondent as the 'sole' cause of the appellant's injuries. The injuries were caused by the fault of both and, that being so, the case called for apportionment of responsibility ...

316 In my opinion, much the same observation may be made about this case. Mr Barclay was responsible for the sleeve bearing being manufactured in such a way as to increase the prospect that it might fail prematurely, and it did so fail, presenting Mr Penberthy with the hazard as a consequence of the right-hand engine shutting down almost immediately after the take-off process was completed. The aircraft crashed because, in his attempt to deal with the hazard created by the negligence of Mr Barclay, Mr Penberthy was himself negligent. I would consider that in those circumstances, in this case also, it is not possible, as a matter of commonsense, and there is no requirement of policy to conclude, that the fault of Barclay is isolated by the subsequent negligence of Penberthy from being causatively related to the harm suffered by the plaintiffs. That harm was caused by the negligence of both, for which there must be an

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apportionment of liability, having regard to their respective contributions to the harm caused.

317 There have been subsequent cases decided in different factual circumstances, but all of them have applied the approach generally endorsed in *March*. Reference may be made to such cases as *Bennett v Minister of Community Welfare* (1992) 176 CLR 408; *Chappel v Hart* [1998] HCA 55; (1998) 195 CLR 232 and *Rosenberg v Percival* [2001] HCA 18; (2001) 205 CLR 434. A number of the cases have been concerned with a failure to warn of risk necessarily attendant upon the conduct of the defendant, even though that conduct may itself not be negligently performed.

318 In this court, issues of causation have been thoroughly discussed in the potentially difficult context of asbestosis cases. I have referred to *Amaca*, where the law was discussed at length. But a later case where the deceased had contracted lung cancer was *South Australia v Ellis* [2008] WASC 200; (2008) 37 WAR 1. There it was argued that the deceased's smoking, which continued well after the asbestosis exposure, should be regarded as the intervening cause and the sole cause of the lung cancer. All members of the Court of Appeal rejected this proposition because, on the evidence, it was probably the case that the risk of contracting lung cancer had been heightened by both the exposure to asbestos and the deceased's smoking habit: Martin CJ (dissenting on other grounds) at 74 [279] - [280], and Steytler P and McLure JA at 89 - 90 [354].

319 Reference should also be made to the recent endorsement of the principles referred to above by the High Court in *Roads and Traffic Authority v Royal* [2008] HCA 19; (2008) 82 ALJR 870, where *March* was applied. See Gummow, Hayne and Heydon JJ at 878 [32], and Keifel J at 896 [135].

320 In this case, in my opinion, it is sufficient to express my conclusion about causation in the following terms. The negligence of Barclay created a heightened risk that the right-hand engine-driven fuel pump might fail. That risk eventuated while the aircraft was in flight. That caused the right-hand engine to shut down and presented Penberthy with the risk that the aircraft might crash. He was negligent in his handling of the aircraft. It did crash, and that crash caused harm to be suffered by all six plaintiffs, subject, in the case of Nautronix (and conceivably in the case of FSS in the action CIV 2279 of 2009), to the decision still to be made about the nature of the harm for which recovery may be made.

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321 But the harm sustained by the plaintiffs is, in this case, properly to be regarded as resulting from the cumulative effect of the negligent conduct of Barclay and Penberthy. The negligence of Penberthy did not break the chain of causation. It operated within the factual environment of the very risk created by the negligence of Barclay. Penberthy failed to prevent that risk resulting in the harm that was suffered. But that did not elevate his negligence to an independent cause of the harm suffered, which might be regarded as overtaking and rendering causally ineffectual the negligence of Barclay.

Negligence: economic loss

322 I have mentioned that Nautronix makes a claim against the defendants generally for economic loss suffered by it. The question for me in this trial of issues is whether Nautronix may succeed in its claim against the defendants, to the extent that the claim is for pure economic loss, ie, loss arising from the disruption of its business activities and the damage it sustained, it alleges, in the pursuit of its economic interests. Here we are concerned with damage of a kind which is not damage to property and is not personal injury, or associated with such damage or loss. I understand, of course, that I am not to make an assessment of any economic loss which may have been sustained by Nautronix. Indeed, on the evidence before me, I could not do so. I am not concerned with the assessment of damages, but with whether Nautronix may succeed in its claim that it suffered damage or loss of a purely financial kind.

323 There may be an element of a claim of this kind by FSS against Barclay in CIV 2279 of 2009, but it will be more useful to focus on the claim by Nautronix, and in the course of that discussion the claim by FSS will be resolved. That Nautronix did suffer such loss or damage is undoubted. I have referred briefly to the roles played in the organisation of Nautronix by Messrs Cifuentes, Knubley and Perincek, and the men who died, Messrs Warriner and Protoolis.

324 Nautronix pleads its claim most particularly in relation to damages for breach of contract. But as the matter was litigated, it is clear that the broad thrust of its claim in negligence is based upon the following propositions. The flight on 11 August 2003 was for the purpose of testing and developing marine technology and underwater communication systems which Nautronix hoped to exploit commercially by entering into contractual arrangements in the defence, oil and gas, and related enterprises or industries. That this was the purpose of the flight was

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directly known to FSS, from whom the aircraft was chartered. Penberthy knew that this was the case, in broad terms.

325 The intellectual property in the technology in question, vested in Nautronix, was contributed substantially by its expert employees, who also had control of the advancement of the project to develop the technology to the point of sale or other contractual exploitation. The harm to and loss of those employees to Nautronix inhibited its capacity to develop and commercially exploit the technology, quite apart from the loss and damage it suffered as a result of loss of the equipment it had installed in the aircraft. It will be recalled that I have referred, briefly and in general terms, to modifications made to the aircraft to accommodate equipment installed by Nautronix.

326 FSS and Penberthy, although they deny the particular pleading of these matters in terms of the claim for breach of contract, admit the allegation made in par 22 of the consolidated statement of claim, including the pleading in par 22.4, that, '[Nautronix] suffered property damage and economic loss.' The same pleading is specifically denied on behalf of Mr Barclay, as are the more particular allegations made later in the consolidated statement of claim concerned with the claimed breach of contract.

327 There are some imperfections in the pleading, but at trial the action CIV 1312 of 2008 was litigated on the clear basis that Barclay, in particular, raised the contention that this was not a case in which Nautronix could pursue a claim in negligence that it had suffered economic loss as a result of the accident. Further, it was contended that so far as the Nautronix claim, in this regard, depended upon the loss of the services of its employees, it was tantamount to pursuing an action per quod servitium amisit, which was not open as a matter of law. That issue, so far as it affects liability, was firmly joined, and I will deal with it upon that basis.

328 Before examining the law, it is necessary only to say that the nature of the technology being developed by Nautronix was explained in evidence by its finance director, Mr Watson. He particularly referred to the pursuit of contractual arrangements with the navies of Australia and the USA. I think it is fair to say that his evidence in relation to these matters established the general proposition that, in the manner to which I have referred above, Nautronix suffered economic loss as a result of the accident, which I have held to have been brought about by the breach of

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the duty of care owed by Barclay and Penberthy, for the conduct of whom FSS is vicariously liable.

329 Mr Watson also gave evidence of more specific contractual matters. But I think in this regard, his evidence amounted to no more than the reference to documents said to establish the terms of the charter contract entered into as a result of the course of dealing between Nautronix and FSS of which the witness spoke. Mr Watson's evidence added little to what appears on the face of the documents upon which Nautronix relies. I shall return to these matters when discussing the contractual claim.

330 I turn now to the question in issue between Nautronix and all defendants, as to whether the claim made by Nautronix in negligence may include a claim to recover damages for the economic or financial loss which I find, in general terms, that it sustained.

331 It is trite to observe that the law in this country originally set its face against such recovery. That was so until the decision of the House of Lords in *Hedley Byrne & Co Ltd v Heller & Partners Ltd* [1964] AC 465, concerning liability for negligent misstatements. The law in this country then commenced to recognise that a duty of care to protect against pure economic loss might be imposed, and the question became whether liability for negligent misstatements should be regarded as an exception to the general rule that the law would only impose and protect duties of care to provide recompense for physical injury, damage to property and the harm which might reasonably be expected to flow from the occurrence of such injury and loss.

332 Certainly that could not be said after the High Court decided *Caltex Oil (Aust) Pty Ltd v The Dredge 'Willemstad'* (1976) 136 CLR 529. The dredge had fractured an oil pipeline which ran across the seabed of a bay connecting an oil refinery to a shipping terminal. Crude oil would be pumped across to the refinery and the refined product pumped back to the terminal, to be shipped out. The pipeline was owned by the refinery and the terminal was owned by another company. The contractual arrangements between the two companies were as I have mentioned.

333 The pipeline was damaged by the dredge as the result of an error by a marine surveyor employed by the company which operated the dredge, who showed the pipeline in the wrong position on a survey chart. The company which operated the terminal incurred expense in otherwise transporting oil from the refinery to the terminal until the pipeline was repaired, and it was held that that expense, caused by the negligence of

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those responsible for the dredge, was recoverable, although not of itself a consequence of the damage to the pipeline, in respect of which harm recovery was available to the refinery.

334 It was a significant step in the development of the law, but it depended very substantially upon the fact that the defendant was found to have knowledge, or constructive knowledge, ie, the reasonable means of knowledge, of the existence and likely impact, by way of economic loss, upon the plaintiff who operated the terminal and received the product of refined oil through the pipeline for shipment.

335 Since then, this branch of the law of negligence, if I may term it that, has been developed incrementally and carefully, to avoid the result that defendants would have to guard against their breach of duty causing loss for which there might be recovery, although it was sustained in indeterminate circumstances by an indeterminate class of plaintiff.

336 In *Fortuna Seafoods Pty Ltd v The Ship 'Eternal Wind'* [2005] QCA 405; (2008) 1 Qd R 429, McMurdo P stated the applicable legal principles in relation to a negligence claim where the plaintiff suffered pure economic loss by saying, at 437 [6] that:

[T]he determination of whether a defendant owes a claimant a duty of care not to cause mere economic loss will depend on a combination of factors including the reasonable foresight of the likelihood of harm; the defendant's knowledge or means of knowledge of an ascertainable, determinate class of persons who are at risk of foreseeable harm; the claimant's vulnerability or whether they are unable to protect themselves from the foreseeable harm; whether the implication of a duty would impair the defendant's legitimate pursuit of autonomous commercial interests including the existence of any contracts between the claimant and defendant; whether the damage flowed from the occurrence of activities within the defendant's control; the closeness of the relationship between the parties and the existence of any other special circumstances justifying compensation (citations omitted)

Jerrard JA and Dutney J were the other members of the court. Jerrard JA stated the applicable principles in similar terms at 456 - 457 [75]. His Honour, however, dissented on the facts of that case, while Dutney J took a view of the facts similar to that of McMurdo P, and therefore formed the majority.

337 Fortuna was the defendant at first instance. As a result of its negligence, a commercial fishing vessel was sunk. The plaintiff was the agent of the owner of the vessel who processed and sold the catch. That

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was a common arrangement, and so it was held that although the negligent defendant may have had no knowledge of the identity of the plaintiff, it did have knowledge, at least constructively, of the agent as a member of a class of persons who might reasonably be expected to be in a position where they would suffer economic loss as a result of the sinking of a commercial fishing vessel.

338 It will be seen that there are some parallels factually between that case and this, as the aircraft was owned by FSS and, among other uses, it was chartered for commercial purposes by persons or entities seeking to make a profit from the use of the aircraft, and who might suffer loss upon its destruction. But I hasten to add that the parallel between the facts of this case, and those in *Fortuna*, is by no means complete.

339 The crucial matter to be considered as to whether Nautronix may be the beneficiary of a duty of care owed by either or both of Penberthy and Barclay to enable it to recover pure economic loss suffered by it, is the question of indeterminacy of liability, whether Nautronix was a member of a class of plaintiffs or victims of negligence by the defendants causing the destruction of the aircraft and the injuries and deaths of the employees of Nautronix, which class was limited and ascertainable, or alternatively was effectively indeterminate.

340 In the former case Nautronix would be able to recover damages for the economic loss sustained, as well as damages for the loss of its property. In the latter circumstance, the relevant defendant (and, of course, the matter must be considered separately in relation to each of Penberthy and Barclay) would be held not to owe a duty of care to Nautronix in relation to economic loss. This is the factor described by McMurdo P as, 'the defendant's knowledge or means of knowledge of an ascertainable, determinate class of persons who are at risk of foreseeable harm'.

341 In *Perre* at 194 [10], Gleeson CJ said:

[K]nowledge (actual, or that which a reasonable person would have) of an individual, or an ascertainable class of persons, who is or are reliant, and therefore vulnerable, is a significant factor in establishing a duty of care.

His Honour went on to observe that, of course, vulnerability can arise from circumstances other than reliance.

342 In *Perre*, it is helpful also to refer to the judgment of McHugh J, particularly at 220 - 225 [106] - [117]. His Honour spoke of what is

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described as the 'ripple effect' of careless conduct. Economic loss sustained directly as a result of the negligence of the defendant by a trader might cause economic loss also to those who deal commercially with the trader, and so on down the line. But, at 221 - 222 [108] McHugh J made the point that:

The number of claims or their size, therefore, does not of itself raise any issue of indeterminacy. Indeterminacy depends upon what the defendant knew or ought to have known of the number of claimants and the nature of their likely claims, not the number or size of those claims.

343 Concerns about indeterminacy caused McHugh J to dissent from the approach of the majority in *Perre*, which made no distinction between any plaintiff in relation to the question whether the defendant owed a duty of care. Hayne J was similarly moved to dissent on the facts in relation to particular groups of claimants. As I read the case, neither McHugh J nor Hayne J took issue with the statement of principle supported by the majority. Their dissent was a judgment about the facts of the case, to which I will not refer as they are dissimilar to this case: as to the views of Hayne J, see his judgment at 303 - 305 [336] - [343].

344 Finally, the decision of the High Court in *Woolcock Street Investments Pty Ltd v CDG Pty Ltd* [2004] HCA 16; (2004) 216 CLR 515 was cited. Again, the case is factually dissimilar from this, but it contains an affirmation of the relevant principles to which succinct reference is made in *Fortuna*. I do not consider it to be necessary to refer separately to the relevant passages from the various judgments, particularly that of Gleeson CJ, Gummow, Hayne and Heydon JJ, concerned with the notion of the 'vulnerability' of the plaintiff, the plaintiff's demonstrated incapacity to protect itself from the consequences of the defendant's negligence.

My conclusion as to this claim

345 Turning to this case, I note that in its final submissions, Nautronix submits that FSS would owe a duty to Nautronix in relation to the economic loss suffered in the circumstances of this case. I think that will be so, having regard to all the various matters enumerated as the factors upon which the existence of such a duty may depend. But it is unnecessary to consider the matter in detail because the matters alleged against FSS in relation to its breach of a duty of care, independently of its vicarious liability for the negligence of Penberthy, concern an alleged failure to ensure that VH-ANV was in a sound mechanical condition prior to the flight on 11 August 2003, that it was safe to fly the aircraft, and that Penberthy was a pilot who was appropriately qualified and skilled and

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able to exercise due care in his handling of the aircraft, having regard to the professional standards affecting a pilot in Penberthy's position. I have found no breach of a duty of care owed by FSS in relation to its maintenance of the aircraft, its provision of an aircraft capable of performing the service for which it was chartered, and its provision of Penberthy as a pilot properly qualified and having the appropriate degree of professional expertise to fly the aircraft. The liability of FSS, as I have found, is vicarious liability for the negligence of Penberthy.

346 As to that, it will be apparent from my findings, previously expressed, that in my view Penberthy did owe a duty of care not to cause economic loss to Nautronix, and he breached that duty. He knew the purpose of the flight. He knew that it was a commercial purpose. He knew that the company who employed his passengers was Nautronix. Mr Penberthy knew, therefore, not only that Nautronix was a member of an ascertainable class of commercial users of the aircraft, but that Nautronix was the particular commercial entity which depended upon the exercise of his professional skill as a pilot for the successful performance of the service for which the aircraft was chartered. Of course, it was the case that if Penberthy failed, as he did, to discharge that duty of care, Nautronix was vulnerable in the sense that they were unable to protect themselves from the foreseeable harm of an economic nature caused, in part, by Penberthy's negligence. There are no other circumstances specially affecting the existence of a duty of care owed by Penberthy, and vicariously by FSS, to Nautronix in relation to economic loss suffered by that plaintiff.

347 The position in respect of a duty of care in relation to economic loss sustained by Nautronix, owed by the defendant Barclay is, I think, by no means so straightforward. I have referred a number of times, in broad summary, to the nature of the economic loss which I have found was sustained, although the pleading is rather odd because it appears, when substantially particularised, to be pleaded in relation to the breach of the charter contract alleged. The case was fought on the basis that the relevant economic loss attributable to the negligent conduct of Barclay was that, as a result of the crash, by the deaths and injuries suffered by the senior staff of Nautronix who were passengers on the plane, and the damage or destruction of its equipment, economic loss was caused to Nautronix.

348 This arose, I accept, by reason of the delays to which Mr Watson referred, in developing and testing the marine technology and subsea communications systems for the purpose of their commercial exploitation

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in the defence arena, and in the oil and gas and related industries. I have found it to be the case, without, of course, embarking upon any assessment of damages, that Nautronix lost the intellectual property and corporate knowledge of the technology and communication systems which it was in the process of testing and developing for the purposes of its business.

349 Barclay's connection with all that, and his negligent conduct in breach of his duty of care owed generally to those who might foreseeably suffer loss and damage, and therefore, in the conventional areas of the claim, a duty owed to all six plaintiffs, was in his involvement with the design of the replacement sleeve bearing for the right-hand, engine-driven fuel pump. That involvement occurred some three years before the day of the accident, 11 August 2003.

350 For Nautronix, it was put to me that the evidence which showed an involvement of Barclay in the even earlier arrangements to modify the aircraft to install a sonar buoy drop tube for a company called Kevron Aerial Surveys Pty Ltd, which was linked to Nautronix, would support the inference that Barclay knew that Nautronix used aircraft supplied by FSS for what is described in Nautronix's submissions as its 'highly specialised work'. It is submitted that the absence of Barclay from the witness box would support that conclusion, applying the decision in *Jones v Dunkel*. However, to my mind, to use the decision in that way would be to use it wrongly to supply a link in the evidentiary chain which the evidence would otherwise not provide.

351 There is, in fact, I think, nothing more in the evidence than would support the conclusion, in fact put at [201] of the final submissions for Nautronix, that the class of persons Barclay ought reasonably to have had in mind as being at risk of foreseeable harm if he was negligent in the specification of the requirements for the sleeve bearing, and the pump failed, were those persons who hired the aircraft of FSS, presumably for a variety of commercial purposes, or simply to provide chartered air transport.

352 In my opinion, the relevant class into which the plaintiff Nautronix must fall cannot be defined more closely, and that is the crucial difficulty in relation to this head of claim. It is an example of the 'ripple effect' discussed by McHugh J in *Perre*, particularly at 223 [112], where his Honour said that:

[A]s a general rule, no duty will be owed to those who suffer loss as part of a ripple effect. Ordinarily, it will be an artificial exercise to conclude

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that, before acting or failing to act, the defendant should have contemplated the interests of those persons who suffer loss because of the ripple effect of economic loss on the first line victims. While the defendant might reasonably foresee that the first line victims might have contractual and similar relationships with others, it would usually be stretching the concept of determinacy to hold that the defendant could have realistically calculated its liability to second line victims.

353 My conclusion then in relation to the question whether Barclay owed a duty of care to Nautronix in relation to its economic loss, is that it was reasonably foreseeable for a person in Barclay's position that economic loss might result, in general terms, if an aircraft was caused to crash upon the failure of an engine in flight as a result of the failure of an engine-driven fuel pump caused by negligence in the modification of the pump by the insertion of an inadequate sleeve bearing. But that is not enough to impose a duty of care and, in this case, it seems to me that the plaintiff Nautronix fails to place itself within a reasonably determinate class of persons at risk of that foreseeable harm. The class identified by Nautronix is essentially indeterminate. It can be narrowed no further than being comprised of any user of the aircraft under any type of arrangement who might suffer loss of a purely financial kind, in whatever manner it might be incurred, if the aircraft crashed. That may be a class even wider than those users of the aircraft who might be described as doing so in furtherance of a commercial interest.

354 Nor is it the case that Nautronix was vulnerable to suffer the harm in the sense that it was unable, reasonably, to protect itself from such harm or loss. For Barclay, it was submitted that Nautronix could have entered into a contractual arrangement with FSS which would enable it to recover losses incurred if the contract for the hire of the aircraft was breached by failure to deliver the service for which Nautronix had contracted. It is pointed out that Nautronix has, in fact, sued FSS for breach of what is described as the charter contract. I have not yet discussed that issue. But for Barclay it is put that to decline to impose a duty of care in relation to economic loss upon Barclay in favour of Nautronix, does not leave Nautronix without a remedy as it had the capacity to protect itself from the foreseeable harm in question.

355 I think there is merit in this submission, which may be encapsulated in the proposition expressed by McHugh J in *Perre* at 225 [118], when his Honour said:

If the plaintiff has taken, or could have taken steps to protect itself from the defendant's conduct and was not induced by the defendant's conduct from taking such steps, there is no reason why the law should step in and

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impose a duty on the defendant to protect the plaintiff from the risk of pure economic loss.

No such difficulties arise in relation to FSS as the owner and commercial operator of the aircraft, and I conclude that Barclay owed FSS a duty of care to guard against economic loss as claimed by FSS.

Loss of services

356 Finally in relation to this head of claim, Barclay draws attention to the fact that in the consolidated statement of claim, par 23.2, in relation to FSS and Penberthy, Nautronix pleads that those defendants should have been aware that, 'any failure to exercise reasonable care and skill in the piloting of the plane was likely to result in death or injury to the passengers and resultant economic loss to [Nautronix]'. Similarly, in par 42, the same proposition is pleaded generally against the defendants, although, as I have said, on a fair reading, the pleading might be taken to relate to the alleged breach of the charter contract rather than as the pleading of a tortious duty imposed at common law. However that may be, in his defence, at par 44, Barclay pleads that so far as Nautronix seeks to rely on the action per quod servitium amisit in respect of the consequences of the deaths of Messrs Protoolis and Warriner, 'such claim is not available at common law and is misconceived'. At trial, issue was joined on that proposition.

357 It seems to me that to so argue is to express the position too widely. Certainly the case principally relied upon for the defendant, ***Swan v Williams (Demolition) Pty Ltd*** (1987) 9 NSWLR 172, held that at common law an action could not be brought by an employer for damages for loss of services caused by the negligently caused death of the employee, but generally it appears that the law may provide for such an action in relation to the loss of services of an employee, the measure of damages being that which measures the value of the services lost.

358 It is certainly the case that a claim in negligence formulated in that way is often said to be falling into disuse because it is unsound in principle. Concern was felt that the theory that an employer had a proprietary interest in the services of his employee was unsound. Further, in this country, at least prior to ***Caltex***, the availability of such an action was seen to be inconsistent with the incapacity generally to sue in tort to protect financial interests. But as we have seen, the law has moved on since then, and there is a developing jurisprudence in relation to the availability of an action in negligence where the damage relied upon is

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purely financial loss, subject to the careful prescriptions emerging from recent decisions.

359 For completeness then, I express the view that had I considered that Nautronix had available to it an action against Barclay for the negligent damage to its financial interests, I would not have held that action to be foreclosed, so far as the loss relied upon resulted from the deaths of Messrs Protoolis and Warriner. I would have taken the view that the claim being made was for the damage to the financial interests of Nautronix caused by the breach of the duty of care owed by Barclay, an action to recover for the damage represented by the interference with the intellectual property in the technology being developed by Nautronix, rather than an action concerned to directly compensate Nautronix for the loss, whether entirely or for a time, of the services provided by the five employees who were either killed or injured as a result of the crash of the aircraft.

Apportionment of liability

360 It is necessary, having regard to the pleadings, to apportion liability as between Barclay and Penberthy, pursuant to s 7(1)(c) of the *Law Reform (Contributory Negligence and Tortfeasors' Contribution) Act 1947* (WA), which provides that, subject to the relevant part of the *Civil Liability Act* which, as I have noted, has no application in the circumstances of this case:

where damage is suffered by a person as a result of a tort, any tortfeasor liable in respect of that damage may recover contribution from any other tortfeasor who is ... liable in respect of the same damage

361 By s 7(2):

the amount of the contribution recoverable from any person shall be such as may be found by the Court to be just and equitable.

Although under that subsection there is power to order a contribution which will amount to a complete indemnity, and such an outcome is sought by FSS, that would not, in my opinion, be an appropriate order in this case.

362 The clear implication to be derived from the words of the statute is that the task of the court is to evaluate the respective contributions made by each negligent party to the harm suffered. As the High Court said in *Podrebersek v Australian Iron & Steel Pty Ltd* (1985) 59 ALJR 492, a

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case of contributory negligence to which, under the Act, the same approach is to be applied:

The making of an apportionment as between a plaintiff and a defendant of their respective shares in the responsibility for the damage involves a comparison both of culpability, ie, of the degree of departure from the standard of care of the reasonable man, and of the relative importance of the acts of the parties in causing the damage. It is the whole conduct of each negligent party in relation to the circumstances of the accident which must be subjected to comparative examination. The significance of the various elements involved in such an examination will vary from case to case; for example, the circumstances of some cases may be such that a comparison of the relative importance of the acts of the parties in causing the damage will be of little, if any, importance (494) (citations omitted).

363 This is not a case where that comparison is of relatively little importance. Indeed, in my opinion, that comparison is a useful aid, in this case, to the judgment about apportionment which I must make, just as is the comparison of the relative culpability of Barclay and Penberthy.

364 I have discussed the evidence bearing upon the evaluation of the conduct of each of Barclay and Penberthy in some detail, and I have expressed my conclusions about the manner in which each man breached his duty of care. I will not repeat what I have said about that. Barclay's negligence was, in my view, of a relatively high order of culpability. He overlooked, or failed to give effect to what was clearly within his expertise as an aeronautical engineer in relation to what was required by way of the material out of which the replacement sleeve bearing was to be manufactured, the clearance between the bearing and the spindle shaft, and the failure to specify the smooth finish required of the replacement part. That created an elevated risk of failure, having regard to what he ought reasonably have understood to be the potential consequences of the manner in which he expressed his specifications for the design of the new part. The risk of failure during the anticipated life of the part may have been relatively low, but, particularly if the pump failed in flight, the consequences could be dramatic, as they were on this occasion.

365 And yet the aircraft finally crashed because of the negligent errors of judgment made by the enormously experienced and highly qualified, Mr Penberthy. Barclay presented him with the emergency, and he failed to cope because of his negligent misjudgment in the flying of the aircraft. Had he not behaved so negligently, by turning to the left and continuing to do so, and by failing, without cause, to nurse the aircraft to a safe altitude above the ground before endeavouring to return and land at the airfield, he might well have been able to land the aircraft safely, thereby avoiding the

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harm suffered by the plaintiffs, for which these defendants are together liable. The contribution made by Penberthy's negligence therefore seems to me to be greater, not so much having regard to his culpability, but in relation to the relative importance of the conduct of Barclay and Penberthy in causing the damage in question.

366 I would apportion liability as to one-third against Barclay, and as to two-thirds against Penberthy. As to the Nautronix claim in respect of its economic loss, when damages for that loss are assessed or agreed, they will not, of course, be subject to that apportionment, but will be borne by Penberthy, and vicariously by FSS. There is an aspect of the contractual claim against FSS in relation to its potential liability to Nautronix for its economic loss which may bear upon the liability of FSS to meet that loss, but I shall deal with that in discussing the contractual claim, to which I now turn.

The charter contract: the claim

367 This head of claim is by Nautronix against FSS. In par 20 of the consolidated statement of claim it is pleaded that, on or about 11 August 2003, Nautronix and FSS entered into a charter contract for the hire of the aircraft by Nautronix from FSS and the provision of the services of a pilot to conduct the aerial work which was the purpose of the flight. It is pleaded that the charter contract was partly oral and partly in writing, but it is a distinction in terms rather than in substance, because the discussions forming the oral contract are said to have been conducted by Mr Warriner on behalf of Nautronix, and Messrs Hillier and Wallington on behalf of FSS, recorded in, or perhaps better put, conducted by emails and correspondence between the parties. Particulars are given.

368 The purpose of conducting the flight, and therefore the purpose of the provision of the aircraft and the pilot is pleaded expansively in par 32. I have referred to it on a number of occasions and found that Penberthy, and Hillier in particular, acting for FSS, was well aware of Nautronix' purpose in hiring the aircraft for the flight on 11 August 2003. The aircraft had, as I have mentioned, been modified specifically to accommodate Nautronix' requirements, and Nautronix had fitted the aircraft out with its equipment.

369 In par 33 of the statement of claim, Nautronix relies upon express terms of the charter contract that FSS would:

1. perform the services for which it was engaged with due care, diligence and skill,

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2. provide an aircraft fit for the purpose,
3. provide a pilot skilled and competent to pilot the aircraft, and
4. provide a pilot skilled and competent to perform the emergency procedures to be followed if an engine in the aircraft failed.

370 These terms are said to arise from Nautronix' standard conditions incorporated into the charter contract by a course of dealings between Nautronix and FSS between 17 June 2002 and 8 August 2003. That course of dealings involved the provision of purchase orders raised by Nautronix, and I will discuss later the manner in which it was said that the course of dealings between the parties achieved the incorporation of the standard conditions. Two such standard conditions are relied upon:

Clause 4 Services:

The Supplier or Contractor warrants that it will render the Services with due skill and care, and that materials supplied in connection with the Services will be fit for purpose.

Clause 9 Quality Assurance:

The Supplier or Contractor shall perform the services required by the Purchase Order with due care, diligence and skill.

371 As I understand the case made by Nautronix, it is that if those standard conditions were not, by the course of dealing between the parties, expressly incorporated into the charter contract, terms to the same effect were to be implied as a matter of fact, in accordance with the common law conveniently stated by the Privy Council (Viscount Dilhorne, Ld Simon and Ld Keith) in a decision applied by the courts of this country on innumerable occasions, ***BP Refinery (Westernport) Pty Ltd v Shire of Hastings*** (1977) 180 CLR 266, at 283, where their Lordships said:

[F]or a term to be implied, the following conditions (which may overlap) must be satisfied: (1) it must be reasonable and equitable; (2) it must be necessary to give business efficacy to the contract, so that no term will be implied if the contract is effective without it; (3) it must be so obvious that "it goes without saying"; (4) it must be capable of clear expression; (5) it must not contradict any express term of the contract.

372 In this case the pleader draws upon that formulation of the principle to be applied, adding, rather oddly in my view, that the implied terms set out in par 34 of the statement of claim also arise from the terms of the charter contract and, as a matter of law, pursuant to the *Trade Practices Act 1974* (Cth), s 74.

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373 I will find it useful to refer to the matters set out in the majority judgment in *BP Refinery (Westernport)*. But in this case I wish to add a reference to the recent decision of the Privy Council in *Attorney General of Belize v Belize Telecom Ltd* [2009] UKPC 10; [2009] 2 All ER 1127, where, referring to the earlier decision, at 9 [27], it was said:

The Board considers that this list is best regarded, not as series of independent tests which must each be surmounted, but rather as a collection of different ways in which judges have tried to express the central idea that the proposed implied term must spell out what the contract actually means, or in which they have explained why they did not think that it did so.

374 At 6 - 7 [16] - [17] and [21], the Board made some general observations about the process of implication. It said:

The court has no power to improve upon the instrument which it is called upon to construe, whether it be a contract, a statute or articles of association. It cannot introduce terms to make it fairer or more reasonable. It is concerned only to discover what the instrument means. However, that meaning is not necessarily or always what the authors or parties to the document would have intended. It is the meaning which the instrument would convey to a reasonable person having all the background knowledge which would reasonably be available to the audience to whom the instrument is addressed. ...

The question of implication arises when the instrument does not expressly provide for what is to happen when some event occurs. The most usual inference in such a case is that nothing is to happen. If the parties had intended something to happen, the instrument would have said so. Otherwise, the express provisions of the instrument are to continue to operate undisturbed. If the event has caused loss to one or other of the parties, the loss lies where it falls.

...

It follows that in every case in which it is said that some provision ought to be implied in an instrument, the question for the court is whether such a provision would spell out in express words what the instrument, read against the relevant background, would reasonably be understood to mean. ... There is only one question: is that what the instrument, read as a whole against the relevant background, would reasonably be understood to mean?

375 It will be noticed that this process applies the ordinary principles of construction of a contract. See *Toll (FGCT) Pty Ltd v Alphapharm Pty Ltd* [2004] HCA 52; (2004) 219 CLR 165 at 179 [40].

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376 Against that background, I need to subject the Nautronix pleading to rather more specific analysis. I have set out the express terms of the contract as pleaded in par 33, but it is to be noted that, in truth, this is a contention that the charter contract was one in which Nautronix' standard terms and conditions, cls 4 and 9, were incorporated. In my view, what is pleaded as being the express terms of the contract must be taken as a reference to particular factual matters as to the way in which it is alleged the contract was breached. In other words, it must be the case that what is said is that the obligation imposed on FSS by cls 4 and 9 of the standard conditions was an obligation to provide an aircraft which was fit for the purpose for which it was hired, and to provide a pilot who was skilled and competent to fly the aircraft, including carrying out the emergency procedures.

377 When one comes to par 34, different words are used to describe the terms which are to be implied. But the substance is effectively the same. It is said that there was an implied term obliging FSS to ensure that the aircraft was in a sound mechanical condition, and safe to fly. Then, as to the obligation to ensure that the pilot was suitably skilled and competent to fly the aircraft and perform the emergency procedures, the emergency procedures are described broadly, as I read the pleading, by asserting that there was an obligation to use the full length of the runway for the take-off roll-up, to discontinue the take-off in the event of engine failure at the point of take-off or shortly thereafter, to fly the aircraft over the powerlines, and to fly it straight ahead for a sufficient time to allow it to climb on one engine.

378 As to the implication of terms, I note that those terms pleaded in par 34 of the statement of claim are also said to be those which arise as a matter of law under s 74 of the *Trade Practices Act*. I will deal with that assertion in due course. But the gravamen of the pleading is that contained in par 35, which contends that the breach of the contract by FSS which caused the aircraft to crash, whether the relevant terms of the contract are expressly to be found therein or implied as a matter of fact or law, was the failure by FSS to:

1. Ensure that the Plane was fit for the Purpose, and in sound mechanical condition, and in safe condition for flying;
2. use due and reasonable professional care and skill in providing the Services; and

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3. ensure that Penberthy was trained and instructed in the emergency procedures to be followed if an engine in the plane failed shortly after take-off.

379

It is convenient to set out the pleading of FSS, by way of defence, by incorporating here pars 17 and 18 of the defence, in full:

17. Fugro and Penberthy deny each and every allegation in paragraphs 20, 33 and 34 of the statement of claim and say that:

17.1 Fugro and Nautronix Limited entered into a contract on 8 August 2003;

17.2 The contract was formed by:

- (a) an offer by Fugro to Nautronix Limited, contained in a letter from Fugro to Nautronix Limited dated 5 June 2003, which incorporated by reference Fugro's standard terms and conditions of contract;
- (b) a counter offer by Nautronix Limited to Fugro, contained in an email from Nautronix Limited to Fugro dated 7 August 2003, which incorporated by implication the terms of the offer, except as varied by the counter offer; and
- (c) the acceptance of that counter offer by Fugro, by its conduct on 8 August 2003, in permitting Nautronix Limited to install equipment in the plane in preparation for the flight;

17.3 It was the common understanding of Fugro and Nautronix Limited, before the acceptance of the counter offer on 8 August 2003, that an airborne acoustic telemetry trial, proposed by Nautronix Limited to be conducted during the flight, required that equipment, to be provided by Nautronix Limited:

- (a) be carried in the plane to airspace above the ocean west of Rottnest Island; and
- (b) be used on board the plane;
 - i. by passengers to be nominated by Nautronix;
 - ii. to receive, record and interpret the data to be transmitted by sonar buoys in the ocean west of Rottnest Island;

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17.4 The express terms of the contract, so far as they are material, were to the effect that:

- (a) Fugro agreed to make available to Nautronix Limited the plane, and either Penberthy or a replacement pilot, for an airborne acoustic telemetry trial ex-Jandakot, on 11 August 2003;
- (b) Nautronix Limited agreed to install in the plane all necessary equipment for the trial, on 8 August 2003;
- (c) Nautronix Limited agreed to pay Fugro at the rates specified in letters from Fugro to Nautronix Limited dated 24 April 2003 and 5 June 2003;
- (d) Fugro would not be liable to Nautronix Limited for any loss incurred as a result of mechanical equipment failure which could not have been prevented by regular care and maintenance; and
- (e) Fugro would not be liable to Nautronix Limited for any special or consequential losses or damages, however caused, including loss of product and loss of profit;

17.5 The implied terms of the contract, so far as they are material, were to the effect that:

- (a) Fugro agreed to permit Nautronix Limited to install equipment in the plane on 8 August 2003;
- (b) Fugro agreed to transport the passengers to be nominated by Nautronix Limited, and the equipment to be provided by Nautronix Limited, from Jandakot to airspace to be nominated by Nautronix Limited over the ocean west of Rottnest Island;
- (c) Fugro agreed to fly the plane within that airspace while the passengers used the equipment, in the plane, to receive, record and interpret data transmitted by sonar buoys in the ocean;
- (d) Fugro agreed to transport the passengers and the equipment from that airspace back to Jandakot; and
- (e) Fugro agreed to exercise reasonable care in performing its obligations under the contract; and

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- 17.6 The contract did not include the warranty implied under s.74(l) of the *Trade Practices Act 1974* (Cth), by virtue of s.74(3) of that Act.
18. Fugro and Penberthy deny each and every allegation in paragraph 35 of the statement of claim and say that on 11 August 2003:
- 18.1 Fugro believed that the plane was in sound mechanical condition and in safe condition for flying;
- 18.2 Fugro did not have any reason to suspect, and did not suspect, that the plane was not in sound mechanical condition and in safe condition for flying;
- 18.3 Fugro believed, and it was the fact, that Penberthy was sufficiently trained, experienced, instructed and fit to undertake the flight; and
- 18.4 Fugro did not have any reason to suspect, and did not suspect, that Penberthy was not sufficiently trained, experienced and instructed, or otherwise unfit, to undertake the flight.

The charter contract: the facts

380 Nautronix and FSS both rely upon a series of documents which, it is said, contain the terms of the charter contract which both agree was entered into by Nautronix for the hire of the aircraft VH-ANV, together with the services of a skilled pilot who was, as it turned out, Mr Penberthy. As I have mentioned, although Nautronix puts its case in terms of a contention that the contract was partly oral and partly in writing, there is no evidence that the discussions relied upon between Mr Warriner, the project manager for the flight, who acted for Nautronix, and Messrs Hillier and Wallington, who acted for FSS, contained anything related to the determination of the terms of the contract, which was not recorded in the correspondence which occurred, generally by email. The documents were referred to in the evidence of Mr Watson. I propose to accept that the documents which are contractually relevant are those relied upon by Nautronix and FSS, respectively, in the written final submissions presented for them.

381 The Nautronix standard terms and conditions said to have been incorporated in the contract are in evidence as exhibit 126. The document refers to its incorporation in a 'purchase order': cl 1. The terms of the document make it abundantly clear that it was, in fact, intended to apply to the supply of goods and/or services to Nautronix. Clause 4 requires goods purchased to be new and to 'comply with the highest level of

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commercially accepted standards and be fit for purpose'. Clause 4 also contains a warranty as to services given by the supplier or the contractor to Nautronix in the terms already set out. I have also set out cl 9, the other term relied upon in this case by Nautronix.

382 Nautronix' case is that the standard terms and conditions were incorporated by a course of dealing between Nautronix and FSS. Although the pleadings refer to the period between 17 June 2002 and 8 August 2003, in its final submissions Nautronix refers to a more limited group of documents. It relies on exhibit 67, which is actually a tax invoice rendered by FSS to Nautronix, referring to various flights in February 2003 out of Port Lincoln in South Australia for sonar buoy deployment. Reliance is placed upon a tax invoice rendered by FSS to Nautronix on 27 May 2003 concerned with flights in May for the purpose of sonar buoy deployment in WA waters. Finally, there is a reference to exhibit 101, a tax invoice rendered by FSS to Nautronix on 8 August 2003, in relation to the hire of the aircraft VH-ANV for flights on 29 and 30 July 2003.

383 For Nautronix, it is put that there is particular relevance to an exchange of emails, exhibits 80 - 84, 88 and 89, generally between Mr Warriner for Nautronix, and Mr Wallington of FSS. The exchange seems to be concerned with what are described by Mr Warriner as sonar buoy aircraft missions for either VH-ANV (the aircraft concerned in this case) or its sister aircraft, VH-AZU. There is a reference to what is described as a critical activity for Nautronix, the flight on Monday 11 August 2003, to be a demonstration of the system to 'foreign military visitors'. It is clear that this was to be the culmination of a series of flights in July, and leading up to 11 August 2003. Modifications to the aircraft are discussed, as well as confirmation of the availability of the aircraft.

384 On 5 June 2003, FSS sent a letter, under the hand of Mr Wallington, to Nautronix for attention by Mr Warriner (exhibit 83), which provided a quote for the hire of the aircraft VH-ANV. The letter observed that the quotation was based on the use of one pilot, Mr Penberthy, or, if he was unavailable, the chief pilot, Mr Hillier. It is this letter upon which FSS relies as constituting an offer to provide the aircraft and the services of Mr Penberthy for dates which included 11 August 2003. The letter concludes, 'Upon acceptance of this offer, [FSS] standard Terms and Conditions of Contract apply; a copy of which is available upon request.' The FSS standard terms and conditions are before the court. They are exhibit 130.

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385 Exhibit 84 is an exchange of emails on 12 June 2003, in which Mr Warriner seeks to confirm, with Hillier and Wallington, the availability of the aircraft. The organisation of the activity continued with the exchange of emails, exhibit 88, on 9 July, with a response on 14 July. Exhibit 89 is a letter from FSS, under the hand of Mr Wallington, directed to Nautronix for Mr Warriner's attention, finalising the exchange by confirming the availability of the aircraft for various dates, including 11 August 2003. Exhibit 93, and exhibit 96, are further email exchanges which show those responsible for the project on either side making arrangements in an endeavour to have the aircraft available, properly equipped according to Nautronix' requirements for the flight in question in this litigation.

386 Nautronix relies upon a purchase order, exhibit 101, dated 6 August 2003, directed to FSS, for the flights which appear to have been conducted on 29 and 30 July 2003. The document contains the following note:

Nautronix' terms and conditions apply to this purchase order and they are printed on the reverse side of this order. Acceptance of this purchase order is deemed to constitute acceptance of the terms and conditions mentioned above. If this order is faxed, terms and conditions will be provided on a seperate [sic] page.

The document in evidence is a photocopy. There is evidence that it was sent to FSS by facsimile transmission on 6 August 2003. There is no evidence that on that occasion, or on any other occasion when a purchase order was raised by Nautronix, the terms and conditions document was separately sent by facsimile transmission. There is no evidence that an original purchase order in respect of any transaction between Nautronix and FSS was provided, incorporating the standard terms and conditions on the reverse of the form.

387 There is in evidence an email dated 7 August 2003, from Warriner for Nautronix, to Hillier for FSS, copied to Wallington, which confirms the requirement for the flight for an 'acoustic telemetry trial', using VH-ANV on 11 August 2003. Other requirements of Nautronix are referred to, and Mr Warriner says, 'I will raise a purchase order to reflect the above.' No such order is in evidence. It appears that it had not been raised by 11 August 2003. But for Nautronix, it is submitted that upon that basis I should conclude that it was communicated to FSS that the flight to be conducted on 11 August 2003 was to be governed by the Nautronix standard terms and conditions.

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388 I have set out the pleading by way of defence, particularly contained in par 17. I have noted the reference to the letter dated 5 June 2003, exhibit 83, sent by FSS to Nautronix, providing a quote for the hire of the aircraft and the provision of the services of a pilot. It is clear from the chain of correspondence that this is part of a process of discussion, initiated previously, in which Nautronix sought to hire the aircraft for various dates in June, July and 10 - 12 August 2003. As I have said, the letter describes itself as an offer, and concludes with advice that the FSS standard terms and conditions will apply upon acceptance of the offer.

389 There is no reference in the evidence to whether or not anybody from Nautronix ever sought access to those terms and conditions, or whether they were ever provided. Exhibit 130 contains 25 carefully drawn terms. They obviously involve the contribution of a solicitor. They are hardly expressed in plain English. Among them is cl 21, entitled 'Force Majeure'. Clause 21.1 provides:

[FSS], in the execution of the Contract, shall not be liable for any delay or loss in providing goods or services under the Contract as a result of Force Majeure Events. A Force Majeure Event is defined as follows:

390 Clause 21.2 provides the definition. Among a large number of different events are, 'mechanical or electrical equipment failure which could not have been prevented by regular care and maintenance'. The subclause concludes by providing what appears to be intended to be a reason or explanation for the inclusion of this denial of liability by saying, 'All of the above being a cause or causes which could not reasonably have been foreseen by [FSS] and which could not be overcome by using sound business practices.' It is clear, of course, that, at least so far as Nautronix may be said to have suffered economic loss by reason of the failure of the fuel pump causing the right-hand engine to shut down, cl 21 of the FSS standard conditions would sit uncomfortably with the relevant portion of cl 4 and cl 9 of the Nautronix standard terms and conditions.

391 FSS relies on what is described as a counter-offer by Nautronix to FSS contained in the email of 7 August 2003, exhibit 102, which is said to have incorporated the terms of the FSS offer except as varied. I note in that regard, as I have said, that having confirmed the engagement, Mr Warriner said he would raise a purchase order to cover the commitment for 11 August 2003. Purchase orders had been provided in respect of previous flights, whether before or after the flights were conducted, and as I have said, it is the Nautronix purchase orders which refer to the incorporation of the Nautronix terms and conditions. Having regard to the defence pleading in par 17.2(b), should that be regarded as a

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variation of the original offer by FSS? FSS pleads that the counter-offer by Nautronix was accepted by its conduct, which certainly occurred on 8 August 2003, in permitting Nautronix to install equipment in the plane in preparation for the flight to be conducted on 11 August.

392 In any event, although there is no evidence that Nautronix ever took up the offer to acquire a copy or view the FSS terms and conditions, FSS pleads what is effectively a reference to the relevant portion of par 21 of the standard terms and conditions in par 17.4(d) of the defence.

393 In addition, by its pleading in par 17.4(e) of the defence, FSS relies upon a further provision in its standard conditions document, cl 22, which is in the following terms:

Notwithstanding any other provision of the Contract to the contrary, neither party shall be liable to the other in tort, contract or otherwise at law, for any special or consequential losses or damages, however caused including without limitation, loss of use, production, product or profit.

The contention of FSS is that having regard to that provision, any liability it might have, directly in tort or otherwise to Nautronix, particularly for economic loss, is removed.

The law as to the terms of the contract

394 In this case, as has been seen, the parties respectively adopt, as their primary position, that standard terms were incorporated in the contract for the charter of the aircraft, which contract was otherwise comprised of documents exchanged between the parties by which Nautronix hired the aircraft for the flight on 11 August 2003, which was to be conducted for the specific purpose to which reference was made by the parties. In addition, FSS was to supply an experienced and competent pilot to fly the aircraft, which was to be modified to permit the installation in the aircraft of specific equipment required by Nautronix to carry out the purpose for which the flight was to be conducted. To that extent, at least, the contract was performed.

395 There was specific agreement as to the payment to be made by Nautronix upon the supply of the services by FSS. Nautronix says that there were express warranties derived from its standard terms and conditions incorporated in the contract, and FSS says not only was that not the case, but there were terms limiting and excluding its liability derived from its standard terms, which had been incorporated into the agreement.

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396 There are a number of ways, of course, by which terms may be incorporated in a contract. They seem to me to have the common element that there is a requirement that the court may find that they are brought to the notice of the contracting party against whom they may operate, by the party seeking to enforce the term, or at least the existence of the term to be incorporated must be brought to notice.

397 That may be evidenced in a variety of ways, commonly by the formal process of signature. In *Toll*, an exclusion clause protecting a carrier against negligence was enforced, although the customer who had hired the carrier was not, in fact, aware of its existence. However, the form of contract contained the printed condition limiting liability on its reverse. On the face of the form, which was that of the carrier, was the invitation to read the conditions of the contract, which were to be found overleaf, before signing the document. The representative of the customer read that invitation and signed. He did not, however, turn the form over and read the limiting condition.

398 The High Court held that the customer was bound. In doing so, it applied the earlier decision in *Oceanic Sun Line Special Shipping Co Inc v Fay* (1988) 165 CLR 197, where, at 228, Brennan J said:

If a passenger signs and thereby binds himself to the terms of a contract of carriage containing a clause exempting the carrier from liability for loss arising out of the carriage, it is immaterial that the passenger did not trouble to discover the contents of the contract.

399 In *Toll*, the court stated the general principle at 185 [57]:

If there is a claim of misrepresentation, or non est factum, or if there is an issue as to whether a document was intended to affect legal relations or whether, on the other hand, it was tendered as a mere memorandum of a pre-existing contract, or a receipt, or if there is a claim for equitable or statutory relief, then even in the case of a signed document it may be material to know whether a person who has signed it was given sufficient notice of its contents. The general rule, which applies in the present case, is that where there is no suggested vitiating element, and no claim for equitable or statutory relief, a person who signs a document which is known by that person to contain contractual terms, and to affect legal relations, is bound by those terms, and it is immaterial that the person has not read the document.

400 The signature evidences that the terms incorporated in the contract were brought to the notice of the party to be bound by them. Whether or not that party took advantage of that is immaterial. If, as in this case, there is not a signature evidencing the acceptance that the terms in

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question have been brought to notice, the question of fact remains whether reasonable notice has been given: **Balmain New Ferry Co Ltd v Robertson** (1906) 4 CLR 379, 386 (Griffith CJ).

401 In that case, there was also discussion of the use of a prior course of dealing to provide evidence that the term in question was brought to the notice of the party to be charged with it, and it is accepted that where a term has been brought to the attention of the party to be charged with it on a prior occasion, that of itself may provide evidence that the party was bound by it on a subsequent occasion.

402 The law in that regard was succinctly stated by Roberts-Smith J in **Barrymores Pty Ltd v Harris Scarfe Ltd** [2001] WASC 210; (2001) 25 WAR 187 at 207 [98]:

Contractual terms may be inferred from the business relationship of parties if the course of their dealings raises the reasonable expectation that terms imposed on previous occasions will form part of the contract on a subsequent occasion. For that to be done four requirements need to be satisfied:

- (1) the terms previously used must be identifiable (usually by reference to contractual documents);
- (2) those previous occasions must be sufficiently numerous and frequent;
- (3) the conduct must be consistent enough to constitute a regular course of dealing;
- (4) which raises the reasonable expectation that the same terms should be included in the subsequent contract.

403 However, it is, I think, important not to overlook, in respect of terms limiting or excluding liability, the cautious approach that the courts take, requiring evidence of some reasonable cogency that reasonable efforts have been made to bring a term to the notice of the party to be taxed with it. Where the term is said to limit the contractual rights which would otherwise be attendant upon the bargain made, the court will be astute to ensure that the contracting parties had at least the reasonable opportunity to reach their agreement, knowing in what circumstances there was limitation upon the liability which would otherwise be borne by one party.

404 Finally, I have already commented upon the basis upon which Nautronix contends that if the standard terms upon which it relies were

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not expressly incorporated into the charter contract, their application was to be implied.

405 In that regard, it is apposite to refer to the statement of the law by Dawson and Toohey JJ in *Breen v Williams* (1996) 186 CLR 71 at 90 - 91, citing Deane J in *Hawkins v Clayton* (1988) 164 CLR 539 at 573:

The implication of a term in a contract is based upon the presumed or imputed intention of the parties. In the case of a formal contract which is complete on its face, it may be said in general that no implication arises (save where it is a legal incident of a particular class of contract) unless it is necessary or obvious -- necessary in the sense of being required to give business efficacy to the contract or obvious in the sense that it goes without saying. Where, however, as in this case, there is no formal agreement, the actual terms of the contract must be inferred before any question of implication can arise. The test which is then to be applied was formulated by Deane J in *Hawkins v Clayton* in these terms:

The most that can be said consistently with the need for some degree of flexibility is that, in a case where it is apparent that the parties have not attempted to spell out the full terms of their contract, a court should imply a term by reference to the imputed intention of the parties if, but only if, it can be seen that the implication of the particular term is necessary for the reasonable or effective operation of a contract of that nature in the circumstances of the case. That general statement of principle is subject to the qualification that a term may be implied in a contract by established mercantile usage or professional practice or by a past course of dealing between the parties.

That is to say, no question of there being an obvious implication arises in such a case because that which is obvious will be a term of the contract as a matter of inference. Moreover, the line between inference and implication will not always be easy to draw.

406 *Breen v Williams* was a case of the relationship between doctor and patient. This is a case which their Honours would describe as 'a formal contract which is complete on its face', although made by a process of the exchange of written communications not subsequently incorporated into a single formal document. However, here, it does seem to me that if the terms in question are to be regarded as being incorporated into the document, it will be that they are expressly incorporated as a matter of inference, and this will not be a case of the incorporation of the terms in question by implication as a matter of fact, having regard to the principles to which I referred when discussing the nature of the Nautronix claim.

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Trade Practices Act 1974 (Cth), s 74

407 There is one further matter to which I should attend, before
expressing my final conclusion about the contractual issues.

408 It will be recalled that the plaintiff pleads that the terms of the charter
contract upon which it relies were, if not expressly incorporated in the
contract, and if not implied as a matter of fact, then they were implied by
law, under s 74 of the *Trade Practices Act 1974 (Cth)*. That such was the
case is denied by FSS.

409 The warranties asserted by Nautronix are those arising under s 74(1)
and (2), as follows:

74 Warranties in relation to the supply of services

- (1) In every contract for the supply by a corporation in the course of a business of services to a consumer there is an implied warranty that the services will be rendered with due care and skill and that any materials supplied in connexion with those services will be reasonably fit for the purpose for which they are supplied.
- (2) Where a corporation supplies services (other than services of a professional nature provided by a qualified architect or engineer) to a consumer in the course of a business and the consumer, expressly or by implication, makes known to the corporation any particular purpose for which the services are required or the result that he or she desires the services to achieve, there is an implied warranty that the services supplied under the contract for the supply of the services and any materials supplied in connexion with those services will be reasonably fit for that purpose or are of such a nature and quality that they might reasonably be expected to achieve that result, except where the circumstances show that the consumer does not rely, or that it is unreasonable for him or her to rely, on the corporation's skill or judgment.

410 Under s 68 of the Act, a term in a contract, 'including a term that is not set out in the contract but is incorporated in the contract by another term' which purports to exclude the application of a provision like s 74, expressly or because the contractual term is inconsistent with that provision, is void. Therefore, if s 74 applies, in my view, the terms which FSS asserts were incorporated in the charter contract from its standard conditions would have no effect, but would be held to be void.

411 If a s 74 term is implied by law, regardless of the objectively imputed intention of the parties, the implied term becomes, of course, a term of the contract, and it is clear that the remedy would be that available in contract

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law for breach of the contract. There is no proscription which would sound in an action for breach of the *Trade Practices Act*. There could not be, and is not here, a claim for damages pursuant to s 82 of the *Trade Practices Act*: ***E v Australian Red Cross Society*** (1991) 27 FCR 310 per Wilcox J at 352. Nautronix simply claims generally for damages.

412 It will be noticed that s 74(1) and (2) apply to contracts or the supply of services by a corporation (in this case allegedly FSS) in the course of a business to a 'consumer'. That term is effectively defined in s 4B. It is not suggested that Nautronix was not a consumer within the provisions of s 4B.

413 However, FSS does make three points, as I understand its case, in respect of the potential application of s 74. Firstly, it relies upon s 74(3), as follows:

- (3) A reference in this section to services does not include a reference to services that are, or are to be, provided, granted or conferred under:
 - (a) a contract for or in relation to the transportation or storage of goods for the purposes of a business, trade, profession or occupation carried on or engaged in by the person for whom the goods are transported or stored; or
 - (b) a contract of insurance.

414 FSS argues that the services constituted by the provision of the aircraft, suitably modified according to Nautronix' requirements for the installation of its telemetry equipment, and the services of the pilot, Mr Penberthy, were provided under a contract falling within the terms of s 74(3)(a). The charter contract, FSS submits, was one 'in relation to', if not 'for', the transportation of goods in the form of Nautronix' equipment for the purposes of the business carried on by Nautronix, the person for whom the goods were to be transported. It is argued that the transportation of the equipment was an essential part of the services to be provided by FSS, even though it is clear that the aircraft was hired also for the transportation of persons.

415 No authority was cited to support the submission. In ***Wallis v Downard-Pickford (North Queensland) Pty Ltd*** (1994) 179 CLR 388, the appellant, a police officer, had made a claim for the damage done to his possessions by a carrier, the respondent, as a result of the negligence of its employees. The claim relied upon the warranty in s 74(1), and it was held that it was not excluded by s 74(3)(a), on the ground that the goods were

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not transferred for the purposes of the occupation of the Commissioner of Police or the police officer. But, as can be seen, the point was a different one from that ventilated in this case, and the nature of the transportation of the goods was quite different. There was, in that case, no question that the services to be provided were properly characterised as other than a contract for or in relation to the transportation of goods.

416 In this case, it is submitted by FSS that the words 'in relation to' are of wide import, and there is no suggestion that when that phrase is relied upon, the characterisation of the transportation as being 'of goods' requires consideration of whether that was the primary or dominant characterisation of the transportation. The position might be different if one is concerned to consider whether the services were, or were to be, provided under a contract for the transportation or storage of goods.

417 In my view, there is merit in the submission made by FSS, that s 74(3) would apply so as, effectively, to exclude the operation of s 74(1) and (2), because there would be no 'services' supplied within the meaning of those subsections. There is no need for the 'services' which are, or are to be, provided to be exclusively of a particular character. Section 74(3) will operate if the services are, or are to be, provided under a contract which itself, relevantly for present purposes, relates to the transportation of goods for the purposes of Nautronix' business. The transportation of the Nautronix equipment was an essential part of the services provided. It was to operate that specialised equipment that the Nautronix staff members were themselves to be transported in the aircraft. That was the reason why the aircraft was hired and the reason why Mr Penberthy's services were provided to pilot the aircraft. In my view, the implication of the warranties described in s 74 are excluded by the operation of s 74(3).

418 If I am wrong in that view, FSS argues that it has effectively admitted the implication of the first warranty, 'that the services will be rendered with due care and skill': defence par 17.5(e).

419 Otherwise, FSS argues that the aircraft, VH-ANV, did not fall within the description of 'materials supplied in connection with those services' so as to make it the subject of an implied warranty of reasonable fitness for purpose under s 74(1) or s 74(2). The word 'materials' is not a term defined in the Act. But for myself, I can see no reason why the services supplied would not be the hire of the aircraft and the provision of the pilot, part of the core business of FSS.

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420 If that should be my view, FSS argues that the aircraft was not 'supplied'. The word 'supply', when used as a verb, as here, is defined in s 4(1) to include:

- (a) in relation to goods - supply (including re-supply) by way of sale, exchange, lease, hire or hire-purchase; and
- (b) in relation to services - provide, grant or confer.

The word 'goods' is defined in s 4(1) to include aircraft, as well as ships and other vehicles.

421 FSS points out that it retained possession and control of the aircraft through its employee, Penberthy, and so it is submitted that the aircraft was not supplied to Nautronix. However, in my view, it naturally falls within the definition of 'supply', because the aircraft was hired by Nautronix in the sense that its use was made available to Nautronix, together with the services of the pilot, Penberthy. Were it not for the operation of s 74(3), I would conclude that the warranties in relation to the supply of the services under s 74(1) and s 74(2), were implied, by law, as terms of the charter contract.

422 I turn then to the question of the alleged breach and the liability of FSS for damages in that regard.

My conclusions as to the contractual claim

423 The charter contract did not, in my view, have incorporated in it, by reference, cl 4 and cl 9 of the Nautronix standard conditions. A purchase order was not raised in relation to this particular charter contract between Nautronix and FSS. Nor was there a sufficient course of dealing to support the inference of the terms in question. There is no evidence that an original purchase order was ever supplied by Nautronix to FSS in relation to any similar charter contract. Nor is there any evidence that when such a purchase order was transmitted by facsimile, there was any separate transmission of the standard conditions document.

424 I think it may well be the case that that was never done. But, of course, it is not necessary that I make any such finding. It is sufficient that I conclude that the evidence carries me no further than that documentation was provided by Nautronix to FSS, by which Nautronix asserted, generally, that its standard terms and conditions would apply. There is no evidence that notice was ever given as to what those standard terms and conditions were or, specifically in relation to this case, that they included cls 4 and 9, so far as they are said to be material.

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425 In addition, I note that the general statement in the purchase order asserts that the terms and conditions apply, 'to this purchase order' and will be deemed to have been accepted upon, 'acceptance of this purchase order'.

426 I have said that in my view the way in which Nautronix developed its case makes it necessary to consider that if the clauses relied upon were incorporated into the charter contract, it would be because the proper conclusion is that they were included as express terms by inference from the course of dealings between the parties, rather than that, as a matter of fact, they were to be implied because, on the evidence, the reasonable conclusion to be drawn was that these were terms upon the basis of which the parties formed their agreement.

427 However, by reason only of the admission made by FSS in par 17.5(e) of the defence, I accept that it was an implied term of the charter contract that FSS agreed to exercise reasonable care in performing its obligations under the contract. This, of course, might give rise to a contractual liability independently of the admitted vicarious liability for the negligence of Penberthy.

428 However, there is, in my opinion, as will already be clear from what I have written above, no evidence sufficient to establish that FSS breached its implied agreement to exercise reasonable care. There is no evidence to suggest that the aircraft was not properly maintained. There is, in fact, evidence to suggest that the care it was given was appropriate. The fuel pump which ultimately failed was repaired when it was required to be repaired. The decision to incorporate the inadequate sleeve bearing was not suggested to be one made contrary to the standard procedures governing such matters, and did not demonstrate negligence by FSS. The expert assistance of Barclay in the design and specification of the bearing was appropriately relied upon. Nor is there any suggestion that FSS should have adopted maintenance procedures which might have revealed that the pump was operating in such a manner that it was becoming more likely that it would fail in the way that I have found it did.

429 As to the pilot, I have found that the evidence in fact established that he was enormously experienced and highly qualified. His qualifications were tested regularly in the manner required. There was, I have found, absolutely nothing to suggest that he was not appropriately skilled to handle, as best he might, an emergency of the kind which in fact arose, and which ultimately caused the aircraft to crash.

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430 It is really unnecessary that I should examine contractual matters further. But for completeness, I observe that, just as I have not been prepared to find that the Nautronix standard terms and conditions were incorporated in the charter contract, I am not prepared to conclude that the contrary terms excluding liability asserted by FSS, were included by reference to the FSS standard terms and conditions.

431 To put it shortly, to say, in a letter of offer, that acceptance of the offer would import the standard terms and conditions is, by itself, insufficient to give notice of those terms. Nor is there evidence that Nautronix was prepared to enter into the charter contract upon the basis of the incorporation into that contract of standard terms and conditions relied upon by FSS which, in their material terms, would contradict the relevant standard terms and conditions relied upon by Nautronix. This is not a case where Nautronix should be subjected to the operation of terms limiting the liability of FSS upon the basis that Nautronix is seen to have had clear notice of those exclusionary terms and has elected not to familiarise itself with them, but has agreed to contract with FSS on the basis that those terms will apply, whatever form they might take.

432 I have, I think, sufficiently dealt with the proposition that the warranties under s 74 of the *Trade Practices Act* may apply. I have held that they do not. But if they did so, it will now be apparent from the views I have expressed, that it has not been established that FSS lacked reasonable care and skill in the provision of the aircraft and the services of Mr Penberthy for the flight to be undertaken for the particular purposes for which it was proposed. I would conclude that there was no breach of the warranty which might be implied in terms of s 74(1) or s 74(2) of the *Trade Practices Act*.

My final conclusions

433 The plaintiffs in CIV 1312 of 2008 should have judgment against the defendants in negligence for damages to be assessed, except that the sixth plaintiff, Nautronix, should have judgment against FSS and Penberthy for damages by way of its economic loss, again to be assessed. In relation to that issue, Nautronix should not have judgment against Barclay.

434 Except in relation to the economic loss which may sound in an award of damages to Nautronix against Penberthy and FSS, the defendants should be liable to the plaintiffs in the proportions two-thirds against Penberthy and FSS, and one-third against Barclay. The claim by Nautronix against FSS for damages for breach of contract should be dismissed.

MURRAY J

435 As to the action CIV 2279 of 2009, I have dealt with the issues which arise in this litigation. The claim by FSS against Barclay for negligence is in respect of the loss of the plane and some associated costs, together with a claim for loss of profit during the period from the crash to the availability of a replacement aircraft suitably modified for the work required. In addition, FSS claims indemnity for the loss and damage suffered by the plaintiffs in CIV 1312 of 2008, to the extent of the vicarious liability of FSS leading to a judgment against it in that action. By his defence, Barclay puts in issue his liability to FSS in respect of both forms of loss and damage. And Barclay joins Penberthy in that action, by a third-party notice which effectively seeks a contribution under the *Law Reform (Contributory Negligence and Tortfeasors' Contribution) Act 1947* (WA).

436 I have held that Barclay owed a duty of care to FSS and Penberthy, and that Barclay was negligent. No question of causation arises. I have held that Barclay does not owe a duty of care in relation to the pure economic loss for which Nautronix makes a claim. But my reasoning in that regard includes the finding that Barclay owed a duty of care in respect of economic loss suffered by that class of persons who owned or operated aircraft for commercial purposes, and FSS would fall into that class.

437 There should be judgment for FSS for damages to be assessed in relation to the loss and damage it has suffered as a result of the crash. Of course, nothing in this judgment should be taken as expressing a view in relation to the assessment of those damages. As to its claim for an indemnity, it follows from the view that I have expressed, in my opinion, that the appropriate order would be that FSS is not entitled to recover a full indemnity from Barclay, but its entitlement should be limited to that portion, one-third of the liability vicariously imposed which is to be borne by Barclay. That outcome would seem to me to allow the apportionment process to be appropriately reflected in the judgment in each of the two actions.

438 I will, of course, hear the parties on the appropriate terms of final orders to reflect these reasons for decision. The successful parties are invited to submit a minute of final orders, if possible in a form agreed with the defendants.

JURISDICTION : SUPREME COURT OF WESTERN AUSTRALIA
IN CIVIL

CITATION : CIFUENTES -v- FUGRO SPATIAL SOLUTIONS
PTY LTD [2009] WASC 316 (S)

CORAM : MURRAY J

HEARD : 3 - 7, 10 - 14, 24 & 25 AUGUST 2009,
20 & 27 NOVEMBER 2009 & ON THE PAPERS

DELIVERED : 11 NOVEMBER 2009

**SUPPLEMENTARY
DECISION** : 4 DECEMBER 2009

FILE NO/S : CIV 1312 of 2008

BETWEEN : MALCOLM ANTHONY CIFUENTES
First Plaintiff

MICHAEL BRIAN KNUBLEY
Second Plaintiff

JULIE ANNE WARRINER
Third Plaintiff

JANET GRAHAM
Fourth Plaintiff

OZAN PERINCEK
Fifth Plaintiff

NAUTRONIX (HOLDINGS) PTY LTD
(ACN 009 067 099)
L-3 COMMUNICATIONS NAUTRONIX LIMITED
(ACN 009 019 603)
Sixth Plaintiffs

ALEC PENBERTHY
Seventh Plaintiff

AND

FUGRO SPATIAL SOLUTIONS PTY LTD
(ACN 008 673 916)
First Defendant

AARON BARCLAY
Second Defendant

ALEC PENBERTHY
Third Defendant

FILE NO/S : CIV 2279 of 2009

BETWEEN : FUGRO SPATIAL SOLUTIONS PTY LTD
(ACN 008 673 916)
Plaintiff

AND

AARON BARCLAY
First Defendant

CIVIL AVIATION SAFETY AUTHORITY
Second Defendant

ALEC PENBERTHY
Third Party

Catchwords:

Tort - Application of Civil Aviation (Carriers' Liability) Act 1961 (WA)

Costs - Special costs order

Legislation:

Civil Aviation (Carriers' Liability) Act 1961 (WA)

Result:

Costs orders made

Category: B

Representation:

CIV 1312 of 2008

Counsel:

First Plaintiff	:	Mr M J McCusker QC & Mr S V Forbes
Second Plaintiff	:	Mr M J McCusker QC & Mr S V Forbes
Third Plaintiff	:	Mr M J McCusker QC & Mr S V Forbes
Fourth Plaintiff	:	Mr M J McCusker QC & Mr S V Forbes
Fifth Plaintiff	:	Mr M J McCusker QC & Mr S V Forbes
Sixth Plaintiffs	:	Mr M J McCusker QC & Mr S V Forbes
Seventh Plaintiff	:	Mr M J McCusker QC & Mr S V Forbes
First Defendant	:	Ms K J Levy
Second Defendant	:	Mr D R Clyne
Third Defendant	:	Ms K J Levy

Solicitors:

First Plaintiff	:	Bradley Bayly Legal
Second Plaintiff	:	Bradley Bayly Legal
Third Plaintiff	:	Bradley Bayly Legal
Fourth Plaintiff	:	Bradley Bayly Legal
Fifth Plaintiff	:	Dwyer Durack
Sixth Plaintiffs	:	Freehills
Seventh Plaintiff	:	Trewin Norman & Co
First Defendant	:	SRB Legal
Second Defendant	:	DLA Phillips Fox
Third Defendant	:	SRB Legal

CIV 2279 of 2009

Counsel:

Plaintiff	:	Ms K J Levy
First Defendant	:	Mr D R Clyne
Second Defendant	:	Mr D R Clyne
Third Party	:	Ms K J Levy

Solicitors:

Plaintiff	:	SRB Legal
First Defendant	:	DLA Phillips Fox
Second Defendant	:	DLA Phillips Fox
Third Party	:	SRB Legal

Case(s) referred to in judgment(s):

Cifuentes v Fugro Spatial Solutions Pty Ltd [2009] WASC 316
Collins v Westralian Sands Ltd (1993) 9 WAR 56
Esther Investments Pty Ltd v Markalinga Pty Ltd (1992) 8 WAR 400
Naidoo v Williamson [2008] WASCA 179; (2008) 37 WAR 516
Schmidt v Gilmour [1988] WAR 219
Tranchita v Danehill Nominees Pty Ltd [No 3] [2009] WASC 49

MURRAY J

1 **MURRAY J:** I published my reasons, after the consolidated hearing of these two matters, on 11 November 2009: *Cifuentes v Fugro Spatial Solutions Pty Ltd* [2009] WASC 316. Although I had allowed some time before publication, during which the parties had access to the reasons, they sought further time before moving for final orders in respect of the issues of liability which I tried, and for costs. Ultimately, when I heard argument, a number of matters were raised.

Civil Aviation (Carriers' Liability) Acts

2 This was a most unusual point arising out of [260] - [266] of the reasons, which were concerned to explain why the litigation before the court raised issues of tort (and also contract) at common law. The portion of the reasons to which I refer were concerned to explain why the provisions of the *Civil Liability Act 2002* (WA) did not apply to the case.

3 In the first place, although that Act came into operation on 1 January 2003, and although the accident with which this case is concerned occurred on 11 August 2003, potentially relevant provisions of the *Civil Liability Act* did not apply to an accident occurring before 1 December 2003: s 5A(3).

4 However, not content with that proposition, I felt I needed to add that the provisions of the *Civil Liability Act* potentially relevant to the subject matter of the litigation would not apply because their application was excluded if the damages which might be awarded would be those under the *Civil Aviation (Carriers' Liability) Act 1961* (WA), including the applied provisions defined in that Act: s 3A(1), item 5.

5 I was not in the trial of the issues of liability concerned with an award of damages and so, in the reasons at [265], I made that observation. But the question was whether, because of the application of the *Civil Aviation (Carriers' Liability) Act* to the litigation as a whole, for that reason also the *Civil Liability Act 2002* would have no application to the litigation. On the material available to me, I drew the conclusion that that was the case, based on the pleadings of the parties.

6 As I observed in the principal reasons, the purpose of the WA *Civil Aviation (Carriers' Liability) Act 1961* was to apply, to intrastate commercial aviation operations, the provisions of the relevant Commonwealth legislation of the same name, enacted in 1959. The purpose of that legislation was to enact into Australian law the provisions of various international conventions and protocols dealing with the liability of carriers by air, by providing for a statutory cause of action to

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enable recovery by passengers or their personal representatives, for personal injury or death, and loss of and damage to baggage as a result of accidents in the course of carriage by air. The damages which may be awarded are capped. The Commonwealth Act also applies that statutory regime to interstate commercial carriage by air in Australia, and requires carriers to insure against the statutory liability. Part IV of the Commonwealth Act applies to that interstate carriage, and Pt IVA deals with the obligation to insure.

7 Section 6 of the State Act applies, as State law, the provisions of Pts IV and IVA of the Commonwealth Act. The interpretation provision in the State Act is s 3. It gives to terms used in the State Act the meaning given to those terms in the Commonwealth Act, relevantly for present purposes, s 26 of the Commonwealth Act.

8 As I noted in [263] of the principal reasons, the carriage to which the State Act applies, if the Commonwealth Act does not, is, pursuant to s 5(1):

the carriage of a passenger where the passenger is or is to be carried in an aircraft being operated by the holder of an airline licence or a charter licence in the course of commercial transport operations under a contract for the carriage of the passenger between a place in the State and another place in the State.

9 Under s 26(1) of the Commonwealth Act, an 'airline licence' and a 'charter licence' are both defined to include, 'an Air Operator's Certificate in force under the Civil Aviation Act 1988 (Cth) authorising charter operations'. The same subsection defines 'commercial transport operations' to mean, 'operations in which an aircraft is used, for hire or reward, for the carriage of passengers or cargo'.

10 The conclusion to which I came, that the WA Act would apply to the flight the subject of the proceedings before me, was based on the findings of fact made in [260] and [261] of the principal reasons. Those findings were based on the pleadings. In the consolidated statement of claim, on behalf of the first six plaintiffs, par 9 is in the following terms:

9. The first defendant ('Fugro'):

9.1 is and was at all material times a proprietary limited company registered and incorporated in Australia according to law;

9.2 was at all material times the holder of an Air Operator's Certificate issued by the Civil Aviation Safety Authority

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under the *Civil Aviation Act 1988* (Cth) in respect of a Cessna 404 Titan twin engine aircraft, registered number VH-ANV ('the **Plane**');

9.3 at all material times carried on the business of an air operator from hangar premises which it occupied at Jandakot Airport in the State of Western Australia, including the provision of air charter services for commercial purposes;

9.4 ...

9.5 at all material times was the registered owner of the Plane pursuant to the Civil Aviation Regulations ('CAR');

9.6 ...

11 The first and third defendants admitted pars 9.1 to 9.5 of the statement of claim: defence par 3. The defence of the second defendant, par 9, was not, for present purposes, in materially different terms from the pleading of the other defendants. Paragraphs 9.1 and 9.2 of the statement of claim were admitted. Paragraph 9.3 was admitted, except that it was denied that the first defendant provided air charter services. The second defendant pleaded that the first defendant 'was authorised to provide aerial work services'. As to par 9.5, it was simply admitted that the first defendant was the owner of the aircraft, and the subparagraph was otherwise not admitted.

12 I must say that I assumed that the pleading in par 9 of the statement of claim, and the consequent admission by the first defendant, the party who was said to be the holder of an air operator's certificate in respect of the aircraft, carrying on the business of an air operator, including the provision of air charter services for commercial purposes, was intended to establish that this aircraft, on the particular flight, conducted under a contract made between the sixth plaintiffs and the first defendant, was carrying on a commercial transport operation within the meaning of the *Civil Aviation (Carriers' Liability) Act*, pursuant to the first defendant's air operator's certificate.

13 I do not understand otherwise why par 9 of the statement of claim contained the allegations to which I have referred. However, I am told that it is not the case that that was the purpose of the pleading, and the admission of those facts by the first defendant was not intended to convey an acceptance that the flight was conducted pursuant to such an authorisation.

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14 There being no objection, I accepted in evidence an affidavit sworn by Mr Bradley, the solicitor for the first to fourth plaintiffs. He annexes the first defendant's air operator's certificate, effective from 20 March 2002 until 31 July 2004, for a number of aircraft, including Cessna 404 aircraft. The certificate, issued by the Civil Aviation Safety Authority under the *Civil Aviation Act 1988* (Cth), authorises the first defendant to conduct what are described as aerial work operations, not charter operations. The aerial work operations authorised are aerial photography, aerial survey work, dropping incendiaries for bushfire control, aerial baiting, dropping seeds and fertiliser for forestry purposes, and search and rescue work.

15 It is put to me, and no submission is made to the contrary, that this particular flight by this aircraft was not caught by the *Civil Aviation (Carriers' Liability) Act 1961* (WA) as the air operator's certificate was not an airline licence, as defined, because it did not authorise 'airline operations', and nor was it a charter licence as defined, because it did not authorise 'charter operations'. In the circumstances, I am prepared to accept that argument.

16 I make no finding, because it is irrelevant that I should do so, as to whether the flight undertaken in the circumstances and for the purposes that it was, was a flight authorised by the first defendant's air operator's certificate. However, in light of the terms of that certificate, and the reservation from its authorisation of 'charter operations', it does seem to be clear that this was not a flight to which the *Civil Aviation (Carriers' Liability) Act 1961* applied, despite the fact that the plaintiffs pleaded, and the first defendant admitted, that the flight was part of the business of the first defendant, which included, 'the provision of air charter services for commercial purposes'.

Costs orders: CIV 1312 of 2008

17 The *Legal Profession Act 2008* (WA) was proclaimed to come into operation on 1 March 2009 (Government Gazette 27 February 2009, page 511). By s 616(1) the current provisions in relation to costs, contained in Pt 10 of the Act, only apply where the client first instructs the law practice on or after the commencement day. Otherwise, as in this case, Pt 13 of the *Legal Practice Act 2003* (WA) will continue to apply, as will the provisions of legal costs determinations made under s 210 of that Act. In relation to contentious business it would seem that the relevant determinations for the purpose of taxation of costs in relation to this litigation are the Legal Practitioners (Supreme Court) (Contentious

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Business) Determination 2006 which operated from 1 July 2006 to 30 June 2008 and the Legal Practitioners (Supreme Court) (Contentious Business) Determination 2008 which came into operation on 1 July 2008. The determinations apply to the remuneration of practitioners based on costs incurred during the period of their operation.

18 The two determinations are similarly constructed. They fix maximum hourly and daily rates of remuneration. Rates are fixed for senior practitioners of more than five years standing, junior practitioners and senior counsel. There is no longer a need to certify for the involvement of senior counsel, or, as was traditionally done, second counsel. The determinations provide a table and generally speaking no distinction is made between solicitor/client costs and party/party costs. The scale describes various types of legal work. The maximum allowance is a combination of a period of time supposed to be the maximum required to perform the particular task, multiplied by the rate applicable to the particular fee earner hypothetically involved in the performance of the work.

19 Of course I am not involved in the taxation of costs in this case, but broad familiarity with what is involved in the scale assists in this case because the plaintiffs seek special costs orders under s 215(2) of the *Legal Practice Act*. Section 215(1) provides that the taxation of costs is regulated by the relevant legal costs determination in force under s 210. Section 215(2) provides:

- (2) Despite subsection (1), if a court or judicial officer is of the opinion that the amount of costs allowable in respect of a matter under a legal costs determination is inadequate because of the unusual difficulty, complexity or importance of the matter, the court or officer may do all or any of the following -
- (a) order the payment of costs above those fixed by the determination;
 - (b) fix higher limits of costs than those fixed in the determination;
 - (c) remove limits on costs fixed in the determination;
 - (d) make any order or give any direction for the purposes of enabling costs above those in the determination to be ordered or taxed.

20 Generally speaking the judicial discretion in relation to costs orders is very wide (*Naidoo v Williamson* [2008] WASCA 179; (2008) 37 WAR

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516, 526 [38] - [39] (Steytler P, Pullin JA & Murray AJA agreeing)), but the exercise of the discretion to make a special costs order under s 215(2) is guided. In the first place it is evident that the party seeking the order must persuade the judge to the opinion that the amount of costs allowable under the relevant legal costs determination is inadequate. That will be established if the unusual difficulty of the matter, its complexity and/or its importance lead to the conclusion that reasonable remuneration for the successful party will not be provided simply by ordering the payment of costs to be taxed and therefore by limiting that process of taxation by the application of the relevant provisions of the applicable legal costs determination.

21 In that regard I think that some of the older cases continue to have application. The inadequacy of the legal costs determination may be demonstrated by consideration of the amount of work involved in the preparation and presentation of the case. That consideration of itself may sufficiently relate to the complexity of the matter to demonstrate the inadequacy of the scale: *Schmidt v Gilmour* [1988] WAR 219, 220. The consideration of the issue by the judge should not descend into the taxation process, but the judgment to be made is essentially preliminary and provisional: *Collins v Westralian Sands Ltd* (1993) 9 WAR 56, 64, 68.

22 It is to be remembered that a special order which fixes higher limits than those derived from the relevant determination, or which increases the amounts for specific items of work, or removes limits on costs derived from the determination, does no more than that. It is for the taxing officer to consider the reasonableness and the necessity for the work and to make a judgment about the remuneration reasonably required: *Esther Investments Pty Ltd v Markalinga Pty Ltd* (1992) 8 WAR 400, 404.

23 Against the background of those statements of general principle I turn to some of the specific issues raised by the parties in respect of costs in this matter. In the first place it seems to me to be perfectly obvious that the costs of all the plaintiffs should be taxed as in an action. The originating summonses by which these matters were consolidated in this court was a convenient device to enable the issues of liability to be tried out in one proceeding. The pleadings were consolidated and it is clear that the process of preparation and the trial process itself was indistinguishable from the conduct of an action. Further, it seems to me that reference to the 2008 scale shows that taxation as for an originating summons would provide entirely inadequate remuneration.

MURRAY J

24 I also think that what I know, particularly from the presentation of the case, about the process of preparation makes it convenient that the costs of the first to sixth plaintiffs in the proceedings before me and in the relevant District Court actions, should be taxed as one set of costs. The position of the seventh plaintiff will be conveniently handled separately in view of the different process involved in that instance.

Special costs orders

25 In relation to the taxation process generally there are particular matters in respect of which the plaintiffs seek orders which would remove limits imposed on the taxation process by relevant items in the scale. Speaking generally, it seems to me that although there is no specific evidence before me in relation to some of the items concerned with matters of preparation, in relation to which special orders are sought, as a general proposition there is in my view sufficient to ground the proposition that items of central importance under the scale ought to have the limits removed on the ground of the unusual difficulty and complexity of the case, both factually and in relation to the questions of law which arose.

26 Factually I have in mind particularly the need to marshal and present a significant body of expert evidence from pilots, from the physicist Mr Steven Roberts, and in relation to matters of an engineering character concerned with the operation of the engine driven fuel pump. In addition, there was of course a significant body of expert evidence in relation to metallurgical investigation and the investigation of the cause of the failure of the fuel pump generally.

27 So far as matters of law are concerned the parties had to prepare and present matters of some difficulty in relation to the sixth plaintiffs' claim in negligence, particularly in relation to economic loss, and issues concerned with the imposition of a duty of care in that regard. Further, the contractual claim involved some issues of real substance in relation to the incorporation of terms in contracts by reference to other documents, the incorporation of terms as a result of a course of dealing between contracting parties and the question of implication of terms, as well as the need to consider the warranties provided by s 74 of the *Trade Practices Act 1974* (Cth).

28 As to specific matters, I commence with the observation that although there is not, and has not been for some time, a requirement under the scale to certify for second counsel, it is very evident to me that this was a case where the involvement of senior counsel for all parties was

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well justified at all substantial stages, including during a mediation process.

29 As to the items of the scale specifically addressed as being the subject of special costs orders and the submissions made to me, I am satisfied that on the general grounds to which I have referred above it would be appropriate to remove the limit in relation to the preparation of the statement of claim and in particular the consolidation of that pleading. The coordination of the work of consolidation between the solicitors for the plaintiffs and the involvement of Queen's Counsel would suggest that the limit of \$3,960 would be inadequate.

30 Mention of the mediation process prompts me to refer to the claim that the mediation conference held in this case was a major effort, although concerned only with issues of liability. It was listed for three days and I am told that it took some time. Position papers were exchanged and counsel attended the conference. Item 23 of the scale allows for remuneration at a maximum of the hourly rate for a senior practitioner, \$396. There is no limit to the number of hours which may be allowed for, but that will not help where others, and indeed senior counsel, were necessarily involved. In my view the limiting factor of the rate at which remuneration may be allowed should be removed to enable proper consideration to be given on taxation to the attendance of solicitors and counsel to provide necessary advice at the mediation conference in a matter of this potential complexity: ***Tranchita v Danehill Nominees Pty Ltd [No 3]*** [2009] WASC 49 [5] - [6] (Martin CJ).

31 As to the trial itself, I note that item 19 of the scale is prepared on the basis of an allowance for three days of preparation, the first day of the trial and unlimited refreshers to the daily limit of counsel and senior counsel on the basis of a 10 hour day. There is evidence before me of the hourly rate charged by senior and junior counsel engaged by the first and third defendants, but no other evidence. The principal complaint of the plaintiffs stems from the fact that when the respective parties had closed their cases I adjourned the trial for one week for the preparation and exchange of closing submissions, and to give me the opportunity to read those documents, before I resumed the hearing for a further two days to allow counsel to speak to their written submissions and make oral presentations designed to focus my attention upon particular matters which required resolution. The process was an efficient one.

32 The complaint is that there is no allowance specially made for the involvement of counsel in such preparatory work. In my opinion the costs

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involved would be taxed as part of getting the case up for trial, albeit, the trial process was suspended while this work was done. As to that, the plaintiffs also apply to remove the limit upon getting-up for trial.

33 In relation to getting up, particular reference is made to the solicitor, a senior practitioner, acting specifically for the first to fourth plaintiffs, but in effect acting for all attending the inquest, which was held in April, May and June 2005. The solicitor is said to have limited his attendance to days when it appeared the evidence might relate to matters of fact and law which would be in issue in respect of liability in proceedings such as those ultimately held before me.

34 I have no difficulty with the proposition that the taxing officer would be able to make a judgment as to the reasonableness of attendance. Nor do I have any difficulty with the broad proposition that to attend in that way, and subsequently obtain transcript of the evidence given at the inquest so far as it was thought to be helpful, would enable informed decisions to be made relative to the process of getting up for trial and would be likely to save costs incurred in the process of investigation of the facts which is a central part of getting-up the case for trial. I am content to observe that in my view it would be proper for the taxing officer to make an allowance under that head for the costs reasonably incurred in relation to the inquest.

35 Having regard to that matter, to the costs incurred in the process of preparing written closing submissions, to which I have referred, and to the unusual difficulty and complexity of the case in the aspects to which I have also referred above, I am persuaded that it would be appropriate to remove the limit involved in the scale allowance for getting-up for trial which is based on 100 hours of the time of a senior practitioner charged at the scale rate, and an order should be made to achieve that result in respect of item 16 of the scale.

36 As to the trial itself and counsel's involvement in preparation as well as attendance at the trial together with the allowances available for solicitors and clerks reasonably attending trial, I think the allowances in item 19 are generally reasonable and should not be interfered with. However, in view of the unusual difficulty and complexity of the matter I think it is likely that taxation subject to the limits provided in item 19(a) and 19(b), would be likely to be inadequate in relation to preparation for and the first day of trial. I would remove those limits from item 19, but not the others.

MURRAY J

37 In relation to the process of preparing for trial there are items in the scale dealing with costs incurred in requiring and giving discovery and inspection of discovered documents. The plaintiffs submit that the scale limit should be removed in relation to the process of giving discovery. Having regard to the documents, not all of which by any means ended up being tendered in evidence, which found their way into the book of documents, I am not persuaded that there is justification for removing or increasing the limit available under the scale in relation to this process.

38 The plaintiffs also seek a reasonable allowance for the cost of obtaining transcript of the inquest and for the costs incurred in proofing and generally qualifying expert witnesses to give evidence at trial. So far as the lawyers are concerned of course the process of perusing transcript and dealing with expert witnesses is centrally part of the getting-up process. So far as the fees charged for the provision of transcript and by expert witnesses are concerned, no special order is required and I will make none. Item 33 of the scale provides that as between party and party, a party may be allowed on taxation disbursements necessarily or reasonably incurred.

39 In that way the taxation process may also make a reasonable allowance for the expense incurred by the sixth plaintiffs who bore the costs of the trial transcript obtained for the use of the plaintiffs generally. To do so was certainly reasonable and necessary, in fact, I expected that the submissions would refer to relevant evidence, they did so, and I was assisted by that.

40 A further disbursement which I would say was necessarily and reasonably incurred by the plaintiffs (without wishing to trespass upon the function of the taxing officer), was the cost incurred in relation to the process of obtaining the evidence of Mr Steven Roberts and Mr Barton by video-link from Canada and America respectively. Again, no special order is required in relation to these costs.

41 A problem arises in relation to costs because the sixth plaintiffs' claim against the first defendant for damages for breach of contract is dismissed. In its minute of orders in CIV 1312 of 2008 the first defendant proposes that the sixth plaintiffs should pay its costs of that claim, including special orders of the kind proposed otherwise by the first to sixth plaintiffs. On the other hand in the minute of orders submitted by the plaintiffs no distinction is made between the costs sought generally by the sixth plaintiffs and those in relation to the contractual claim which failed.

MURRAY J

42 In its written submission on costs the first defendant refers to the dismissal of the contractual claim and submits, not that it should have the costs of defending that claim, but that the costs to be awarded to the sixth plaintiffs should be reduced by 50% to reflect the proportion of the litigation between the sixth plaintiffs and the first defendant represented by the contractual claim.

43 Of course the general outcome of the action both in respect of the sixth plaintiffs' claim in tort, including the claim for economic loss, and the claim for breach of contract, was a judgment for the sixth plaintiffs and it is not clear to me that the damages for breach of contract would, when assessed, be substantially different from those pleaded in respect of economic loss arising out of the tortious claim.

44 In my view in those circumstances it would be inappropriate to order the sixth plaintiffs to pay the first defendant's costs of the contractual claim. Nor I think would it be appropriate to attempt some assessment of the time and significance of the issues upon which the sixth plaintiffs succeeded and those upon which they failed when overall they were successful, for the purpose of reducing their recoverable costs. And yet they brought the contractual claim, putting the first defendant to expense to defend it, and they lost. The best I can do I think in those circumstances is to allow the costs of the contractual claim to lie where they fall - to be borne by the respective parties who incurred them. I will make no order as to the costs of this claim.

45 Finally in relation to the matter CIV 1312 of 2008, the seventh plaintiff, whose action against the second defendant was settled by consent, needs to be considered. Orders were made disposing of that matter, including that the second defendant pay the seventh plaintiff's costs to be taxed. He seeks special costs orders pursuant to liberty reserved to him to make such an application. He does so on the ground that the claim against the second defendant was only settled immediately prior to the commencement of the trial.

46 However it is not otherwise sought to justify an application for special orders and, as the second defendant observes, the position of the seventh plaintiff was quite different from that of the remainder of the plaintiffs. His involvement in the trial was as the third defendant and as a third party and his preparation for the trial was no doubt substantially in that capacity. As a plaintiff he was separately represented and advances nothing out of the ordinary in relation to the taxation of costs. I do not

MURRAY J

make any special costs order in relation to this plaintiff but leave the question of his costs to the order made by consent at the outset of the trial.

Costs orders: CIV 2279 of 2009

47 I was provided with a minute which was discussed by counsel for the plaintiff and third party on the one side and counsel for the first defendant on the other. In my view the minute accurately presents the orders which would be appropriate. I sum up my views about this particular litigation at the end of the principal reasons in [435] - [437], but I should express my reasons at a little more length and make my thinking clear.

48 I was not aware that originally the first five plaintiffs in CIV 1312 of 2008 commenced their actions in the District Court only against FSS and Mr Barclay. The sixth plaintiffs in CIV 1312 of 2008 sued the three parties who became the defendants in the consolidated proceedings, and as those proceedings were formulated before me and as the litigation was conducted, the question of contribution between the second and third defendants in those proceedings was, without regard to formality of the pleading process, raised generally.

49 I determined that the third defendant, for whose negligence the first defendant is admittedly vicariously liable, was two-thirds responsible for the accident and its consequences in law, whereas the second defendant bore responsibility for one-third of the legal consequences of the accident in relation to the claims made. That was the general position, except that the sixth plaintiffs succeeded in their claim for economic loss not incurred consequentially upon property damage, and therefore described as pure economic loss, only against the first and third defendants and not against the second defendant, Mr Barclay.

50 The action CIV 2279 of 2009 is a claim by FSS for damages for negligence, relevantly against Mr Barclay, who joins Mr Penberthy as a third party. The damages for which the plaintiff in CIV 2279 of 2009 sues are those directly suffered by reason of the loss of the aircraft and arising out of the economic consequences of the incapacity to use the aircraft for commercial purposes. Those damages are also said to include a component for the loss suffered by FSS as a result of its liability incurred vicariously for the negligence of Mr Penberthy to awards of damages in CIV 1312 of 2008.

51 Having regard to my views as to the apportionment of liability as between the third party, Mr Penberthy, and the first defendant, Mr Barclay, I have concluded that the damages recoverable by the

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plaintiff FSS in CIV 2279 of 2009 will be one-third of the damages it has incurred as ultimately assessed because of the contribution to that loss by the negligence of Mr Penberthy for which FSS is vicariously responsible.

52 As to the damages by way of indemnity against the liability of FSS to pay damages for pure economic loss to the sixth plaintiffs in CIV 1312 of 2008, I found at [436] and earlier in the principal reasons that Mr Barclay owed FSS a duty of care in this regard. Because the loss suffered by FSS arises causally out of the occurrence of the accident for which, having regard to its vicarious liability for the negligence of Mr Penberthy, FSS is two-thirds responsible, in my opinion the indemnity which the first defendant in CIV 2279 of 2009 is liable to provide to the plaintiff in that action FSS should again be one-third of the damages recovered by the sixth plaintiffs from FSS. The orders I will make reflect that view.

53 As I think I explained in the principal reasons, in my opinion the proper view of the third party notice is that it raises on behalf of the first defendant a claim to be indemnified by the third party, which is not fully maintainable, and a claim for a contribution to the liability of the first defendant to FSS, which will result in the capacity of that plaintiff to recover from the first defendant the damages it must meet and the loss it sustained to the extent of the one-third responsibility for the accident and its consequences which the first defendant Mr Barclay must bear.

Final orders

54 In the circumstances I think I have been able to resolve the matters which have an impact upon the terms of those orders in both CIV 1312 of 2008 and CIV 2279 of 2009. The convenient course is therefore to make the orders which I have determined are appropriate, and I set them out below.

CIV 1312 of 2008

1. Judgment be entered for the first to fifth plaintiffs against the first and second defendants.
2. Judgment be entered for the sixth plaintiffs against the first, second and third defendants.
3. The first and second defendants do pay to the first to fifth plaintiffs damages to be assessed.

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4. The first, second and third defendants do pay to the sixth plaintiffs damages (save and except damages for pure economic loss) to be assessed.
5. The first and third defendants do pay to the sixth plaintiffs damages for pure economic loss to be assessed.
6. As between the first, second and third defendants, liability for the damages and costs payable to the first, second, third, fourth, fifth and sixth plaintiffs be apportioned as to two-thirds to the first and third defendants and as to one-third to the second defendant save and except for liability for the sixth plaintiffs' claim for damages for pure economic loss which is to be borne by the first and third defendants.
7. The sixth plaintiffs' claim against the first defendant for breach of contract be dismissed. Each party is to bear their own costs of that claim.
8. The first to seventh plaintiffs' costs be taxed as costs of an action.
9. The first to sixth plaintiffs' costs in these proceedings and in the District Court actions 400 of 2006, 402 of 2006, 2072 of 2006, 2073 of 2006, and 1592 of 2005 and Supreme Court action 1831 of 2006 be taxed as one set of costs.
10. Except as provided in order 7, the first, second and third defendants do pay the first to sixth plaintiffs' costs of the action, included reserved costs, to be taxed if not agreed, subject to the following:
 - 10.1 the relevant scale limits as to time be removed in relation to the statements of claim and consolidated statement of claim (item 1(b));
 - 10.2 the relevant scale limit as to amount be removed in relation to preparation and attendance at the mediation conferences (item 23(a));
 - 10.3 the relevant scale limits as to time and amount be removed in relation to getting up (item 16);
 - 10.4 the relevant scale limits as to time and amount be removed in relation to trial for items 19(a) and (b) only.

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11. The actions identified in order 9 herein be deconsolidated.
12. Pursuant to s 17(2) of the *Supreme Court Act 1935* (WA) the actions of the first to fifth plaintiffs, being District Court action numbers 400 of 2006, 402 of 2006, 2072 of 2006, 2073 of 2006, and 1592 of 2005, be transferred back to the District Court of Western Australia at Perth for assessment of damages.
13. Supreme Court action number 1831 of 2006 continue under that action number for assessment of damages.

CIV 2279 of 2009

1. Judgment be entered for the plaintiff against the first defendant for damages to be assessed if not agreed.
2. The first defendant do pay the plaintiff one-third of the damages assessed or agreed.
3. A declaration be made that the first defendant is liable to indemnify the plaintiff as to one-third, in respect of its liability to the sixth plaintiffs' claim for pure economic loss and the costs of that claim, in CIV 1312 of 2008.
4. The costs of the action be reserved.
5. The action be otherwise adjourned to a directions hearing on a date to be fixed by the court.