4

Impact of the Agreements

Introduction

4.1 Chapter 4 deals predominantly with the impact of the intended purpose of the Nuclear Material Transfer Agreement, that is, the sale of uranium to China. In addition to receiving evidence in this regard, the Committee also received evidence on the potential environmental opportunity cost and social impact of selling uranium to China.

4.2 The second agreement under review, the Nuclear Cooperation Agreement provides for research programs, the use of OPAL[1] for advanced materials science and expands the scope of future collaborative research and development with China.[2] The Nuclear Cooperation Agreement is not expected to provide an economic benefit in the short term,[3] but rather provides benefits in the research and development of nuclear technology.

---

1 OPAL is a 20 megawatt pool reactor using low enriched uranium fuel, and cooled by water. OPAL is a multipurpose facility for radioscopic production, irradiation services and neutron beam research. Its compact core is designed to achieve high performance in the production of neutrons. The building is constructed from reinforced concrete; it is seismically qualified and has a metallic grillage for protection from a light aircraft crash. Australian Nuclear Science and Technology Organisation, viewed 21 August 2006, <www.ansto.gov.au>.

2 RIS, p. 4.

3 RIS, p. 4.

Background

4.3 China has predicted that by 2020, it will consume four times more nuclear energy than at present and is seeking a secure, long-term source of uranium to satisfy its expanding nuclear energy program. China currently sources the majority of its uranium domestically, but will need to import uranium to meet its future energy demands.[4]

4.4 Australian uranium producers are interested in exporting uranium to China, but are currently denied access to this export market due to long-standing Australian Government policy. This policy limits supply of Australian uranium to countries with which Australia has bilateral safeguards agreements and detailed administrative arrangements in place.[5]

4.5 While China is a potential new market for uranium producers, there is currently no bilateral safeguards agreement in place with China. This led Australian uranium mining companies[6] together with Chinese Government officials to approach the Australian Government in 2004 to request that the Australian Government consider negotiating a bilateral safeguards agreement with China.[7] The treaties under review resulted from these negotiations.

4.6 The short-term impact of the Nuclear Material Transfer Agreement (which includes safeguards provisions) is expected to increase the volume of uranium exported from Australia by existing uranium producing companies, agents and agencies.[8]

4.7 The obvious impact the Agreements would have in the medium to long term is an increase in uranium production leading to the expansion of Australia's uranium industry. However, whether Australia's uranium industry can expand its production (in response to increased demand for uranium), is based on commercial decisions

4 Regulation Impact Statement (RIS), p. 5.

5 RIS, p. 5.

6 BHP Billiton (Olympic Dam Mine, South Australia), Energy Resources Australia (Ranger Mine, Northern Territory), Heathgate Resources (Beverley Mine, South Australia) and other mines given approval to operate. RIS, p. 6.

7 Regulation Impact Statement (RIS), p. 1; Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 33.

8 Nuclear Material Transfer Agreement National Interest Analysis (NMTA NIA) Consultation Annex, para. 1.

by mining companies, and approvals by relevant State, Territory, and Federal Governments.[9]

The economic impact of the sale of uranium to China

World uranium demand and supply

4.8 The Committee received evidence that the world demand for energy is growing quickly with total electricity consumption forecast to grow from 15 000 billion kWh per annum to approximately 24 000 billion kWh by 2025. The Australian Uranium Association (AUA) informed the Committee that approximately 3300 billion kWh of the 2025 total electricity consumption would be attributable to nuclear power generation. Currently, coal continues to be the primary source of electricity generation, with nuclear and natural gas also widely used.[10]

4.9 Further, by 2010 world uranium demand is expected to grow to 71 500 tonnes per annum and by 2020 to grow to 84 700 tonnes per annum. In 2006, primary production will have yielded 44 300 tonnes of uranium and secondary production will have yielded 21 100 tonnes of uranium. Secondary sources, which currently make up 35 per cent of nuclear generator demand are derived from: diluted weapons grade uranium (17%), reprocessed uranium (12%) and mined stocks (6%).[11]

4.10 There is consensus that as secondary supplies are declining, primary production will need to rise to meet demand.[12] AUA provides that because of the decline in secondary supplies, by 2020, global uranium production will have to rise by nearly 60 per cent to 70 500 tonnes per annum to meet demand.[13]

4.11 However, according to the International Atomic Energy Agency (IAEA) and the Organization for Economic Cooperation and Development's (OECD) latest *Red Book,*[14] global uranium resources

9 RIS, p. 5.

10 Australian Uranium Association (AUA), *Submission 34*, pp. 3-4.

11 AMEC, *Submission 31*, p. 3.

12 AUA, *Submission 34*, p. 4; AMEC, *Submission 31*, p. 3; Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 34.

13 AUA, *Submission 34*, p. 4.

14 The full title of the Red Book is *Uranium 2005: Resources, Production and Demand.* The Red Book is the recognised world reference on uranium and is based on official information

(supplies) are more than adequate to meet the projected global demand for uranium. As can be seen (by country break down) in Table 1.1, the total global uranium resource that can be mined for less than $US130 per kilogram is approximately 4.7 million tonnes. Based on the 2004 nuclear electricity generation rate of demand, the amount of uranium resources available is sufficient for 85 years of use. Use of fast reactor technology would extend this timeframe to over 2500 years.[15]

4.12 In addition, continuing advances in nuclear technology will allow for the more effective use of uranium. Development is underway on reactors that can extract more than 30 times the energy of current reactors.[16]

4.13 The IAEA provides that the price of uranium has increased by 500 per cent since 2001 providing the impetus for new initiatives and investments in uranium exploration. Based on geological evidence and knowledge of uranium in phosphates, it is considered that there is more than 35 million tonnes of uranium available for exploiting. In 2005, global uranium exploration investment accounted for approximately $200 million, up by 50 per cent since 2004. The growth in uranium exploration is expected to increase the uranium resource base and the world's uranium production capacity.[17]

4.14 The Australian Safeguards and Non-Proliferation Office (ASNO) informed the Committee that China has a long standing contract with Canada for the supply of uranium and recently signed transfer of nuclear material agreements with Kazakhstan and Namibia. ASNO informed the Committee that Australia would not be disadvantaged by other countries' long standing supply of uranium to China:

> At the moment, uranium production is less than two-thirds of uranium demand worldwide because a substantial amount—I think it is something like 40 per cent—of uranium demand at the moment is being met through down-blending of ex-military material, mainly from Russia. It is clear that that

---

received from 43 countries. IAEA, Global Uranium Resources to Meet Projected Demand, Staff Report, viewed 6 November 2006, <www.iaea.org>.

15 IAEA, *Global Uranium Resources to Meet Projected Demand*, viewed 2 November 2006, <www.iaea.org>.

16 IAEA, *Global Uranium Resources to Meet Projected Demand*, viewed 2 November 2006, <www.iaea.org>.

17 IAEA, *Global Uranium Resources to Meet Projected Demand*, viewed 2 November 2006, <www.iaea.org>.

> supply is coming to an end and as a result there is now a scramble for long-term contracts. That is one factor that is driving the uranium price up quite substantially. So I would not be confident that other producers at the moment have surplus capacity that they are able to swing in to help new buyers. I think the market will stay tight for a period.[18]

Table 1.1: Known recoverable naturally occurring uranium resources at less than US$130 kg/Uranium[19]

Country	**Tonnes of uranium**	**Percentage of total uranium reserves %**
Australia	1 143 000	24.1
Kazakhstan	816 000	17.2
Canada	444 000	9.4
US	342 000	7.2
South Africa	341 000	7.2
Namibia	282 000	5.9
Brazil	279 000	5.9
Niger	225 000	4.7
Russian Federation	172 000	3.6
Uzbekistan	116 000	2.4
Ukraine	90 000	1.9
Jordan	79 000	1.7
India	67 000	1.4
China	60 000	1.3
Other	287 000	6.1
World total	**4 743 000**	**100**

18 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 34.

19 IAEA, Uranium 2005, Resources, Production and Demand (Red Book); AMEC, *Submission 31*, p. 2; Dr Justin Walawski, *Transcript of Evidence*, 6 October 2006, pp. 15-16; MCA, *Submission 32*, p. 8.

China's demand for uranium

4.15 China is the world's largest country with a current population of approximately 1.3 billion people, a Gross Domestic Product (GDP) of approximately US$2.3 trillion[20] and was ranked as the fourth largest economy globally in 2005.[21] China's real GDP growth rate in 2005 was 9.9 per cent.[22] Following the United States of America (US), China is also the world's second largest energy consumer[23] and carbon dioxide emitter.[24] It is estimated that by 2030, China will generate as much electricity as the US, Japan, Canada and Germany currently do together.[25] China is also Australia's third largest trading partner. In 2005, China was Australia's largest energy export market.[26]

4.16 In 2001, China's total installed energy generation capacity (of electricity) was 338.6 Gigawatts of which 74.4 per cent was from thermal power,[27] 24.5 per cent was from hydropower and 0.7 per cent was from nuclear power. In 2001, electricity production in China had an annual growth rate of 8 per cent with only 1.2 per cent of electricity produced from nuclear power. The Chinese Government has given priority for the increased use of natural gas, hydropower, and nuclear power for electricity generation.[28]

4.17 While China will continue to rely on coal and natural gas to power its growing electricity consumption,[29] it is expected that China will become more reliant on nuclear power as an alternative energy source, particularly for coastal regions where populations are growing rapidly and there is a recognised shortage of energy resources.[30]

---

20 For the year 2005. IAEA, People's Republic of China, viewed 1 November 2006, <www.iaea.org> , p. 211.

21 International Monetary Fund, viewed 1 November 2006, <www.imf.org>.

22 US Department of State, Bureau of East Asian and Pacific Affairs, Background Note: China, viewed 8 November 2006, <http://www.state.gov>.

23 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 20.

24 Australian Uranium Association (AUA), *Submission 34*, p. 8.

25 Minerals Council of Australia (MCA), *Submission 32*, p. ii.

26 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 20.

27 derived from coal and natural gas. MCA, *Submission 32*, p. ii; Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 20.

28 MCA, *Submission 32*, p. ii; Mr Peter Morris, *Transcript of Evidence*, 16 October 2006, p. 6.

29 MCA, *Submission 32*, p. ii; Mr Peter Morris, *Transcript of Evidence*, 16 October 2006, p. 2.

30 IAEA, People's Republic of China, viewed 1 November 2006, <www.iaea.org>, p. 214; AUA, *Submission 34*, p. 8.

4.18 The Committee was informed that in China nuclear power is favoured as an alternative to coal fired power generation because it does not produce greenhouse gas emissions:

> China is … a member of the Asia-Pacific Partnership on Clean Development and Climate, in which Australia is participating with four other nations as well as China. This represents an important initiative currently with the greatest prospect of delivering real progress to abate greenhouse gas emissions. A key reason for the current interest in developing nuclear power is the role it can play in climate change management. The maths here is quite simple. Every 22 tonnes of uranium used saves the emission of about one million tons of CO_2 relative to coal fired generators producing the same amount of energy. On a life cycle basis, nuclear power plants emit less CO_2 than other energy production mechanisms.[31]

4.19 China has supported the generation of nuclear power for energy since 1970 and by June 1983 began construction on the Qinshan nuclear power plant. By 1991, the Qinshan nuclear power plant was connected to the electricity grid and nuclear power generation began on China's mainland. Following Qinshan, the Daya Bay nuclear power plants were the result of a joint venture and began operation in 1994.[32]

4.20 Since 1964, China has conducted research into various types of nuclear power generation including: liquid metal fast reactors, advanced passive pressurised water reactor simulators and high temperature gas reactors. Currently, pressurised water reactors are favoured for nuclear power generation, whilst other types of reactors are considered where appropriate.[33] The Australian Nuclear Science and Technology Organisation (ANSTO) informed the Committee:

> We can expect China to become more involved in the development of new reactor designs. I think it is at that stage that they may start talking to people like us who have some expertise in the sorts of materials that you would need to run a generation IV reactor, because generation IV reactors are supposed to run at much higher temperatures than current reactors. ANSTO has some expertise in that area and it is at

31 Mr Peter Morris, *Transcript of Evidence*, 16 October 2006, p. 2.

32 IAEA, People's Republic of China, viewed 1 November 2006, <www.iaea.org>, p. 216.

33 International Atomic Energy Agency, People's Republic of China, viewed 1 November 2006, <www.iaea.org>, p. 216.

> that stage that we would start to cooperate with them on nuclear technology. At the moment, the area that we are looking to cooperate with them is in the area of neutron beam science on the use of instruments on the new OPAL reactor.[34]

4.21 China presently has nine nuclear power reactors in commercial operation and a further nuclear reactor will commence operations in 2007, bringing the total to ten.[35] China plans an almost 500 per cent increase in its nuclear capacity by 2020[36] with another five nuclear power plants (NPPs) under construction, 13 planned NPPs and a further 50 proposed NPPs.[37]

4.22 ASNO informed the Committee that China's nuclear power capacity in 2020 would be approximately 40 Gigawatts (equivalent to 40 large power reactors) and represents 4 per cent of China's expected installed electrical capacity at that time and 6 per cent of China's electricity output. This level of electricity production will be larger than the whole of Australia's current total electricity output.[38]

4.23 According to the IAEA, China has approximately 1 per cent (of the world's uranium resources) or 60 000 tonnes of known low cost recoverable uranium. The World Nuclear Association estimates that China has 10 000 more tonnes of low cost recoverable uranium or 70 000 tonnes. This is enough for China to meet its current energy requirements. However, if the planned and proposed NPPs come online, China will need to import uranium to meet its energy needs.[39]

4.24 China's current uranium production is 840 tonnes and this supplies 65 per cent of China's nuclear energy requirements. China imports the remaining 35 per cent from Kazakhstan, Namibia and Russia. It is estimated that China has a capacity to process 1320 tonnes of uranium per annum. China has also stepped up its domestic exploration efforts and has two new mines proposed that together will yield 300 tonnes of uranium per annum.[40]

---

34 Mr Steve McIntosh, *Transcript of Evidence*, 4 September 2006, p. 32.

35 AMEC, *Submission 31*, p. 1; AUA, *Submission 34*, p. 9.

36 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 20.

37 Association of Mining and Exploration Companies (AMEC), *Submission 31*, p. 1; MCA, *Submission 32*, p. ii.

38 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 20.

39 MCA, *Submission 32*, p. 4.

40 MCA, *Submission 32*, pp. 4-5.

4.25 The main consideration for China's future energy requirements is 'how to provide economically secure and stable power … and reduce the environmental impacts of generating this power.'[41]

4.26 The Committee was informed that the Australian Government expects that China would not seek to source more than approximately one third of its uranium requirements from any one-supplier country including Australia.[42] This would equate to around 2.5 thousand tonnes of uranium a year sourced from Australia.[43] China already has bilateral agreements with other countries and sources uranium from these countries.[44]

Australia's uranium supply

4.27 As Table 1.1 shows, Australia has 24 per cent of the world's low cost recoverable uranium reserves. The Association of Mining and Exploration Companies (AMEC) informed the Committee that not all the known recoverable uranium reserves are economically recoverable. Australia has 36 per cent of world uranium reserves which are recoverable at low cost (approximately US$40 per kilogram). As exploration activities are regulated, only limited exploration occurred between 1985-2005. Increased uranium exploration could result in the discovery of greater uranium reserves.[45]

4.28 AMEC stated that Australia's low cost recoverable uranium puts it at an advantage to countries such as Kazakhstan and Canada:

> Figures that we have to hand are that Australia has 24 per cent of the known recoverable reserves and Kazakhstan has around 17 per cent. However, as I mentioned earlier, while we have 24 per cent of the world's known recoverable reserves, that does not necessarily translate into the economically recoverable reserves. In that regard, Australia is even more favourably positioned in that it has 36 per cent of the world's economically recoverable deposits. On top of that fact, 98 per cent of our reserves are at the lowest end of the market—that is, they can be mined for less than US$40 per

41 MCA, *Submission 32*, p. ii; Mr Peter Morris, *Transcript of Evidence*, 16 October 2006, p. 2.

42 RIS, p. 5.

43 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 22.

44 MCA, *Submission 32*, p. 5.

45 AMEC, *Submission 31*, p.2; Dr Justin Walawski, *Transcript of Evidence*, 6 October 2006, p. 14.

> kilo. So our leverage in negotiation is significant and far in advance of Kazakhstan, Canada or other places around the world—or Namibia for that matter.[46]

4.29 AMEC informed the Committee that approximately 97 per cent of Australia's uranium resources at a cost of recovery of less than US$40 per kg are located in the following deposits:

- Olympic Dam (the world's largest deposit), Beverley and Honeymoon, South Australia
- Jabiluka, Koongarra and Ranger, Northern Territory
- Kintyre and Yeelirrie, Western Australia.

Of these deposits, Olympic Dam, Ranger and Beverley are in production, Kintyre and Yeerilee can not be developed under West Australian Government policy, Jabiluka's reserves require traditional owner approval before mining and Honeymoon is not yet in operation.[47]

4.30 In addition, since 2001, Australia's production and exports of uranium have almost doubled from 5989 tonnes per annum (2001-2002) to 11 489 tonnes per annum in 2005-2006.[48]

4.31 International demand for uranium is increasing and the trend appears likely to continue. China is expected to increase its nuclear power generation capacity by almost 700 per cent in the next 25 years.[49]

4.32 By expanding its uranium exports, Australia could meet China's long-term uranium demand.[50] As already stated, China's planned total nuclear electricity capacity by 2020 will require an annual supply of about 8000 tonnes of uranium, which is a little less than Australia's total annual uranium exports over recent years.[51]

4.33 Representatives from the Government of South Australia provided evidence about the life expectancy of Australia's uranium mines:

> Should the proposed expansion proceed, BHP has already indicated publicly that the life of Olympic Dam would be

---

46 Dr Justin Walawski, *Transcript of Evidence*, 6 October 2006, pp. 15-16.

47 AMEC, *Submission 31*, p. 3; Dr Justin Walawski, *Transcript of Evidence*, 5 October 2006, p. 16.

48 AMEC, *Submission 31*, p. 3.

49 AMEC, *Submission 31*, p. 3.

50 NMTA NIA, para. 9.

51 RIS, p. 1.

> something like 70 years—a very long-lived mine. In the case of the current Beverley mine, I do not think I can really comment on the life of the mine other than to say that it is probably within the next 10 years. Honeymoon is only a small deposit at this stage. It would have a life of somewhere between five and ten years, depending on the level of extraction.[52]

4.34 Representatives from the Government of South Australia added that there are no new proposals for uranium mines:

> There are no other proposals that have come forward for mining developments at this stage. Bear in mind that from the point of exploration and discovery of uranium or a metals resource to the point of coming forward with a mining proposal there are usually some years. There is often something like five to seven years in terms of the discovery and proving up of a resource through to mining development. At this stage there are certainly quite a number of indications of uranium mineral occurrences that have been identified in the last few years during the mineral exploration upswing. But in terms of the likelihood of those coming forward as a mine, we would be looking at several years down the track. So there is nothing on the doorstep awaiting government assessment for a new mine.[53]

4.35 The Minerals Council of Australia (MCA) provided that because of strict uranium mining regulations in other Australian States, Australia's increase in uranium production would come from the expansion of Olympic Dam and from the Honeymoon Mine:

> A significant part of the increase in resources for production and export would come from the expansion of the Olympic Dam and also from the Honeymoon mine, which will come into production in about two years time. There are opportunities for further expansion but they are restricted at the moment by state government policies. In particular, there are a number of known deposits in Western Australia and a number of other states which have not had the benefit of modern exploration techniques, although there is some application, of course, of those more modern approaches now, with a very significant increase, according to Australian

52 Dr Edward Tyne, *Transcript of Evidence*, 5 October 2006, p. 25.

53 Dr Edward Tyne, *Transcript of Evidence*, 5 October 2006, pp. 26-27.

> Bureau of Statistics figures, of exploration for uranium in Australia.[54]

4.36 The Committee received evidence that no forward contracts for the sale of uranium to China had been entered into, but anticipates that once the Agreements enter into force that uranium could be exported to China in the first half of 2007. Representatives from the Government of South Australia and AMEC agreed.[55] In relation to forward contracts, ASNO stated:

> Contracts could be entered into at any time—though, to our knowledge, this has not yet occurred—but no material can actually be transferred into China until the agreements are in place, along with the ancillary documentation, the administrative arrangement and so on. We hope that that will all be in place by the end of the year. How quickly uranium then transfers into China really depends on commercial arrangements, whether the uranium bought will be processed in other countries before going to China or whether it will go directly to China for processing. In principle, we could have uranium going into China in the first half of next year, but that is speculative.[56]

Value of Australian uranium exports

4.37 ASNO informed the Committee that the economic benefit of the Agreements would provide an estimated value of an additional A$250 million per annum[57] for Australia once they enter into force.

4.38 In 2005, Australia's uranium exports were worth A$573 million.[58] With the Agreements in place, uranium exports would be worth around A$820 million per annum.

4.39 Friends of the Earth Australia (FOEA) stated that the expected return of A$250 million per annum from the sale of uranium to China is equivalent to approximately 0.33 per cent of the value of Australia's total exports to China in 2005. FOEA, the Australian Conservation Foundation (ACF), the Medical Association for Prevention of War (Australia) MAPW, the Anti-Nuclear Alliance of Western Australia

54 Mr Peter Morris, *Transcript of Evidence*, 16 October 2006, p. 4.

55 Dr Edward Tyne, Transcript of Evidence, 5 October 2006, p. 24: Dr Justin Walawski, *Transcript of Evidence*, 6 October 2006, p. 16.

56 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 22.

57 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 22.

58 RIS, p. 6.

(ANAWA) and one other submission[59] put the view to the Committee that for such a small return, Australia was risking the misuse of its uranium (namely for weapons manufacture) and contributing to the environmental and social problems associated with nuclear waste management.[60] FOEA added that it believes the amount of A$250 million is an overestimate:

> I think that is an overestimate. I think it is highly likely that China's nuclear expansion plans will not be met, just as its previous nuclear expansion plans have not been met by a factor of two or more. Even if it does reach $250 million per annum, that is an increase on existing exports to China of just over one per cent. So it is not great. Senator Ian Campbell says there are 'phenomenal' opportunities for renewable energy investment in China. More broadly on uranium sales, they account for less than one-third of one per cent of Australia's entire export income. That would strike many people as odd, given all the rhetoric we read about in the newspapers these days about getting rich on the back of uranium and Australia being the Saudi Arabia of the nuclear industry and so on.[61]

Other issues

Recruitment of skilled technicians and graduates

4.40 The Australian Nuclear Science and Technology Organisation (ANSTO) informed the Committee about Australia's situation in relation to the recruitment of skilled technicians and graduates in the area of nuclear technology:

> We have put in place fairly recently an advanced materials group. In fact, we have recruited some people for that and we have put out expressions of interest for other people in the organisation to join that group. The expertise that the Australian Atomic Energy Commission used to have back in the 1960s and 1970s was really run down, and it is a matter of resuscitating it and rebuilding it. We have had continued expertise in waste forms, obviously, with synroc and so on.

59 Ms Carol G. Williams, *Submission 15*, p. 3.

60 FOEA, *Submission 24*, p. 33; Dr Jim Green, *Transcript of Evidence*, 25 October 2006, p 8; Mr David Noonan, *Transcript of Evidence*, 5 October 2006, p. 3; Mr James Courtney, *Transcript of Evidence*, 6 October 2006, p. 5.

61 Dr Jim Green, *Transcript of Evidence*, 25 October 2006, p. 8.

> But, for the rest of the fuel cycle, we are now engaged in thinking about strategic recruiting of particular people. For instance, we are currently recruiting a new head for our Materials and Engineering Science Institute. The preferred candidate—who has not yet been announced publicly—is somebody from overseas with expertise in that area.[62]

Selling uranium to India

4.41 The Committee was interested to know about the possible sale of uranium to India. In particular, the Committee was interested in whether there had been any changes to Australia's policy to only sell uranium to NPT[63] Party countries and where bilateral safeguards agreements are in place. A representative from the Department of Foreign Affairs and Trade informed the Committee:

> The policy still remains the same. There have been no negotiations with India. In fact, a group of officials visited India earlier this year, in about May, and made it quite clear to India that there would be no question of Australia selling uranium to India given the current policy ...[64]

Environmental and social concerns arising from the sale of uranium to China

4.42 A number of organisations that provided submissions to the Committee are opposed to uranium mining and the sale of uranium because of its potential negative environmental and social effects.[65]

4.43 In brief, opposition to the treaties for environmental reasons was raised in the relation to:[66]

---

62 Mr Steve McIntosh, *Transcript of Evidence*, 4 September 2006, p. 32.

63 *Treaty on the Non-Proliferation of Nuclear Weapons* is aimed at preventing the spread of nuclear weapons and weapons technology to foster the peaceful uses of nuclear energy and to further the goal of achieving general and complete disarmament. NPT also establishes a safeguards system managed by the IAEA, which takes responsibility under the NPT in areas of technology transfer for peaceful purposes. IAEA, International Conventions and Agreements, viewed 6 November 2006, <www.iaea.org>.

64 Mr John Sullivan, *Transcript of Evidence*, 4 September 2006, p. 38.

65 *Submissions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 29, 36*.

66 *Submissions 1, 2, 3, 6, 7, 8, 11, 13, 14, 16, 17, 18, 19, 21, 22, 24, 26, 29, 36*.

- inadequate long term nuclear waste management and the risk of permanent toxic pollution
- uranium mining, transportation, building nuclear power plants and decommissioning, which causes considerable greenhouse pollution
- the potential for nuclear accidents and the negative environmental and social effects of such accidents
- persistence of radioactivity for thousands of years and the detrimental genetic effects on humans, animals and the natural environment
- the unsustainability of the nuclear industry.

4.44 Organisations were also opposed to entering into the Agreements with China because of claims that:[67]

- there is considerable public opposition to the treaties from Australians
- bilateral nuclear safeguards contained in the Agreements and the international nuclear safeguards system are inadequate
- China's level of accountability and transparency is poor
- the media in China is highly censored by the Government
- China has a poor human rights record
- China's occupational health and safety and labour policies are not at an acceptable standard
- China has a long history of nuclear proliferation E.g. China has previously sold stolen nuclear technology which could be used to make nuclear weapons and potentially exacerbate long standing regional conflicts to other States (such as North Korea, Iran, Pakistan, Libya and Syria).
- an increase in uranium supply to China will allow China to free-up its domestically sourced uranium for weapons production
- there are inadequate safeguards in place to stop uranium being used by China or possibly a third country (if the uranium is sold on) to manufacture weapons.

67 *Submissions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 29.*

China's accountability and transparency

4.45 A number of organisations raised particular concerns in their submissions about accountability and transparency stemming from China's system of Government and the governance mechanisms inherent in its organisations and companies.[68] These organisations have recommended that Australian uranium not be sold to China based on these concerns in combination with claims that the safeguards system (which provides for non-military use of uranium) is inadequate. ACF), MAPW, FOEA and People for Nuclear Disarmament Western Australia (PNDWA) provide more detail about these concerns. Safeguards concerns are discussed in more detail in Chapter 5.

4.46 ACF and MAPW instanced claims of China's human rights abuses constituting breaches of the *United Nations Convention Against Torture and other cruel, inhuman or degrading treatment or punishment* and the *United Nations Convention on the Rights of the Child*.[69]

4.47 In relation to the *United Nations Convention Against Torture and other cruel, inhuman or degrading treatment or punishment,* ACF and MAPW stated:

> Notwithstanding some improvements in the prosecution of perpetrators of torture, Amnesty again stated in 2006 that, "torture and ill-treatment continued to be reported in a wide variety of state institutions. In a horrifying twist, recent reports have revealed that the organs of executed political dissidents are often harvested and sold as transplants for Western customers. China has clearly breached its international treaty obligations in this instance, and has so far not been held to account for its actions.[70]

4.48 In relation to the *United Nations Convention on the Rights of the Child*, ACF and MAPW drew attention to China's one child policy and its cultural preference for male offspring resulting in the ill treatment of female offspring, and China's continuing use of child labour.[71]

4.49 In addition, China's industrial pollution and safety record is also questioned with the environmental damage and social impact caused

68 *Submissions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 29.*

69 ACF & MAPW, Submission 26, pp. 33-34; Mr David Noonan, *Transcript of Evidence*, 5 October 2006, p. 4.

70 ACF & MAPW, *Submission 26*, pp. 33-34.

71 ACF & MAPW, *Submission 26*, pp. 33-34.

by explosions at a chemical plant owned by the China National Petroleum Corporation; and a safety failure at the Shaoguan Zinc Smelter which released ten times the acceptable level of toxic cadmium into the Biejiang River. Both incidents occurred late 2005 polluting water supplies, devastating natural ecosystems and having a negative impact on the human population.[72]

4.50 From claims of China's human rights abuses and environmental incidents and their mismanagement, ACF and MAPW have concluded that it is not certain that China can fulfil its core obligations under the Agreements, nor can the peaceful use of Australian uranium be ensured:

> … the state of accountability in China means China's signed word cannot easily be trusted, they cannot effectively be monitored and held to account for their actions, and little faith can be held in the ability of internal Chinese institutions to monitor and regulate the use of Australian uranium. China will, in all likelihood, not be held to account by the nuclear safeguard agreements. Exporting a highly strategic and dangerous resource in these conditions carries a high degree of risk.[73]

4.51 FOEA shares the same view in relation to China's lack of accountability and transparency and drew attention to the media censorship in China and lack of whistleblower protection:

> Repression exists across Chinese society including the energy sector. For example, police reportedly shot and killed about 20 people who were protesting the construction of a power plant in the southern city of Dongzhou in December 2005, and Chinese officials blocked the spread of information about the event. In addition to the appalling human rights record, whistleblower protections are absent. There are examples of persecution of nuclear industry whistleblowers, such as Sun Xiaodi, who was concerned about environmental contamination at a uranium mine in north-west China and was abducted in April 2005 immediately after speaking to a foreign journalist.[74]

---

72 ACF & MAPW, Nuclear Safeguards and Chinese Accountability, *Submission 26*, p. 30.

73 ACF & MAPW, Nuclear Safeguards and Chinese Accountability, *Submission 26*, p. 37.

74 FOEA, *Submission 24*, p. 29.

4.52 PNDWA were also concerned about media censorship and its implications for the sale of uranium to China and stated:

> there is a very severe lack of media freedom and a lack of political transparency and accountability in Chinese society. We can give an example of this. A Greenpeace campaign and communications director in Beijing, Lo Sze Ping, was questioned by Sholto Macpherson from the journal *The Diplomat* in August-September this year. Lo Sze Ping was asked something about the operation of the nuclear power program in China, and he had to say, 'I'm sorry, I will not be able to help you because this is a no-go area for NGOs'. That is just a snapshot of Chinese society. We think it does not augur well for NGOs to take actions that would expose failures in safety and in the siting of nuclear power stations.[75]

4.53 In addition, FOEA raises concerns about public safety and environmental issues around China's use of nuclear power:

> There are other serious concerns in addition to the potential use of Australian uranium in Chinese nuclear weapons. Wang Yi, a nuclear energy expert at the Chinese Academy of Sciences in Beijing, told the New York Times in January 2005: "We don't have a very good plan for dealing with spent fuel, and we don't have very good emergency plans for dealing with catastrophe."[76]

4.54 ACF stated that it is relevant to the Agreements to discuss China's level of accountability:

> We think it is very pertinent that China is unaccountable and that they do not have the conventional checks and balances that we take for granted in Australia. No independent parliament, no independent parties and no inquiries such as this will ever occur in China under the current government. … with such hazardous material as nuclear material, we should not be exporting to any of them that do not have that accountability. China is the world's largest prison for journalists. Can we reasonably expect that a whistleblower in China will last long enough to be heard in Australia if they

75 Mrs Judith Blyth, *Transcript of Evidence*, 6 October 2006, p. 19.

76 FOEA, *Submission 24*, p. 31.

> wish to say that our nuclear material is not being used as it was claimed it would be under the honorary treaty?[77]

Nuclear waste management

4.55 Nuclear power, the waste it creates and its management is another concern raised by a number of organisations.[78] Issues raised in relation to nuclear waste management are centred on the detrimental permanent effects on humans and the persistence of radioactive pollution in the physical environment.

4.56 ACF draws attention to the non-inclusion of nuclear waste management in the treaty texts of the Agreements:

> Essentially, the treaty provides no information to the committee on nuclear waste management issues or on nuclear safety and nuclear power in China. It focuses almost entirely on the trade issues and the potential use of uranium in a proposed expansion of nuclear power, and it focuses on the claimed safeguards that either the IAEA or the Australian bilateral treaty would put in place. We believe there are three pillars of safeguards. Nuclear safety, nuclear waste management and proliferation should be weighted equally in considerations. They are matters that the committee should take equally into account in its considerations as to what is in Australia's national interests.[79]

4.57 In relation to China's nuclear waste management, the Women's International League for Peace and Freedom (Australian Section) (WILPF) have stated:

> It is known that China is planning to use, or may already use, deep well injection to dispose of liquid radioactive waste. Yet, according to the School of Engineering at Vanderbilt University: "There are large uncertainties in our knowledge of the behaviour of liquid wastes in geological strata, and as a result, there is a potential for migration of substances from the place of its disposal to the accessible environment." China's injection of nuclear waste into geological strata adds to the dilemma posed by the nuclear industry's overall waste management problems. Disposal of nuclear waste in this way

77 Mr David Noonan, *Transcript of Evidence*, 5 October 2006, p. 12.

78 *Submissions 1, 2, 3, 6, 7, 8, 11, 13, 14, 16, 17, 18, 19, 21, 22, 24, 26, 29, 36.*

79 Mr David Noonan, *Transcript of Evidence*, 5 October 2006, pp. 4-5.

> creates difficulties into the future both for production of food safe for human consumption and for water supply/resources.[80]

4.58 PNDWA states that the issue of nuclear waste is an unresolved global issue:

> No one country anywhere on planet Earth has yet figured out what to do with its radioactive waste, live for anything up to 250 000 years. This is a global issue, certainly, but no excuse for letting the Chinese Government, or any other proponents of nuclear power, anywhere, off the hook. Yucca Mountain, the much touted United States depository, remains unfinished, unstable, unusable. The French, the Germans, the Japanese, the British, just to mention the most frequent users/most advanced technological states, cannot figure out what to do with their nuclear waste. This is after sixty years of massive effort and billions of dollars worth or research and development money, coughed up by governments on behalf of their taxpayers.[81]

4.59 In addition, WILPF drew attention to the detrimental effects to humans and the physical environment of radioactive pollution which can result from the mismanagement of nuclear waste:

> As U-238 breaks down over centuries, it creates protactinium-234, which radiates potent beta particles that may cause cancer as well as mutations in body cells that can lead to birth defects. As Drs Rosalie Bertell and Helen Caldicott have stated, these mutations in the human gene pool, unlike cancers, which affect individual persons, affect the whole future of the human species, as these mutations are permanent and virtually unchangeable for future generations.[82]

4.60 MAPW elaborates on the use of nuclear material and its serious permanent, toxic impact on the environment and states:

> My final point, as a scientist and as a biologist, is that there is a conceptual issue here which is of critical importance, and that is that in large measure, in the long run, the political

---

80 WILPF, *Submission 29*, p. 4.

81 PNDWA, *Submission 19*, p. 3; Mrs Judith Blyth, *Transcript of Evidence*, 6 October 2006, p. 20.

82 WILPF, *Submission 29*, p. 2; Ms Ruth Russell, *Transcript of Evidence*, 5 October 2006, p. 16.

> complexion or nature of the regime in Australia or in China matters little at the time that a safeguards agreement might be concluded and nuclear exports might subsequently follow. Once the genie is out of the bottle in terms of these materials then they persist, are hazardous and are potentially usable in weapons for time frames that are simply beyond those for which any human institution has persisted. I remind the committee that the half-life of plutonium-239 is 24,400 years and that the half-life of uranium-235 is 713 million years. Human writing has only been in existence for 5,000 years. There is no human institution that has survived more than a couple of thousand years. We simply cannot guarantee what the capacity will be socially and politically to manage these materials once they are made available.[83]

4.61 Another issue of importance in discussion on nuclear waste management is the reprocessing of uranium for further use and its detrimental effects on the natural environment. The Committee received evidence that there is a current global stockpile of 270 tonnes of plutonium separated at reprocessing plants, which is enough to build around 27 000 nuclear weapons. Reprocessing of uranium is considered environmentally dirty and less than satisfactory by at least one director of the World Nuclear Association but under the Agreements reprocessing is permitted.[84] FOEA recommends that reprocessing be removed from the treaty text:

> … if reprocessing is environmentally dirty in France and the UK according to the World Nuclear Association, what on earth is it going to be like in China? It is unnecessary because most of the plutonium and uranium is simply not reused. The draft treaty text goes in completely the opposite direction and essentially gives blanket or programmatic approval for reprocessing. That ought to be removed from the treaty text. If at some later date there was a case for reprocessing then it could be revisited, but there is certainly not a case for reprocessing at the moment. So that provision in the treaty should be removed or a watered-down version of that recommendation should be considered—programmatic

83 Dr Tilman Ruff, *Transcript of Evidence*, 25 October 2006, p. 13.

84 Mr David Noonan, *Transcript of Evidenc*e, 5 October 2006, p. 14; Dr Jim Green, *Transcript of Evidence*, 25 October 2006, p. 9.

> approval could be changed to case-by-case approval, which used to be Australian government policy.[85]

4.62 In response to concerns raised by organisations in relation to China's waste management practices, ASNO stated:

> China has recently joined the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* and therefore its waste practices and policies will become subject to international scrutiny. China's nuclear waste management program takes into account its entire fuel cycle mix and nuclear fuel inventory from all sources. It is not required to manage waste or spent fuel from AONM any differently from that of other origins so long as AONM is dealt with in accordance with the Nuclear Material Transfer Agreement and IAEA safeguards.[86]

4.63 In addition, ASNO provided that in 1994, China constructed the Lanzhou Nuclear Complex, a centralised store for civil Spent Fuel (SF) with an initial capacity of 550 tonnes. For reprocessing, China has a growing inventory of spent fuel and proposes to recycle the fissile content of large quantities of SF. In 1998, in the Lanzhou Nuclear Complex, at the same site as the centralised SF store, construction of a pilot civil processing plant began. The plant has a planned capacity of 50 tonnes SF per year. In addition to this plant, a larger reprocessing plant with a capacity of up to 800 tonnes of SF per year is also being constructed to be completed by 2020.[87]

4.64 ASNO states that China also has waste repositories for the disposal of low level waste and intermediate level waste operating in the northwest of China:

> China plans to vitrify high-level waste (HLW) arising from reprocessing and to dispose of this HLW in a geological repository at a depth of 500 metres. The candidate site at Beishan, located in the Gobi Desert, was selected in a process that began in 1986 by considering 21 different districts in China. This site is currently being further assessed, and it is

85 Dr Jim Green, *Transcript of Evidence*, 25 October 2006, p. 10.

86 ASNO, *Submission 30*, p. 6.

87 ASNO, *Submission 30*, p. 6; Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 37.

> expected that licensing will start in 2020 with operation to begin around 2040.[88]

4.65 ASNO informed the Committee that China's level of nuclear planning was developing and improving as new technology becomes available:

> … there is a state of flux, if you like, in nuclear planning generally because of the development of new technologies and particularly the boost that this is being given by the US GNEP initiative—the Global Nuclear Energy Partnership—which is bringing together a number of technology developments from several countries and promoting a way of recycling plutonium that avoids some of the proliferation risks associated with reprocessing and also shortens the lifespan of high-level waste. China is following these developments very closely. I was talking with a Chinese expert on this a week ago today, in fact, in Korea. He told me that, although they have a plan to bring a reprocessing plant onstream around 2020, they have not taken any final decision on the technology that they would be following. It could well be that they will go in the direction of these new recycling technologies rather than established technology. As Mr McIntosh said, given that their program is quite new and growing, they are really at a stage with their forward thinking which is pretty much as any country would be in similar circumstances. I do not think that suggests there is a lack of a plan and that there is some sort of safety question mark; it is rather that these things are very long term.[89]

Energy alternatives to nuclear power

4.66 Many of the organisations and individuals opposed to uranium mining and to the Agreements advocated the use of alternative energy options that are environmentally sustainable (unlike coal fired power generation).[90]

4.67 ACF stated that China and India are the only two countries in the world with proposed major nuclear power expansion. Several

---

88 ASNO, *Submission 30*, p. 6.

89 Mr John Carlson, *Transcript of Evidence*, 4 September 2006, p. 37.

90 *Submissions 6, 13, 15, 17, 22, 24, 27, 36;* Mr David Noonan, *Transcript of Evidence*, 5 October 2006, p. 4; Ms Ruth Russell, *Transcript of Evidence*, 5 October 2006, pp. 17-19.

European countries have phase-out policies. ACF advocated that Australia help China to find alternative methods of energy production such as solar, wind and energy efficient initiatives that are sustainable.[91]

4.68 ACF added that there is considerable economic benefit from selling renewable energy to China without the worry of creating nuclear waste:

> If you are looking at Australia's national interests—and there has been a focus, without disrespect, on economic and trade matters in this uranium sales proposal—ASNO made clear to you that the value of Australian uranium exports to China might be some $250 million a year by 2020. A company from Tasmania—the Roaring Forties—has recently sold three wind farms to China valued at $300 million. That is one renewable sale worth more than the maximum in accrued uranium sales to China that may be realised within 15 years. If the Australian community, the commercial world and government, with respect, gave fulsome support to the renewables industry, we could be gaining far greater access to the Chinese market—the 15 per cent mandatory renewable energy renewables market—and far greater innovation, job creation and export value for Australia than ever can be realised at the maximum extent of the nuclear power expansion there through uranium sales.[92]

4.69 FOEA believes that Australia should encourage China to adopt safer alternative energy production, instead of nuclear power, which also does not contribute to greenhouse gas emissions:

> Australia ought to encourage the Chinese regime to abandon the nuclear expansion and to increase the renewable target to 17% or more. There are various mechanisms to facilitate this course of action-the Clean Development Mechanism of the Kyoto Protocol, the AP6 Climate Change Framework, bilateral relations, export industry support, etc. The argument about Australian uranium reducing greenhouse emissions conflicts with the drug dealer's defence.[93] If the only

91 Mr David Noonan, *Transcript of Evidence*, 5 October 2006, pp. 8-9.

92 Mr David Noonan, *Transcript of Evidence*, 5 October 2006, p. 8.

93 The drug dealer's defence applied to the sale of uranium to China provides that if Australia does not sell uranium to China, China will source its uranium from another uranium producing country. FOEA, *Submission 24*, p. 31.

> consequence of a refusal to supply uranium to China was that other suppliers would fill demand, then refusal to supply uranium would not increase greenhouse emissions even if the reference point is coal fired electricity plants.[94]

4.70 Future Directions International (FDI) believes that the Agreements represent an opportunity for Australia to shape changing global energy patterns and requirements, securing its prosperity and security.[95]

4.71 FDI advocates the use of thorium reactors, which overcome the use of uranium and sideline much of the debate in relation to misuse of uranium intended for energy generation.[96] Further, thorium reactors are considered environmentally compatible as they pollute less than any other major form of power generation and Australia is resource rich in Thorium with 25 per cent of the world's reserve. FDI proposed including thorium in addition to uranium in the treaty texts of the Agreements.[97]

4.72 FOEA however, offered the opposing view stating that thorium may be converted to fissile material and used to manufacture weapons if desired:

> I was at a meeting at UNSW last week and Dr Reza, Australia's most prominent champion of thorium reactors, was there. In his presentation he said that for conventional reactors you need safeguards but that thorium reactors are proliferation-proof because after five years the isotopic ratio is entirely unsuitable for weapons use. In the discussion period I pointed out that a would-be proliferator would not irradiate the material for five years and that thorium is converted indirectly to uranium-233, which is a fissile material with safeguards broadly equivalent to highly enriched uranium and plutonium. A significant quantity is eight kilograms and conversion times are measured in weeks to months, depending on the form of the uranium-233. I pointed out that the US has successfully tested a bomb using a U-233 core and he was speechless. He did not want to defend thorium against those points of fact.[98]

94 FOEA, *Submission 24*, p. 31s.

95 FDI, *Supplementary submission 28.1*, p. 1.

96 FDI, *Supplementary submission 28.1*, p. 1.

97 FDI, *Submission 28*, p. 4; Mr Craig Lawrence, *Transcript of Evidence*, 6 October 2006, p. 10.

98 Dr Jim Green, *Transcript of Evidence*, 25 October 2006, p. 9.