

F-111 Withdrawal from Service

Technical and maintenance considerations

- 4.1 In addressing Australia's future strike capability requirements, the *Defence 2000 – Our Future Defence Force* projected that the retirement of the F-111 fleet would likely occur in the 2015–2020 timeframe. The White Paper further went on to observe that it would be:

... unlikely that there will be any comparable specialised strike aircraft suited to our needs available at that time ... [and] the best option may be specialised strike variants of air combat aircraft. This would allow the replacement of the F-111 by the same type of aircraft as we buy to follow the F/A-18 ...¹

- 4.2 The Defence Capability Review conducted in 2003 revised the withdrawal from service date of the F-111 to around 2010. This new timeframe reflected the rebalancing of the ADF's structure and capabilities that occurred following the release of the *Defence Update 2003* and subsequently reflected in the *Defence Capability Plan 2004–2014*. This timeframe continues to underpin Defence planning with regard to air superiority and is again reflected in the latest capability planning document, the *Defence Capability Plan 2006–2016*.
- 4.3 There has been much debate in the media and amongst air power commentators with regard to the decision to change the planned

1 Department of Defence, *Defence 2000 – Our Future Defence Force*, December 2000, p. 93.

withdrawal date of the F-111. During his opening statement to the public hearing on 31 March 2006, the Chief of Air Force addressed the issue of the revised timeframe for the withdrawal of the F-111. Specifically, he outlined the Defence position as being based on minimising the risks associated with operating an ageing aircraft and ensuring an ongoing effective balance across ADF capability:

When you add up the structural risk, the system risk, the support risk, the financial risk and the overall risk to capability, you have a clear and undeniable question about the viability of the F-111 beyond the period when we plan to withdraw it. And all these risks increase as the aircraft age. At the end of the day, my job and the job of all of us here is to minimise strategic risk for Australia. Clearly to go down such a path with these sorts of costs is irresponsible, and the funding pressures would put at risk our balanced land, maritime and air capabilities. We need to decide when to retire the F-111 so that we can manage the transition to the new air combat capability without risk to our overall capability – not be forced to do it at an indeterminate time of the aircraft's choosing. We need to confidently plan for our future, not leave it to chance.²

- 4.4 At the public hearing on 5 July 2006, Defence also advised that the revised planned withdrawal date was influenced by maintenance issues and concerns that had previously been unknown, specifically, the failure of a fatigue test conducted on the aircraft wings. Defence commented that:

Probably the most defining event was in the middle of that period [between the 2000 White Paper and Defence Update 2003] – that is, the fatigue test article failure in 2002 ... that caused a fairly substantial rethink as to the supportability of the F-111 and how we could manage it.³

- 4.5 Given the conviction with which many commentators have suggested that the F-111 could be upgraded, and its service life extended, the Committee pressed Defence for further information on this matter. Defence and industry contractors providing the maintenance support to the F-111 made the following general comments about extending the aircraft's operational life:

2 Air Marshal Geoff Shepherd, *Transcript 31 March 2006*, p. 40.

3 Group Captain Adrian Morrison, *Transcript 5 July 2006*, p. 5.

We have updated the F-111 to get us through to a planned withdrawal in 2010 or 2012 ... Beyond that, its ability to be viable in a number of defence scenarios diminishes over time.⁴

At the moment, we see nothing which would prevent us going beyond that timeframe [2010]. However ... as the aircraft gets older, there is an element of risk ... there is a risk of having problems that we do need to solve increasing the cost, perhaps reducing some of the capability ...⁵

From an engineering perspective, this aircraft is certainly capable of performing until 2012 and beyond, but at some point, you will obviously need to make further investment depending on how far you want to take it.⁶

... we have made plans ... up to 2012. Probably the impediments [to extending] would be things like support and test equipment that would need to be upgraded, because some of that is old technology.⁷

- 4.6 The Committee also sought comment from the Officer Commanding No. 82 Wing, a F-111 pilot, on extending the aircraft's operational life. In response to Committee questioning, the Officer Commanding stated:

... from the point of view of a pilot ... I believe that the amount of dollars and effort required to get a very small increase in its current capability is not an option that we would want to take up.⁸

- 4.7 Where extension of aircraft life has been discussed in the media and by specialist commentators, the B-52 Bomber is regularly referenced as an excellent example of the longevity that can be achieved through upgrades and enhancements.
- 4.8 The Committee sought comment from Defence as to why the F-111 could not be extended in service when the United States clearly has the intention to do so with a similarly ageing aircraft; i.e. the B-52. Defence advised that the two aircraft were quite different and that direct comparisons were difficult, specifically:

4 Group Captain Gavin Davies, *Transcript 5 July 2006*, p. 3.

5 Group Captain Adrian Morrison, *Transcript 5 July 2006*, p. 3.

6 Mr Geoff Webb, *Transcript 5 July 2006*, p. 3.

7 Mr Daryll Macklin, *Transcript 5 July 2006*, p. 4.

8 Group Captain Gavin Davies, *Transcript 5 July 2006*, p. 6.

... they are very different beasts [sic] in the way they have been manufactured and in the access to structure and things like that. In a tactical fighter aircraft like the F-111, there is not a lot of space to get in easily ... The F-111 is a very special beast [sic] in terms of the type of technology that has been used in the aircraft. If you compare that to, say, a B-52, you probably have more airline type technology coming into play ... Ultimately you have to simply look at issues such as fatigue life, wear, the nature of operations of the aircraft and so on ... Are you operating in a benign environment or are you, for example, operating an aircraft at 30,000 feet straight and level for five-hour missions or operating at 200 feet in excess of Mach 1 and pulling lots of G all the time.⁹

- 4.9 Defence concluded that while the aircraft could be technically maintained to 2020, the performance in operational roles would diminish and that it would require:

... a substantial upgrade to not only basic aircraft systems, but also avionics and so on, just to give it both maintainability and supportability ... we would probably need to remanufacture wings ... [and] if we were going to do that for the next 30 or 40 years I think we would want to try and redesign it ... So it is not impossible, but I am beginning to wonder why.¹⁰

- 4.10 Furthermore, in addition to risks to the aircraft and the delivery of capability, Defence also believes that there would be risks to Australian industry with extending the operational service of the F-111. The Chief of Air Force advised the Committee that:

We know completely the ability of Australian industry to support this aircraft now, and we are not sanguine at all that a major upgrade would be achievable and supportable within Australia.¹¹

- 4.11 While industry contractors expressed confidence in their technologies, workforces and their ability to provide ongoing support to the F-111, they nonetheless accepted that there would be increasing risks and cost pressures. While approximately 70 percent of the life-of-type spares were purchased from surplus United States stock, some of the

9 Group Captain Adrian Morrison, *Transcript 5 July 2006*, pp. 12-13.

10 Group Captain Adrian Morrison, *Transcript 5 July 2006*, p. 28.

11 Air Marshal Geoff Shepherd, *Transcript 31 March 2006*, p. 40.

original equipment manufacturers (OEM) are scaling back, or ceasing production, of some of the components and parts. In addressing this issue, Rosebank Engineering advised that:

A lot of effort would need to go into components spares but, having said that, we are doing that along the way ... Rosebank has done reverse engineering many times in the past where there is no OEM support ...¹²

- 4.12 In relation to ensuring a timely, and ongoing supply of spares, the manager of the F-111 Engines Business Unit commented that:

Some of those spares would have to be manufactured, and it takes companies a lead time of anything up to two years ... to go back into production ... We would have to assume that the cost of spares would increase ...¹³

- 4.13 In relation to spares and ongoing future availability, particularly as OEM suppliers cease to manufacture them, Raytheon advised the Committee:

We have OEM suppliers now who are telling us that they do not want to undertake these activities in the future ... So we are undertaking life of type buys now ... I can undertake a buy now or later, but it might cost me if I do it later because I will have to ask that support base to retool and remanufacture.¹⁴

- 4.14 Tasman Aviation Enterprises also expressed the belief that supportability of the aircraft can be achieved, but that there are difficulties, particularly to do with the 'scale' of production runs:

We can manufacture most of the aeroplane. There are some parts that we are not going to be able to do in Australia, because the technology or the equipment is not here ... How we come up with ways of solving unique problems that a sole operator brings is going to come up in the future, and volume is going to be the issue.¹⁵

- 4.15 However, Tasman Aviation Enterprises emphasised that while reverse engineering and innovative design analysis has enabled the

12 Mr Daryll Macklin, *Transcript 5 July 2006*, p. 4.

13 Mr John Duff, *Transcript 5 July 2006*, p. 10.

14 Mr Mark Harling, *Transcript 5 July 2006*, p. 12.

15 Mr Andrew Sanderson, *Transcript 5 July 2006*, p. 14.

F-111 maintenance teams to sustain a viable spares base, to do so into the future may not be possible:

A lot of the way the aeroplane was built was welding steel together in a unique process, certainly around the wings. There will be a new technology that would have to be brought into Australia ...¹⁶

4.16 Dr Kopp and Mr Goon submit that early retirement of the F-111 will result in 'significant loss of employment in domestic systems integration and aerospace industry sector, including training positions.'¹⁷ The Committee therefore sought industry comment as to the business, expertise and training impacts of withdrawal of the F-111.

4.17 The industry contractors who appeared as witnesses were generally positive as to their ability to plan and structure their workforces to transition to other aviation business when the F-111 retired, including balancing retention of unique technical expertise until the retirement date. The biggest issue requiring management from their perspective was ensuring predictability of the withdrawal date to enable them to effectively and efficiently transition their businesses:

Our [Rosebank] current plans are that we have to look ahead for other avenues ... whether it be aviation or whether we support it. But certainly, whatever we do, we will still retain the core skills that we have developed and learned from.¹⁸

F-111 occupies about 60% of [Tasman Aviation Enterprises] ... so we are actually diversifying beyond the F-111 so we can sustain that workforce into the future as well ... so you get a way of continuing the skill set into the future, not just relying on the F-111. There will be a decline as the F-111 withdraws, but we are making sure our forward forecasting is looking at where we can take that group of people ...¹⁹

Beyond the F-111, from an avionics perspective, there are only a small number of elements that will be replicated in other platforms ... Those people and those skill sets will be

16 Mr Andrew Sanderson, *Transcript 5 July 2006*, p. 21.

17 Air Power Australia, *Submission No. 20, Sub. Vol. 1*, p. 144.

18 Mr Daryll Macklin, *Transcript 5 July 2006*, p. 15.

19 Mr Andrew Sanderson, *Transcript 5 July 2006*, p. 16.

retained. It is our job as an industry partner to diversify ...
into other platforms as best we can ...²⁰

- 4.18 As the planned withdrawal date nears, different strategies will need to be employed to ensure critical skills are retained. Further, the stockpiling of components and spares needs to be managed, particularly if re-tooling and re-manufacture is required. Nonetheless, all industry witnesses recognised that the F-111 retirement 'will happen one day.'²¹
- 4.19 However, as mentioned above, the ability of industry to plan and transition from the F-111 to future business opportunities is a major requirement, which is based upon being able to work towards a known, and secure, withdrawal date. Raytheon referred to this requirement as 'tenure security.'²²
- 4.20 Finally, in relation to the maintenance/technical aspects of the F-111 planned withdrawal, submissions to this inquiry have suggested that replacing F-111 engines with F-22 or F15/F16 engines, would provide another means by which the operational life of the aircraft could be extended and the capability effect enhanced.²³ The Committee pursued this proposition during the public hearing at RAAF Base Amberley. Defence advised the Committee that while not impossible to change the engine in a tactical fighter aircraft, such an undertaking is not easy:
- When you start introducing that sort of technology, particularly with such a small fleet, you end up with all of the integration costs but you are not able to amortise it ... So we have to wear all of the qualification testing, the integration and design and so on. It is a very big program we are talking about. As well as that, the scale of the program is such that I think, as we went through it, we would suffer significant aircraft availability problems ... So even if you decided to do this today, it would probably be a decade before you actually came out of it again.²⁴
- 4.21 Defence planning therefore remains focussed on withdrawal of the F-111, to 'get off that increasing risk curve at a time of our own
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20 Mr Mark Harling, *Transcript 5 July 2006*, p. 16.

21 Mr Mark Harling, *Transcript 5 July 2006*, p. 16.

22 Mr Mark Harling, *Transcript 5 July 2006*, p. 16.

23 Mr John Peake, *Submission No. 3*; Mr Adam Lane, *Submission No. 19*; and Mr James Sadler, *Submission No. 23*.

24 Group Captain Adrian Morrison, *Transcript 5 July 2006*, p. 28.

choosing.’²⁵ Defence added that it believes the biggest risk factor is not the risks they are planning to manage and mitigate, but those they have not yet anticipated.

4.22 There has been speculation that the risks as identified by Defence in continuing to operate the F-111 beyond around 2010 are overstated. In 2004, Dr Kopp advised the inquiry into the *Defence Annual Report 2002-03* that Defence had ‘failed to produce a single strategically or technically convincing reason for F-111 early retirement.’²⁶

4.23 Again, in a submission to the present inquiry, Dr Kopp and Mr Goon stated that ‘the risks in extending the life of the F-111 are low, and well understood due to the extensive taxpayer investment in the Sole Operator Program [SOP].’²⁷

4.24 A submission to the inquiry from Air-Vice Marshal Criss (Retd) supported the Dr Kopp and Mr Goon contention above regarding good risk management and the subsequent development of appropriate risk management strategies:

Good risk management is all about knowing what you know and finding out about those things you don’t know, then putting in place risk-management strategies that ensure the risks do not materialise. The F-111 operates under this strategy in the only true Ageing-Aircraft Program in the ADF. We know the aircraft backwards and we know the risks.²⁸

4.25 Defence does not support these contentions regarding risk. Chief of Air Force observed, ‘There are increasing risks. Those risks increase with age. We believe we have those risks managed up to the planned withdrawal date.’²⁹

25 Air Marshal Geoff Shepherd, *Transcript 31 March 2006*, p. 44.

26 Dr Carlo Kopp, *Transcript 4 June 2004*, p. 99.

27 Air Power Australia, *Submission No. 20, Sub. Vol. 1*, p. 133.

28 Air-Vice Marshal Criss (Retd), *Submission No. 38, Sub. Vol. 3*, p. 488.

29 Air Marshal Geoff Shepherd, *Transcript 31 March 2006*, p. 44.

- 4.26 The F-111 SOP³⁰ has enabled the RAAF to develop 'an excellent understanding of what it takes to operate and maintain it ... [but] we know there are significant issues to be addressed to extend its life ...'³¹ Defence believes that the research and activities that have been, and continue to be, undertaken as part of the SOP, are effectively keeping the F-111 going until the planned withdrawal around 2010, not that the program itself presents the means by which the aircraft life should be extended much beyond that time.
- 4.27 During the public hearing at RAAF Base Amberley, the F-111 maintenance support teams, contractor and Defence witnesses, commented on the successes and positive impact of the SOP on the sustainment of the aircraft. They also noted, however, that:
- If there is a problem that nobody has foreseen ... we will be the first people to find it [and] ... if something does occur, we may not necessarily get a forecast of it ... We are certainly better informed than we were, but there can never be a rock solid guarantee that there will not be another surprise.³²
- 4.28 Defence categorised the 'risk' issue in terms of three key factors:
- the F-111 is an old aircraft, is very complex technically and as the sole operator, Defence 'cannot turn to anybody else to help us manage [it];'³³
 - management of those issues that may not be known, but can be anticipated. For example, the aircraft has a test called cold-proof loading test which, according to the Chief Defence Scientist, will see one or more aircraft fail in the near future and those issues will have to be managed;³⁴ and

30 The SOP was established in the late 1990s in response to the United States retirement of its F-111 fleet. The RAAF, in partnership with the Defence Science and Technology Organisation (DSTO), stood up the program to deal with the knowledge issues that were going to arise when required to operate the aircraft alone and to fill in the gaps that existed in taking the aircraft past where the USAF had been. The USAF retirement of their F-111s also enabled the RAAF to acquire an expanded inventory of spares and to invest in a number of test programs to identify future maintenance issues. [Witness testimony of AVM Monaghan to public hearing on 4 June 2004 into the Review of the Defence Annual Report 2002-03, Transcript, p. 81.]

31 Air Marshal Geoff Shepherd, *Transcript 31 March 2006*, pp. 39-40.

32 Group Captain Adrian Morrison and Mr Geoff Webb, *Transcript 5 July 2006*, p. 11.

33 Dr Roger Lough, *Transcript 31 March 2006*, pp. 44-5.

34 Dr Roger Lough, *Transcript 31 March 2006*, p. 45.

- management of those issues ‘that we do not know we do not know,’³⁵ that is, unanticipated problems the risk of which occurring accelerates with each passing year.

4.29 To assist the Committee’s understanding of the scope of risk factors that have to be managed, Defence provided the following examples:

- the F-111 ejection system is powered by a rocket motor which ejects the entire crew module. Rocket motors are a safety critical system and manufactured to an exacting standard. These motors generally have a safe life of 20 years. The last one that Defence holds was manufactured in 1997, with most manufactured around 1994-5. Therefore, they run out of life in 2015. To extend beyond that time, which would be ‘extreme’, it would be necessary to ‘start up a defunct production line and who knows what the cost would be, even if they could do it;’³⁶
- there were exotic materials used in aircraft built in the 1950s and 1960s that pose unacceptable health and safety issues today, for example, beryllium; and
- pushing the life out much beyond 2012 makes obtaining certain replacement parts increasingly difficult, ‘notwithstanding that we have got as many as we can from the desert. They would have to be re-manufactured.’³⁷

Strategic/air superiority considerations

4.30 In addition to the aging aircraft and sole operator issues discussed above, ‘early’ retirement of the F-111 is considered by many to be ill-advised because of the consequences for Australia’s regional security once the ADF ceases to possess a long-range strike capability. For example, Dr Jensen MP stated that:

The F-111 fleet currently provides around 50% of the RAAF’s total strike firepower ... Not only that, but the F-111 is a unique asset in the region ... With the loss of this capability, our competitive edge will be lost.³⁸

35 Dr Roger Lough, *Transcript 31 March 2006*, p. 45.

36 Dr Roger Lough, *Transcript 31 March 2006*, p. 45.

37 Dr Roger Lough, *Transcript 31 March 2006*, p. 46.

38 Dr Dennis Jensen MP, *Submission No. 21, Sub. Vol. 2*, p. 247.

- 4.31 In a submission to the inquiry, Major James Rotramel, a retired USAF F-111 Weapons Systems Officer, observed that:

Whatever you decide to replace your F-111s with, you need to acknowledge that you are going to be giving up a capability that seems to be uniquely suited to your country's range and payload requirements.³⁹

- 4.32 The Committee sought information from Defence as to the way in which the long-range strike roles and responsibilities of the F-111 could be managed once the aircraft was withdrawn from service. With regard to the roles and responsibilities of the F-111, the Chief of Air Force made the point to the Committee that when the F-111 was originally acquired it was envisaged that the aircraft would operate alone, however:

That is not the way we would operate with the F-111 and we have not done so for many years. So when you get to the issues about range ... and the reach that we are able to project strike ... we are effectively constrained to the range of the F18 [sic] with the F-111 now, because the F-111 does not have the situational awareness, it needs to be escorted by F18s [sic] ... It is not as if we were withdrawing a capability that had the power to bomb Vladivostok, say, to replace it with something that is much shorter range ...⁴⁰

- 4.33 The Officer Commanding No. 82 Wing commented that from his perspective, as an F-111 pilot:

... the majority of a modern battlefield scenario will involve a composite package of aircraft to get the best outcome. So I would suggest that the scope for a lone-aircraft role has diminished since we first purchased the F-111.⁴¹

Evolved F-111 proposition

- 4.34 Differing opinions as to the alternative strategies that could have been pursued were raised during the public hearing as well as in the submissions received by this inquiry. For example, Group Captain

39 Major James E. Rotramel (USAF, Retd), *Submission No. 5, Sub. Vol. 1*, p. 28.

40 Air Marshal Geoff Shepherd, *Transcript 31 March 2006*, p. 57.

41 Group Captain Gavin Davies, *Transcript 5 July 2006*, p. 30.

Cottee (Retd), as a former RAAF pilot who worked on the acquisition of the F-111, believes that there is:

... no significant valid reason why these aircraft should not continue through to 2020, at least, considering the large spares holdings acquired during the time when 2020 was planned as life-of-type. There is adequate expertise remaining in Australia to ensure continuing structural integrity.⁴²

- 4.35 Mr James Sadler strongly supports the 'Evolved F-111' option as proposed by Dr Kopp and Mr Goon and contends that:

Replacing the legacy parts that are hard to maintain and/or are rare within the F-111, with modern, more cost-effective and supportable equipment is the way forward ... Defence's argument concerning the F-111's high operational and maintenance cost would be irrelevant if these upgrades were implemented, as support costs and maintenance hours would be much lower than the present number.⁴³

- 4.36 Dr Kopp and Mr Goon first submitted their 'Evolved F-111' concept to Defence in the late 1990s and believe that it remains an economically and strategically viable option. During the public hearing they advised that pursuing such a program would be feasible:

The upgrades proposed for the F-111 are principally technology insertion upgrades to upgrade the remaining legacy systems in the aircraft. The nature of the upgrades and the types of technologies that we are talking about are low risk technologies ... the remaining legacy avionics in the aircraft, which are principally the cockpit, the radar and the Pave Tack system.⁴⁴

- 4.37 The 'Evolved F-111' option was formally submitted to Defence as part of the AIR 6000 project in 2001. Essentially the submission proposed:

... the acquisition of a force mix with up to 55 F-22A Raptors to replace the F/A-18, extensive but low risk incremental upgrades to extend the life of the F-111, and acquisition of further mothballed surplus F-111s to enhance fleet strength.⁴⁵

- 4.38 Furthermore, Dr Kopp and Mr Goon noted that:
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42 Group Captain M.J. Cottee (Retd), *Submission No. 13, Sub. Vol. 1*, p. 56.

43 Mr James Sadler, *Submission No. 23, Sub. Vol. 2*, p. 264.

44 Mr Peter Goon, *Transcript 31 March 2006*, p. 13.

45 Air Power Australia, *Submission No. 20, Sub. Vol. 1*, p. 128.

The F-22A/F-111 force mix is cheaper to implement than the plan devised by Defence, as only the F/A-18As need to be replaced with new fighters, and the existing investment in the F-111 and its extensive support base is exploited fully.⁴⁶

- 4.39 During the public hearing, Mr Goon advised the Committee that he remained confident in the model development by himself and Dr Kopp as it was based on a national interest issue:

... we want the best for Australia in force structure, in terms of defence capability. We looked at that from a variety of different directions and put in a considerable amount of effort in analysis and reporting. We came up with what we thought was, as we still think today is, the most cost-effective optimal option for Australia in air power force structure in relation to the air combat capability requirement.⁴⁷

F-111 – general observations

- 4.40 Given the divergent positions stated in the submissions and testimony of the Department of Defence and Dr Kopp and Mr Goon, the Committee sought general comment from other inquiry witnesses in relation to the future of the F-111.
- 4.41 Dr Stephens advised the Committee that, given his background as a Canberra pilot, he did not support keeping the F-111 in service as he was 'not a big fan of engineering solutions to drag old aeroplanes along past their natural life.'⁴⁸ He nonetheless believes that Australia should retain a strategic strike capability, and that manned aircraft currently still present the best option to achieve this, but that the F-111 was not a viable option past its planned retirement date.
- 4.42 Professor Babbage cited the risks associated with extending the life of the F-111 and commented that it 'is rather an old air frame. It is suffering ... from quite serious fatigue challenges.'⁴⁹ He further added that it is 'not going to be a viable option in intense environments

46 Air Power Australia, *Submission No. 20, Sub. Vol. 1*, p. 133.

47 Mr Peter Goon, *Transcript 31 March 2006*, p. 5.

48 Dr Alan Stephens, *Transcript 31 March 2006*, p. 22.

49 Professor Ross Babbage, *Transcript 31 March 2006*, p. 28.

downstream ... [and] would be in some difficulty without an enormous amount of support.’⁵⁰

- 4.43 As the ADF’s airworthiness authority, and the officer tasked with delivering an effective air power outcome for the Government, the Chief of Air Force, used the following analogy when describing his position on extending the life of the F-111:

... taking an EH Holden – a good car in its day – reworking it from the ground up, calling it a V8 Commodore and expecting it to win first time out at Bathurst.⁵¹

Committee comment

- 4.44 The Committee understands that industry contractors currently supporting the F-111 could manage maintaining the life of the aircraft up to 2020, and possibly beyond, however there would be risks that would increase over time. For example:

- the potential for significant cost and capital outlay pressures, particularly if components and parts needed to be re-manufactured and the facilities did not exist in Australia; and
- the management and sustainment of a specialised and diminishing trained workforce as the core of F-111 maintenance personnel are an ageing demographic.

- 4.45 The Committee believes that industry contractors maintaining the F-111 require predictability in relation to the planned withdrawal date of the F-111. This will ensure that business imperatives, including transitioning their workforces and retention of critical skills, can be managed in an effective manner to minimise potential negative impacts.

- 4.46 The Committee notes that although there are differing views on the likelihood and severity of the risk in operating the F-111 past 2010, there is agreement that there are a variety of substantial risks.

50 Professor Ross Babbage, *Transcript 31 March 2006*, pp. 28–9.

51 Air Marshal Geoff Shepherd, *Transcript 31 March 2006*, p. 40.