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**Research Report**

## Governing uranium in Australia

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DIIS REPORT

Cindy Vestergaard

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Governing Uranium in Australia

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DIIS Report 2015:11

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## Abbreviations

AA	Administrative Arrangement
AAEC	Australian Atomic Energy Commission
ARR	Alligator Rivers Region
ARRAC	Alligator Rivers Region Advisory Committee
ARRTC	Alligator Rivers Region Technical Committee
ACT	Australian Capital Territory
ADU	Ammonium Diuranate
AEC	Atomic Energy Commission (USA)
ALP	Australian Labor Party
AMSA	Australian Maritime Safety Authority
ANRDR	Australian National Radiation Dose Register
ANSTO	Australian Nuclear Science and Technology Organisation
AONM	Australian Obligated Nuclear Material
AP	Additional Protocol
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASO	Australian Safeguards Office
ASTEC	Australian Science and Technology Council
ASNO	Australian Safeguards and Non-proliferation Office
AUA	Australian Uranium Association
CAEA	China Atomic Energy Authority
CD	Conference on Disarmament
CDA	Combined Development Agency
CNNC	China National Nuclear Corporation
CPPNM	Convention on the Physical Protection of Nuclear Material
CTBT	Comprehensive Test Ban Treaty
CWC	Chemical Weapons Convention
DFAT	Department of Foreign Affairs
DME	Department of Mines and Energy (NT)
DMP	Department of Mines and Petroleum (WA)
EDF	Electricité de France
EPA	Environmental Protection Authority
ERA	Energy Resources of Australia Ltd
GAC	Gundjeihmi Aboriginal Corporation
GDP	Gross Domestic Product
IAEA	International Atomic Energy Agency

ICSANT	International Convention for the Suppression of Acts of Nuclear Terrorism
IEL	Indo Energy Limited
ISR	In Situ Recovery
LEU	Low-Enriched Uranium
LNP	Liberal National Party
LPA	Liberal Party of Australia
MKU	Mary Kathleen Uranium Ltd
MCA	Minerals Council of Australia
MTCs	Minesite Technical Committees
NCA	Nuclear Cooperation Agreement
NLC	Northern Land Council
NNWS	Non-Nuclear Weapons State
NPP	Nuclear Power Plant
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NRC	Nuclear Regulatory Commission (USA)
NROP	Non-Resident Ownership Policy (Canada)
NSG	Nuclear Suppliers Group
NSW	New South Wales
NT	Northern Territory
NUMBAT	Nuclear Material Balances and Tracking
NWS	Nuclear Weapons States
PP18	Policy Paper 18
PP21	Policy Paper 21
RAR	Reasonably Assured Resources
SA	South Australia
SOLAS	Convention for the Safety of Life at Sea
SS	Supervising Scientist
SSAC	State System for Accounting and Control
UCF	Uranium Council Forum
UKAEA	United Kingdom Atomic Energy Authority
UMNFP	Uranium Mining and Nuclear Facilities (Prohibitions) Act 1986
UMPNER	Uranium Mining, Processing and Nuclear Energy Review
UMOC	Uranium Mining Oversight Committee
WA	Western Australia
WMC	Western Mining Corporation
WNA	World Nuclear Association
WNTI	World Nuclear Transport Institute

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## I. Introduction

Australia has been a long-time key player in the global uranium market. It has the world's largest known resources of uranium and has been consistently ranked as a top supplier. There is no nuclear power generation in Australia and all domestically mined uranium is exported, a position underpinned by its desire to flex its resource status to advance diplomatic and non-proliferation objectives. Despite its extensive resources Australia has never held top uranium producer spot. It went from sixth-largest producer in the 1980s and 1990s to second-largest in 2000,<sup>1</sup> a ranking held until 2008 when it dropped to third as it was overtaken by Kazakhstan. (A year later Kazakhstan overtook Canada as the world's largest producer). Today, Australia ranks third and accounts for twelve per cent of world production.<sup>2</sup> As of 1 October 2015, Australia has 23 bilateral nuclear cooperation agreements (NCAs) in force, covering 41 countries.

Australia's uranium policy and regulatory structure has been surprisingly resilient since 1977. It is a system that has endowed it with an international reputation for having created a uranium 'gold' standard with non-proliferation at its centre. Today, Australia's long-standing approach is being tested as the government negotiates with India – a state outside the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) – to supply uranium.

This study analyses the Australian uranium supply industry, the evolution of its development, and the legal framework that regulates uranium production and trade in Australia. It is part of the larger *Governing Uranium* project led by the Danish Institute for International Studies (DIIS), which explores the dimensions of security of natural uranium in a changing global market. This report touches upon the evolution of Australia's uranium policies and focuses mostly on Australia's uranium governance today and how it is relating to a shifting global market.

<sup>1</sup> Australian Safeguards and Non-proliferation Office, 'Australian Uranium Exports', ASNO Annual Report, 2000–2001.

<sup>2</sup> A Joint Report by the OECD Nuclear Energy Agency and the International Atomic Energy Agency, 'Uranium 2014: Resources, Production and Demand', OECD 2014, NEA No. 7209, p. 63.



## 2. Uranium Production in Australia

Australia's mineral sector serves as its biggest exporter, representing about 10% of gross domestic product (GDP) in 2012–2013. It has the world's largest resources of gold, iron, lead, nickel, zircon and zinc; the second-largest resources of cobalt, copper, silver, tantalum and thorium, and ranks among the top five worldwide for known resources of black and brown coal, rare earth and vanadium, to name a few.<sup>3</sup> It also has the world's largest known resources of uranium. As of 1 January 2013, Australia has 29% (1,706,100 tonnes of uranium) of the world's reasonably assured resources (RAR) recoverable at costs of less than US\$130/kg of uranium, and 24% of total identified resources in the highest cost category (<USD 260/kgU).<sup>4</sup> Uranium exports, however, represent a small fraction of Australia's overall mineral trade: in 2010, uranium accounted for just 0.6% of total mineral exports.<sup>5</sup>

Australian export tonnages have increased steadily from less than 500 tU<sub>3</sub>O<sub>8</sub> in 1976, to reach a record level of 12,360 tU<sub>3</sub>O<sub>8</sub> in 2005. Since then Australia's overall uranium production has been decreasing, particularly since 2008, owing mainly to operational and weather challenges, but also due to a decreasing spot price and increasing production costs. In 2008–2009 Australia exported 10,114 tU<sub>3</sub>O<sub>8</sub>, approximately 17% of world production, from three operating mines: Ranger in the Northern Territory, and Olympic Dam and the Beverley operation in South Australia. In 2010, Australia's exports were 7,555 tU<sub>3</sub>O<sub>8</sub>,<sup>6</sup> (production was 5,900 tU) reflecting a decline at all three mines as Ranger was disrupted by heavy rainfall; Olympic Dam by damage to the main haulage shaft; and Beverley production reduced due to limited resources remaining in the deposit.<sup>7</sup>

The introduction of the Honeymoon mine helped boost production to 7,009 tU (8,265 tU<sub>3</sub>O<sub>8</sub>) in 2012, 17% greater than for 2011.<sup>8</sup> In 2013, the figure dropped again to

<sup>3</sup> Geoscience Australia, 'Mineral Basics', accessed 2 September 2015: <http://www.ga.gov.au/scientific-topics/minerals/basics>

<sup>4</sup> IAEA Red Book, 2014, p. 17.

<sup>5</sup> Michael Clarke, 'The Third Wave of the Uranium Export Debate: Towards the Fracturing of Australia's Nuclear 'Grand Bargain'', in *Australia's Uranium Trade: The Domestic and Foreign Policy Challenges of a Contentious Export*, Michael Clarke, Stephan Fruhling and Andrew O'Neil eds. Surrey, England: Ashgate Publishing, 2011, p. 90.

<sup>6</sup> Australian Safeguards and Non-Proliferation Office, *ASNO Annual Report 2009 – 2010*, p. 28.

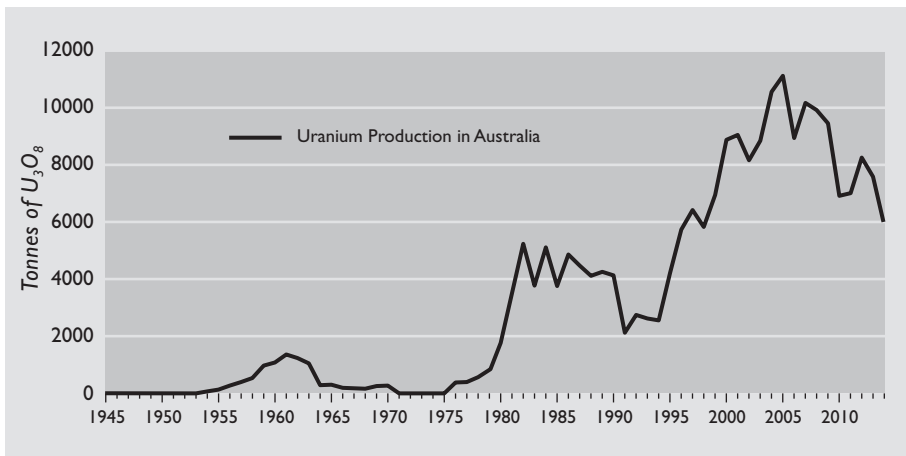
<sup>7</sup> Uranium 2011: Resources, Production and Demand, Joint Report by the OECD Nuclear Energy Agency and the International Atomic Energy Agency, 2012, p. 144.

<sup>8</sup> *Ibid.* p. 150.

6,350 tU (7,488 tU<sub>3</sub>O<sub>8</sub>) and in 2014, Australian uranium production totalled 5,000 tU (5,897 tonnes of U<sub>3</sub>O<sub>8</sub>)<sup>9</sup> with total exports for the 2014-2015 year amounting to 5,515 tU<sub>3</sub>O<sub>8</sub><sup>10</sup> from four mines: Ranger, Olympic Dam, Beverley/Beverley North and Four Mile. The 2014 figures represent the lowest for the country in sixteen years.

The low figures reflect the loss of production at Ranger, where a ruptured leach tank in December 2013 suspended operations for six months; but they also reflect an overall struggling uranium market where low spot prices have led companies to mothball a number of their high-cost mines. In November 2013 Uranium One announced that its Honeymoon mine, located in South Australia, would cease production after only two years of operations.<sup>11</sup> Heathgate's in situ mines at Beverley and Beverley North, also in South Australia, were put on care and maintenance in 2014. Three months later, in June 2014, Four Mile officially took over Honeymoon's spot as Australia's newest and fourth-largest uranium producing mine. As for Australia's oldest (and largest) producing uranium mine, Ranger concluded all open pit mining in December 2012 after thirty-two years of operation and a total of 110,000 tU produced. It is currently producing from stockpiled ore. The chart below provides Australia's annual uranium production since 1945 (to 2014).

Figure I. Australia Uranium Production 1945–2014

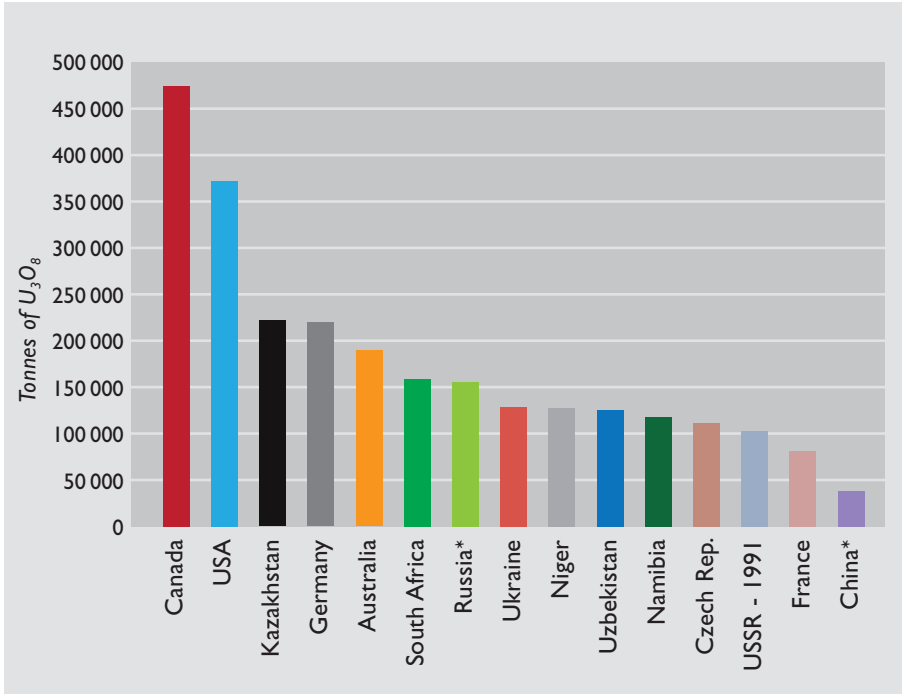


<sup>9</sup> 'Australia and Kazakhstan Report Uranium Production', *World Nuclear News*, 27 January 2015.

<sup>10</sup> Australian Safeguards and Non-Proliferation Office, *ASNO Annual Report 2014-2015*, 20 October 2015, p. 29.

<sup>11</sup> The reasons were: costs related to production problems during the commissioning process, lower than anticipated yields, and low uranium prices. See: 'Honeymoon uranium mine goes into care and maintenance, 90 jobs cut', *Australian Mining*, 14 November 2013.

Figure 2. Total World Production by Country 1945–2013



\* Estimated by Secretariat of OECD/WNA.

In terms of overall production since 1945 (to 2013), Australia has produced a total of 189,589 tU, making it the fifth greatest all-time producer of uranium after Canada, the United States, Kazakhstan, and Germany.<sup>12</sup>

## 2.1 Operating Mines

In 2015 only three uranium mines have been operating in Australia: Olympic Dam, Ranger and Four Mile. Operations at the Honeymoon and Beverley mines were suspended in 2013 and 2014 respectively.

<sup>12</sup> Total figures up to Dec 2013 are: Canada (474,820 tU), the United States (371,941 tU), Kazakhstan (221,864 tU), and Germany (219,652 tU). The remaining list includes South Africa (158,944 tU), Russia (155,853), Ukraine (128,846), Niger (127,950), Uzbekistan (125,191), Namibia (117,646), Czech Republic (111,621), USSR (102,886 to 1991), France (80,963), China (38,249), Democratic Republic of Congo (25,600), Gabon (25,403), Hungary (21,059), Romania (18,819), Bulgaria (16,364), India (10,028), Spain (5,028), Brazil (4,123), Malawi (3,848), Portugal (3,720), Argentina (2,582), Pakistan (1,390), Madagascar (785), Belgium (686) and Poland (650). Source: OECD NEA & IAEA, *Uranium 2014: Resources, Production and demand* ('Red Book') and WNA, *Global Nuclear Fuel Market Report* data.

### *Olympic Dam*

In 1975 the Western Mining Corporation (WMC) discovered the Olympic Dam copper–uranium–gold–silver deposit, 560 km north of Adelaide, one of the world’s largest known accumulations of metals, containing more than 1,000,000 tonnes of uranium as a by-product. Underground mining commenced in November 1988 and the first 120 tU<sub>3</sub>O<sub>8</sub> left the mine the same month. A major expansion programme from 1997 to 1999 more than doubled annual production to 200,000 tonnes of copper and 3,700 tonnes of uranium concentrate, and then accelerated to a capacity of 4,600 tU<sub>3</sub>O<sub>8</sub> per year (which decreased to 4,100 tonnes per year).<sup>13</sup> In mid-2005, BHP Billiton gained control of WMC Resources in a A\$9.2bn takeover. The company has a licence to mine Olympic Dam until 2036 and it is extendable for 50 more years thereafter.<sup>14</sup>

Olympic Dam’s uranium is processed into U<sub>3</sub>O<sub>8</sub> on site and then transported by rail to Adelaide where it is loaded onto cargo ships. In 2010, the underground operations resulted in 2,330 tU, or about 4% of the world’s total uranium production. In 2014, Olympic Dam produced 3,351 tU and was the world’s third largest uranium producer (6 per cent of world uranium production), after the McArthur River uranium mine in Canada and the Muyunkum/Tortkuduk uranium mines in Kazakhstan.<sup>15</sup>

In 2011, a long-proposed major expansion of Olympic Dam received environmental approvals by the Australian and South Australian governments.<sup>16</sup> The expansion included the development of a large open pit to mine the south-eastern portion of the deposit, adjacent to the existing underground mine. At full production, the expanded open-cut and underground operations would mine a total of 80 Mt per annum of ore with annual production estimated to reach 750,000t of refined copper; 16,100 tU (19,000 tU<sub>3</sub>O<sub>8</sub>); 800,000 ounces of gold and 2.9 million ounces of silver. In 2012 BHP Billiton decided to put the expansion on hold, citing weak commodity prices and spiralling costs. BHP Billiton also announced it would investigate an alternative, less capital-intensive design involving new technologies which would substantially improve the economics of the project. Heap leach and other technological solutions were being studied.<sup>17</sup>

<sup>13</sup> ‘Australia’s Uranium Mines’, World Nuclear Association: <http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/Appendices/Australia-s-Uranium-Mines/>. Accessed 10 March 2015.

<sup>14</sup> ‘Olympic Dam Copper–Uranium Mine, Adelaide, Australia’, mining-technology.com: <http://www.mining-technology.com/projects/olympic-dam/>. Accessed 24 July 2015.

<sup>15</sup> ‘Australia’s Uranium Production and Exports’, Australian Safeguards and Nonproliferation Office Annual Report 2014-2015, p. 29.

<sup>16</sup> ‘Expanding Olympic Dam: with great power comes great responsibility’, *The Conversation*, 11 October 2011.

<sup>17</sup> Red Book, 2014, p. 65.

Although it is the world's largest uranium deposit, Olympic Dam is likely the all-time seventh largest producing uranium mine.<sup>18</sup> Operating since 1988, the World Nuclear Association (WNA) states that Olympic Dam has produced 33,650 tU<sub>3</sub>O<sub>8</sub> since BHP Billiton acquired the mine in 2005. Before that, production was roughly 42,000 tU<sub>3</sub>O<sub>8</sub>, for a lifetime total of approximately 75,000 tU<sub>3</sub>O<sub>8</sub> up to the end of 2014.<sup>19</sup>

### *Ranger Mine*

The Ranger mine is Australia's oldest operating mine. Ranger is located approximately 230 kilometres east of Darwin in Australia's Northern Territory and is surrounded by, but separate from, the Kakadu National Park. Ranger is owned by Energy Resources of Australia Ltd (ERA), a 68.39% subsidiary of Rio Tinto, with the remaining capital held publicly. Ranger processes uranium on site to produce U<sub>3</sub>O<sub>8</sub> which is packaged into drums (400 kg each) with a target of 90% extraction (it was 93% in 2010).<sup>20</sup> Drums are trucked to Darwin and then shipped abroad to China or trucked 2,000 km to Adelaide for shipment to the United States, Canada, Japan or the European Union. Three containers of 30–40 drums in each are usually shipped at a time. Each container holds 16 tU<sub>3</sub>O<sub>8</sub>.<sup>21</sup>

Production by open pit began in 1981 at a rate of approximately 3,300 tonnes per year. Mining at Ranger Pit 1 was completed in December 1994 with a total of 19.78 million tonnes of ore mined. Mining of the second pit commenced in 1997 and was completed in 2012. By then, approximately 110,000 tU<sub>3</sub>O<sub>8</sub> had been produced during thirty-two years of Ranger mining.<sup>22</sup> Following the completion of mining Pit 3 in 2012, ERA began the transition from open cut mining to underground exploration of the Ranger 3 Deeps mineral resource.<sup>23</sup> On 22 June 2015 it was decided that the final feasibility study for 3 Deeps would

<sup>18</sup> The top six all-time mines with the largest total production figures are: 1) Wismuth in (East) Germany; 2) Priargunsky in Russia; 3) Rössing in Namibia; 4) MacArthur River in Canada; 5) Ranger in Australia, and; 6) Rabbit Lake in Canada. See Cindy Vestergaard, *Governing Uranium Globally*, DIIS Report 2015:09, 28 August 2015, pp. 31–32.

<sup>19</sup> See: WNA, 'Australia Uranium': <http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/Australia/>. Accessed 3 September 2015. And Dr. Gavin M. Mudd, 'Compilation of Uranium Production History and Uranium Deposit Data Across Australia', Published by the Sustainable Energy & Anti-Uranium Service Inc. (SEA-US), 15 September 2011.

<sup>20</sup> Visit to Ranger mine, 13 June 2012.

<sup>21</sup> Ibid.

<sup>22</sup> Energy Resources Australia, 'Operations': <http://www.energyres.com.au/whatwedo/2326.asp>. Accessed 25 July 2014

<sup>23</sup> Ibid.

not be carried further and the chairman of ERA, along with two non-executive directors, resigned.<sup>24</sup>

In 2013, ERA produced 2,960 tonnes of uranium oxide<sup>25</sup> and in 2014 it produced 988 tU<sub>3</sub>O<sub>8</sub> from Ranger's stockpiled ore.<sup>26</sup> ERA has enough stockpiles to keep Ranger producing until its licence to operate runs out in 2021.<sup>27</sup> The mine will then enter the rehabilitation phase, for completion in 2026.

#### *Four Mile*

Australia's newest mine was discovered in 2005. Two mineralised zones were found in the area known as Four Mile West and Four Mile East, eight kilometres from the Beverley Uranium Mine. The combined estimated mineral resource for the project is 9.8 million tonnes at 0.33% (3,300 ppm) U<sub>3</sub>O<sub>8</sub> containing 32,000 tonnes (71 million pounds) U<sub>3</sub>O<sub>8</sub>. This grade has the potential to make the Four Mile project the highest grade operating uranium mine in Australia.<sup>28</sup> All ore from Four Mile is processed into UO<sub>4</sub> at the adjacent Beverley uranium mine processing facility (see below). The first shipment of 115 tU was dispatched in September 2014 to Cameco Corporation's Blind River refinery in Ontario, Canada. Four Mile is Australia's only operating in situ leach mine.

The project started as a joint venture between Alliance Resources Ltd (25%) and Quasar Resources Pty Ltd (75%). Quasar is an affiliate of Heathgate Resources, owner and operator of Four Mile and the adjacent Beverley uranium mine. At the official opening of the mine on 26 June 2014, Quasar director Dave Roberts noted that most of the workforce from the Beverley mine was transferring over to the Four Mile operation and that remaining ore at Beverley would be extracted at a future point in time. In the meantime, the full processing capacity of Beverley was to be dedicated to the production of Four Mile uranium.<sup>29</sup>

A day before its official opening Alliance Resources put its stake up for sale and pursued legal action against Quasar, citing allegations of misleading and deceptive

<sup>24</sup> 'Energy Resources of Australia Announces Board Member Resignations', *Uranium Investing News*, 22 June 2015.

<sup>25</sup> Energy Resources Australia, 'History': <http://www.energyres.com.au/whowere/2312.asp>. Accessed 25 July 2014.

<sup>26</sup> 'Australia and Kazakhstan Report Uranium Production', *World Nuclear News*, 27 January 2015.

<sup>27</sup> Email exchange with representative from Rio Tinto, 29 July 2015.

<sup>28</sup> Corporate Overview, Four Mile project, Alliance Resources: [http://www.allianceresources.com.au/IRM/content/corporate\\_corporateoverview.html](http://www.allianceresources.com.au/IRM/content/corporate_corporateoverview.html). Accessed 10 March 2015.

<sup>29</sup> 'Four Mile uranium mine becomes Australia's newest', *ABC News* 25 June 2014.

conduct.<sup>30</sup> A trial was set for 30 June 2014 with Alliance claiming, among other things, a failure by Quasar to disclose information related to the prospectivity of part of the tenement. Before the court case Alliance and Quasar agreed a confidential settlement, finalised on the day of the scheduled proceedings.<sup>31</sup> In February 2015 Alliance Resources rejected an offer of A\$57.6 million from Quasar to purchase Alliance's 25% share. Alliance stated that Quasar's offer was below fair market value and that its interest in Four Mile was still up for sale.<sup>32</sup> On 13 July 2015 Alliance accepted a revised offer of A\$73.975 million (US\$54.97 million) from Quasar to purchase Alliance's interest, including its share of UOC already mined. The sale is subject to shareholder approval, the consent of the South Australia minister to the transfer of the tenements, and the agreement of the Commonwealth treasurer.<sup>33</sup>

## 2.2 Mothballed Mines

### *Beverley/Beverley North*

In 2001 production began at the Beverley mine, Australia's first in situ recovery (ISR) mine. Located in South Australia, Beverley is fully owned by Heathgate Resources Ltd, a wholly owned subsidiary of General Atomics (USA). The deposit is estimated to contain 21,000 tonnes of uranium oxide for a mine life of 15 to 30 years.

In 2010, Beverley produced 354 tU, 33% less than the previous year. During 2010 and 2011 production was mainly from wellfields that were reopened after having been previously shut down. In 2009, deposits were discovered to the north of Beverley: the Pepegoona and Pannikan deposits. In early 2011, ISR operations commenced at the Pepegoona deposit. Uranium-bearing solutions were pumped to a satellite ion exchange plant at Pepegoona and ion exchange resins containing uranium were trucked 12 km to the Beverley plant for processing into uranium tetrafluoride (UO<sub>4</sub>·2H<sub>2</sub>O).<sup>34</sup> In December 2013, production from the Beverley wellfields was suspended and in January 2014, operations at Beverley North were also put on care and maintenance. Approval has been granted to extend the capacity of the Beverley plant to produce 1,270 tU per year when the company decides it is commercially viable to do so. The processing plant at Beverley continues to process uranium from Four Mile.

<sup>30</sup> Ibid.

<sup>31</sup> 'Legal Proceedings', Company Statement, Alliance Resources Ltd, 11 July 2014.

<sup>32</sup> 'Alliance rejects Quasar's A\$57.6m offer for Four Mile stake', *Mining Weekly*, 23 February 2015.

<sup>33</sup> 'Healthgate buys out Alliance in Four Mile project', *World Nuclear News*, 13 July 2015.

<sup>34</sup> Peter Woods, 'Sustainability aspects of the Beverley Uranium Mines', *AusIMM Bulletin*, June 2011, p. 30.

### *Honeymoon*

The Honeymoon Uranium project is located 75 km north-west of Broken Hill city in South Australia. It was owned by Rosatom's Uranium One<sup>35</sup> (51%) and Japan-based Mitsui (49%) until September 2013, when Rosatom acquired 100% of the shares. The original in situ facility was constructed in 1982 but did not enter operation. Recommissioning of the site to a trial facility was started in 1998 and restarted in October 2008 by Uranium One.<sup>36</sup> Pilot production commenced in September 2011 and commissioning of the plant continued through 2012. In its first full year of operation Honeymoon produced 140 tU<sub>3</sub>O<sub>8</sub> (119 tU). Drilling and installation of wellfields continued with more than 30 production wells in operation by the end of 2012. Uranium-bearing solutions are processed using solvent extraction technology at the processing facility, which has a design capacity of 340 tU per year.

In November 2013 Uranium One announced that it would suspend Honeymoon production due to pressures related to low commodity prices and high production costs.<sup>37</sup> The site was put into a steady state of care and maintenance in March 2014.<sup>38</sup> According to figures given by the World Nuclear Association (WNA), Honeymoon produced only 312 t of UO<sub>4</sub> in its 3.5 years of operation, all of which was transported by rail to the port of Adelaide and then shipped abroad. Honeymoon produced UO<sub>4</sub>.

On 1 September 2015 Rosatom announced it had agreed to sell Honeymoon to Boss Resources, an Australian-registered minerals exploration company that has nickel and copper projects in Sweden and Finland and gold projects in Burkina Faso, West Africa. Boss' buyout of 100% of the issued share capital in Uranium One Australia involves a complex payment scheme, including a 2.4 million cash payment, a \$200,000 'site access' fee and several milestone payments if the mine does enter into production again.<sup>39</sup> Boss is forming a separate entity with privately owned Wattle Mining that

<sup>35</sup> ROSATOM State Atomic Energy Corporation, through its affiliates, owns 100% of the outstanding common shares of Uranium One.

<sup>36</sup> Ausenco, 'Recommissioning and Development of Honeymoon', <http://www.ausenco.com/case-studies/honeymoon-uranium-project#>. Accessed 10 March 2015.

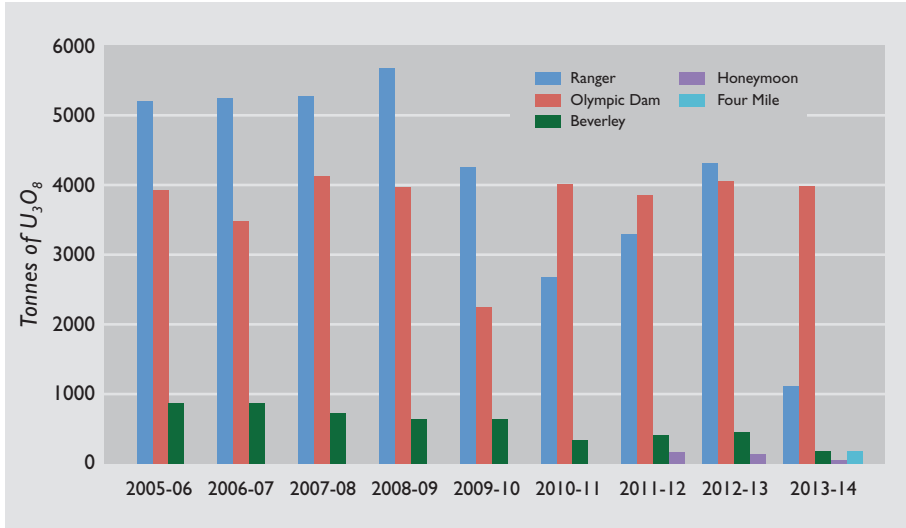
<sup>37</sup> 'Honeymoon uranium mine ceases production', *ABC News*, 13 November 2013.

<sup>38</sup> The reasons were costs related to production problems during the commissioning process, lower than anticipated yields and low uranium prices. See: 'Honeymoon uranium mine goes into care and maintenance, 90 jobs cut', *Australian Mining*, 14 November 2014.

<sup>39</sup> Sydney Morning Herald, 'Rosatom sells Honeymoon uranium mine in South Australia', 1 September 2015.



Figure 3. Recent Production from Uranium Mines



Source: World Nuclear Association

will buy the Honeymoon project of which Boss will own 80% and Wattle will hold 20%.<sup>40</sup> Boss stated that the acquisition will be completed in three months' time.<sup>41</sup>

### 2.3 Mines Approved

The Wiluna Uranium project, owned by Toro Energy Ltd, is the first uranium mine to be approved in Western Australia. Wiluna's regional resource contains approximately 76.5 million pounds of  $U_3O_8$  in six deposits: Centipede, Lake Way, Millipede, Lake Maitland, Dawson-Hinkler and Nowthanna deposits.<sup>42</sup> Centipede and Lake Way are located 15 and 30 kilometres from the town of Wiluna and were granted final environmental approvals by the state government in October 2012 and the federal government in April 2013.<sup>43</sup> The Environmental Scoping Document for Millipede and Lake Maitland was approved by the Environmental Protection Authority (EPA) in February 2015.<sup>44</sup> The Dawson Hinkler and Nowthanna deposits

<sup>40</sup> Ibid.

<sup>41</sup> World Nuclear News, 'Russia sells Australian mining arm to Boss Resources', 1 September 2015.

<sup>42</sup> Toro Energy Limited, 'Wiluna:' <http://www.toroenergy.com.au/projects/wiluna-mine/>. Accessed 25 July 2015.

<sup>43</sup> Toro Energy Limited, Presentation given at Australia Uranium Conference, Perth, Australia, 15–16 July 2015.

<sup>44</sup> Ibid.

contain indicated and inferred resources and are not yet included in Toro's mine plan which outlines an initial operation life of sixteen years, of ore ranging from 799 parts per million (ppm) to 907ppm of uranium, and a total production of 30.2 million pounds (13,698 tonnes) of  $U_3O_8$ .<sup>45</sup> Mining will be done by open pit with transport of 1,200 tonnes of UOC per year via Port Augusta to Port Adelaide with an option of rail transport from Adelaide to Darwin.<sup>46</sup>

The second uranium mine in Western Australia to receive state and federal approvals is the Kintyre project, located in the East Pilbara region, approximately 80 km south of Telfer and 260 km northeast of Newman at the edge of the Great Sandy Desert. Canada's Cameco and Japan's Mitsubishi Development Pty Ltd acquired Kintyre from Rio Tinto in 2008. Cameco owns 70% of the project and is the operator; Mitsubishi owns 30%. On 4 March 2015, Kintyre received conditional approval from the Western Australia Minister for Environment<sup>47</sup> and federal environmental approval in April 2015.<sup>48</sup> The deposit has a measured and indicated resource estimate of approximately 55 million pounds (25,000 tU) at an average grade of 0.58% (5,800ppmU),<sup>49</sup> which would make it the highest grade mine in Australia (surpassing Four Mile) when operational. Cameco has noted that a development decision will be guided by when market conditions signal a need for more uranium production. Kintyre is a near surface deposit amenable to open pit mining.

Cameco also wholly owns the Yeelirrie near-surface deposit located in the remote Northern Goldfields region of Western Australia, approximately 420 km north of Kalgoorlie-Boulder, 70 km south-west of Wiluna and 110 km north-west of Leinster. Yeelirrie was discovered in 1972 by Western Mining Corporation (WMC) with further exploration undertaken by BHP Billiton. In 2012, Cameco bought the proposed project, Western Australia's largest uranium project, from BHP Billiton for US\$452 million. Cameco began environmental approvals for Yeelirrie in 2014. It should also be noted that the French company AREVA and the Japanese Mitsubishi Corporation, have been undertaking greenfield exploration for uranium throughout Australia through their respective local subsidiaries AREVA Resources Australia

<sup>45</sup> Toro Energy Limited, 'Wiluna:' <http://www.toroenergy.com.au/projects/wiluna-mine/>. Accessed 25 July 2015.

<sup>46</sup> Toro Energy Limited, Presentation given at Australia Uranium Conference, Perth, Australia, 15–16 July 2015.

<sup>47</sup> 'Kintyre receives conditional approval, *Cameco*, 4 March 2015: <http://www.cameco.com/australia/news/?id=10>. Accessed 12 March 2015.

<sup>48</sup> Cameco Australia, 'Kintyre Receives Federal Environmental Approval', 24 April 2015: <http://www.cameco.com/australia/news/?id=11>. Accessed 25 July 2015.

<sup>49</sup> Cameco Australia, 'Kintyre', <http://www.cameco.com/australia/kintyre/>. Accessed 25 July 2015.

Pty Ltd and Mitsubishi Development Pty Ltd, and have turned over more than 200 tenements covering more than 35,000 square kilometres of area. AREVA currently holds 20 exploration licenses in Western Australia and the Northern Territory.<sup>50</sup> None of its mines are in the process of acquiring approvals.

## 2.4 Government–Industry Collaboration

In September 2006, the Australia Uranium Association (AUA) was established to represent the uranium industry at the national and global level. The AUA's aim is to carry out research-based advocacy where AUA commissions research to form the basis of policy proposals and communications. At the time, the association had 31 members with Rob Atkinson, Chief Executive Officer of Energy Resources Australia Ltd. sitting as chair of the AUA Board. At the Australian Minerals Institute (AusIMM) meeting in June 2013, AUA spoke of the need for a best practice regulatory framework, and argued that filling information gaps increases rather than decreases, public support.<sup>51</sup>

The Australian Government's Uranium Industry Framework (UIF) Steering Group was established in 2005 to identify opportunities for, and impediments to, the further development of the Australian uranium mining industry over the short, medium and longer term, while ensuring stringent environmental, health and safety standards. An implementation group was established to progress the recommendations from the UIF Steering Group Report.<sup>52</sup> The priorities to date include: development of a national radiation dose register for uranium workers; facilitating discussion of uranium exploration and mining issues with indigenous communities; addressing concerns about the transport of uranium and instances of international shipping denials and delays; establishing nationally accredited radiation safety training programmes; and reviewing regulation applying to the uranium industry.

The UIF then became an implementing group and was renamed the Uranium Council Forum (UCF) in 2010. Members included ERA, BHP Billiton, Heathgate, Uranium One, Palladin, Cameco, Areva, Toro and the Department of Infrastructure, Industry and Science (formerly the Department of Resources, Energy and Tourism, DRET), the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA),

<sup>50</sup> 'AREVA Resources Australia: Searching for Uranium.' <http://www.areva.com/EN/operations-584/exploration-and-mining-of-uranium-in-australia.html>. Accessed 25 July 2015.

<sup>51</sup> The AusIMM International Uranium Conference 2013, Darwin, NT, 11 June 2013.

<sup>52</sup> Commonwealth of Australia, Uranium Industry Framework: Report of the Uranium Industry Framework Steering Group, September 2006.

the Australian Safeguards and Non-proliferation Office and the Department of Environment and all states except Victoria and Tasmania. DRET was the secretariat. UCF meetings were usually attended by division heads for the government, CEOs for smaller companies and by senior executives for the majors.<sup>53</sup>

In December 2013, the AUA and Minerals Council of Australia merged to form the MCA Uranium Forum to represent the uranium industry by ‘articulating the national and global benefit of Australian uranium exploration, mining and export, as well as by advocating the industry’s views to government and the community’.<sup>54</sup> Dr. Vanessa Guthrie, Managing Director of Toro Energy Limited is the forum’s chair. The MCA Uranium Forum has published a ‘Uranium Forum Code of Practice and Stewardship’ which defines the principles of behaviour and standards of best practice to guide improvements in performance in the Australian uranium industry.<sup>55</sup>

<sup>53</sup> Discussion with DRET officials, June 2013.

<sup>54</sup> Mineral Councils of Australia, ‘Australia’s Uranium Industry’, [http://www.minerals.org.au/resources/uranium/about\\_the\\_mca\\_uranium\\_forum](http://www.minerals.org.au/resources/uranium/about_the_mca_uranium_forum). Accessed 20 October 2015.

<sup>55</sup> Code of Practice and Stewardship: [http://www.minerals.org.au/resources/uranium/leading\\_practice](http://www.minerals.org.au/resources/uranium/leading_practice). Accessed 28 October 2015.

### 3. History of Uranium Production in Australia

Uranium ores were first mined in Southern Australia in 1906 at Radium Hill. At that time radium was the target, used for its bright yellow pigment in colouring ceramics and its gamma rays for treatment of cancer. Uranium was considered an annoying waste product, taking as much as one short ton of uraninite (pitchblende) to yield one seventh of a gram of radium. But the financial rewards grew, and by 1911 radium reached a price of approximately £13,000 per gram. That same year a refinery, Hunter's Hill near Sydney, was built to process the ore from Radium Hill with production stopping in 1914, and the refinery closing the following year. In total 150 kg of uranium were produced. An additional 350 milligrams of radium bromide ( $\text{RaBr}_2$ ) was also produced and used for research in the fields of radiation and radioactivity with some of Hunter's Hill radium sold to researchers Ernest Rutherford and Marie Curie.<sup>56</sup>

Serious uranium exploration took off in 1944 after requests from the United States and United Kingdom to supply their joint Combined Development Trust (later Combined Development Agency, CDA). The trust was established to secure control of all uranium and thorium in 'CDT Territories', i.e. those falling within their own territories such as the British Empire (excluding Canada). By 1948 Canberra was offering tax concessions for discoveries and in 1949 the Rum Jungle uranium deposit was discovered in Australia's Northern Territory, 64 kilometres south of Darwin. After signing an agreement with the United Kingdom and the CDA in 1952, Australia's 1953 *Atomic Energy Act* came into effect and gave ownership of all uranium and thorium in the country to the Commonwealth of Australia. The Australian Atomic Energy Commission (AAEC), established in November 1952, gained statutory status on 15 April 1953 when the *Atomic Energy Act* (1953) came into effect.

Under the act, all discoveries were to be reported within a month of detection and fines were levied if not reported, on both individuals and corporations. The responsibilities of the AAEC were to 'promote the search for, and mining and treatment of, uranium in Australia' with the power to buy and sell on the behalf of the Australian Government. It was also tasked with developing practical uses of

<sup>56</sup> 'Early Workings', Radium Hill Historical Association: <http://www.radiumhill.org/early.htm>. (Accessed 10 September 2013).

atomic energy through conducting and assisting research, constructing plants and equipment and training staff, as well as collecting and distributing information on uranium and nuclear energy.<sup>57</sup>

In 1954 Radium Hill re-opened and became the first uranium mine in Australia to export its product abroad. Its ore was processed at the Port Pirie Uranium Treatment Complex from 1955–1962. Ore was crushed at a ball mill and concentrated on-site and then rail freighted to the Port Pirie Uranium Treatment Complex 280 km away. Approximately 854,000 tU at a grading of approximately 1,100 ppm was extracted and milled to produce 120,000 tonnes of concentrate for treatment at Port Pirie to produce approximately 850 tU<sub>3</sub>O<sub>8</sub>.<sup>58</sup> Port Pirie was operated by the Government of South Australia and also processed ore from Myponga (Wild Dog Hill) uranium mine, south of Adelaide. Myponga produced 346 tU at 0.36% U<sub>3</sub>O<sub>8</sub>, yielding just over one tonne of U<sub>3</sub>O<sub>8</sub>, during 1954–1955.<sup>59</sup>

Rum Jungle, located in the Northern Territory, 64 kilometres south of Darwin, on the East Finnis River also began uranium production in 1954 as an operation run by the Commonwealth.<sup>60</sup> Uranium from Rum Jungle was supplied to the UK–US Combined Development Agency under a contract which ran until 1962. It produced some 3,500 tU<sub>3</sub>O<sub>8</sub> and 20,000 tonnes of copper concentrate, along with smaller quantities of nickel and lead. At the opening of Rum Jungle, then Prime Minister Robert Menzies stated:

Whatever we may think about atomic bombs and their terrible subsequent development, let us understand quite plainly and realistically that part of our security in the present tremulous condition of world safety depends upon the superiority of the Free World in terms of these dreadful instruments. And Australia, by making a contribution of this kind ... is itself making a powerful contribution to international defence.<sup>61</sup>

<sup>57</sup> Australian Atomic Energy Commission – Fact sheet 253 <http://www.naa.gov.au/collection/fact-sheets/fs253.aspx>

<sup>58</sup> ‘About Radium Hill Mine’, Government of South Australia: [http://outernode.pir.sa.gov.au/minerals/mines\\_and\\_developing\\_projects/former\\_mines/radium\\_hill\\_mine/about\\_radium\\_hill\\_mine](http://outernode.pir.sa.gov.au/minerals/mines_and_developing_projects/former_mines/radium_hill_mine/about_radium_hill_mine). Accessed 2 March 2015.

<sup>59</sup> ‘Uranium’, Government of South Australia: [http://www.minerals.dmitre.sa.gov.au/geological\\_survey\\_of\\_sa/commodities/uranium](http://www.minerals.dmitre.sa.gov.au/geological_survey_of_sa/commodities/uranium). Accessed 2 March 2015.

<sup>60</sup> The Commonwealth, through the Australian Atomic Energy Commission (AAEC), was responsible for the mine, The Territory Enterprises Pty, a subsidiary of Consolidated Zinc Pty Ltd, was set up to manage the operation on a contract basis (cost plus).

<sup>61</sup> Alice Cawte, *Atomic Australia: 1944–1990*, Kensington: NSW University Press, 1992, p. 8.

The Mary Kathleen uranium deposit in Queensland was also discovered in 1954. A year later Mary Kathleen Uranium Ltd (MKU) was formed with a majority of shares held by Rio Tinto Mining Company of Australia Ltd. A sales contract with the UK Atomic Energy Authority (UKAEA) was signed in 1956 with mining beginning at the end of that year. The treatment plant was commissioned in June 1958. In its first phase of operation from 1958 to 1963, Mary Kathleen treated 2.9 million tonnes of ore at an average grade of 0.13% to yield 4,082 tU<sub>3</sub>O<sub>8</sub> (nine million pounds of U<sub>3</sub>O<sub>8</sub>) in the form of ammonium diuranate (ADU) containing 3,460 tU.<sup>62</sup> Mary Kathleen was a multibody deposit with a mineralisation of 3% rare earth oxides and 0.025% thorium oxide. Various attempts were made to find markets for the rare earths as a co-product but without success.<sup>63</sup>

A number of small uranium mines and milling facilities also operated in the South Alligator River Valley during the 1950s and 1960s. Mining took place at several locations – principally at El Sherana, El Sherana West, Rockhole Creek and Coronation Hill (Guratba). Milling also occurred at Rockhole Creek within the South Alligator Valley and at nearby Moline which lies outside the Alligator Rivers Region.<sup>64</sup> It is estimated that less than 1,000 tU<sub>3</sub>O<sub>8</sub> was produced at the Rockhole Creek and Moline mills during this period.<sup>65</sup>

By the mid-1950s the CDA's uranium purchases were starting to include discoveries of uranium in the United States. By 1959 the US Atomic Energy Commission (AEC) had more than enough yellowcake for the US nuclear weapons programme and began phasing out its foreign uranium purchases, halting them altogether in 1966. An official embargo prohibiting US utilities from using foreign-origin uranium effectively shut the US out of the global market it had created and led to an immediate problem of oversupply with little demand. In Australia reserves were depleted and contracts fulfilled. By 1964 production was essentially stalled except at Rum Jungle, which went on producing until 1971.

A second wave of exploration occurred in the late 1960s and 1970s. Of the 90 uranium deposits in Australia, the majority were discovered between 1969 and

<sup>62</sup> World Nuclear Association, 'Australia: Former Uranium Mines', <http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/Appendices/Australia-s-former-uranium-mines/>. Accessed 28 July 2015.

<sup>63</sup> Ibid.

<sup>64</sup> Supervising Scientist, *Annual Report 2013–2014*, Commonwealth of Australia, 2014, p. 5.

<sup>65</sup> Ibid. p. 5.

1975,<sup>66</sup> including Narbalek and Koongarra (1970), Jabiluka (1971) and the Ranger mine (1969). Ranger had reserves of more than 100,000 tonnes, making it the largest uranium deposit discovered at the time. During the latter part of this period government-funded exploration for uranium was carried out by the Australian Atomic Energy Commission, and the government purchased a major equity in the Ranger deposit and the Mary Kathleen mine. The period from 1972 to 1975 was also a period of declining exploration for all minerals in Australia after the ‘mining boom’ of the late 1960s.

From 1976 to 2003, only four new deposits were discovered, mainly as a consequence of low levels of exploration expenditure and low uranium market prices. Despite increases in uranium prices and spending on exploration since 2003, only three significant discoveries have been made: the Four Mile and Pepegona deposits in South Australia and Thunderball in the Northern Territory.<sup>67</sup> That said, Australia’s uranium resources have increased progressively, mainly as a result of ongoing drilling and evaluation of known deposits, particularly Olympic Dam. According to the 2014 Red Book, of the more than 35 deposits identified as resources recoverable at costs

Figure 4. Total Uranium Production from Closed Mines in Australia

<i>Mine</i>	<i>Period</i>	<i>Tonnes of ore milled (tU)</i>	<i>Grade U<sub>3</sub>O<sub>8</sub></i>	<i>Production U<sub>3</sub>O<sub>8</sub> (tU<sub>3</sub>O<sub>8</sub>)</i>
Myonga	1954–55	346	0.36%	1
Radium Hill	1954–62	970,000	0.11–0.15%	850
Rum Jungle	1954–71	863,000	0.27–0.43%	3,530
Mary Kathleen	1958–63	2,900,000	0.15%*	4,080
Mary Kathleen	1975–82	6,300,000	0.10%	4,802
Moline	1959–64	128,000	0.35–0.68%	520
Rockhole	1959–62	13,500	1.12%	138
Narbalek	1979–88	600,000	2.0%	10,858

\* *Source:* World Nuclear Association

<sup>66</sup> Geoscience Australia, ‘Uranium.’ <http://www.ga.gov.au/scientific-topics/minerals/mineral-resources/aimr/uranium>. Accessed 10 August 2015.

<sup>67</sup> *Ibid.*



of less than USD 130/kg U, the vast majority of Australia's resources are within five deposits: Olympic Dam (SA), Ranger and Jabiluka in the Alligator Rivers region (NT), and Kintyre and Yeerlirrie (WA).<sup>68</sup>

In 1977 the government took a 42% share of Ranger Uranium Mines Pty Ltd, only to sell its shares two years later whilst at the same time establishing Energy Resources of Australia Ltd (ERA) to own and operate Ranger. Ranger finally opened for production in 1981. In 1979 Queensland Mines opened Narbalek in the same region of the Northern Territory. Its main ore body of about 10,858 tU<sub>3</sub>O<sub>8</sub> was mined out in one dry season and stockpiled for treatment from 1980 to 1988.<sup>69</sup> Mary Kathleen's second production phase ran from 1976 to the end of 1982. By 1982 Australia had signed bilateral safeguards agreements with ten parties: South Korea, Finland, Canada, Sweden, France, Euratom, the Philippines, Japan, the United Kingdom and the United States.

### 3.1 Path to Responsible Supplier

Australia signed the Treaty on Non-proliferation of Nuclear Weapons (NPT) on 27 February 1970 but did not ratify it, citing concerns that international inspection and safeguards 'should not constitute an obstacle to a nation's economic development, commercial interests and trade'.<sup>70</sup> The Australian Labor Party (ALP), which was in opposition at the time, was strongly in favour, and ratified the treaty when it won the December 1972 federal election. On 23 January 1973 the instrument for ratification was deposited and in July 1974, Australia signed a safeguards agreement with the IAEA (INFCIRC/ 217). The Australian Safeguards Office (ASO) was also established that same month in the Primary Industries and Energy Portfolio.

Upon entering government the ALP froze new uranium export contracts. The Mary Kathleen mine was the only one recommissioned in 1974 while other developments were put on hold. The election had featured a divisive nuclear debate, reflected in the Whitlam government where the Energy Minister saw employment and large revenues in pitchblende whereas the Environment Minister saw its waste as the most

<sup>68</sup> *Red Book*, 2014, p. 150.

<sup>69</sup> 'Narbalek Uranium Mine, Australia: The Life Cycle', Presentation given by Peter Waggit, Waste Safety Specialist, Division of Radiation, Transport, Waste Safety, 2007.

<sup>70</sup> Marty Harris, 'The Origins of Australia's uranium export policy', *Parliament of Australia*, 2 December 2011, p. 4.

dangerous to the planet.<sup>71</sup> The government also believed that a growth in nuclear power coupled with the squeeze on oil supply would lead uranium prices to rise. There was a desire to hold off until the market was more favourable.<sup>72</sup>

In April 1975 the ALP initiated the first of what would become a stream of public inquiries into Australia's uranium activities. The Ranger Uranium Environmental Inquiry was set up to investigate and advise on whether Australia should mine and export uranium in general, and on mining in the Northern Territory in particular. Not only was the Ranger mine (along with Jabiluka and Koongarra) within the boundaries proposed for the Kakadu National Park, but it was also on Aboriginal land (or on land that was potentially subject to land claims).<sup>73</sup> The Fox Commission therefore looked at safety, environmental factors, health, impact on native peoples and unresolved land risks, along with nuclear proliferation and threat of terrorist activities.<sup>74</sup> The inquiry lasted almost two years, heard 300 witnesses and produced two reports.

The first report concluded that Australia 'should seek to limit or restrict expansion of (uranium production)' because it was 'inadvertently contributing to an increased risk of nuclear war'.<sup>75</sup> The report also noted that embargoing uranium exports would violate Article IV of the NPT which requires states to share nuclear technology, materials and know-how for civilian purposes. It argued that if the hazards of mining and milling uranium were properly regulated and controlled, then there would be no justification not to develop Australia's uranium mines. It also recommended that all exports should be to countries party to the NPT and subject to the most effective safeguards agreements.<sup>76</sup> With the report's recommendations in mind, the Liberal government announced in August 1977 that it would approve the (re-)development and export of Australia's uranium under strict controls. It accepted all the inquiry's recommendations related to mining and milling. A uniform Australian code covering

<sup>71</sup> Jim Falk, *Global Fission: The Battle Over Nuclear Power*, (Oxford University Press), 1982, p. 258. See also: Drew Hutton and Libby Connors, *A History of the Australian Environment Movement*, (Cambridge University Press), 1999, p. 137.

<sup>72</sup> For a good discussion on the approach of the Whitlam government to uranium, see Chapter 2 of: Michael Clarke, Stephan Frühling, Andrew O'Neil *Australia's Nuclear Policy: Reconciling Strategic, Economic and Normative Interests*, (Ashgate Publishing Company), 2015, p. 50.

<sup>73</sup> An MOU between the Commonwealth and the Ranger partners entered into effect in October 1975, more than three months after the inquiry was launched.

<sup>74</sup> Marty Harris, Department of Foreign Affairs, 'The Origins of Australia's export policy, 2 December 2011.

<sup>75</sup> Jim Falk, Jim Green and Gavin Mudd, 'Australia, uranium and nuclear power', *International Journal of Environmental Studies*, vol. 63 (6), December 2006, p. 447.

<sup>76</sup> Ian Henderson, 'What price Australian uranium?' *New Scientist*, 12 May 1977, p. 336.

mining and milling would become mandatory with legislation implemented together with the states and territories, starting with the *Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores*, which had already been written and published by the Department of Health. The system was to be prescribed by Commonwealth legislation, but where state or territory legislation had an equal or more stringent code, the Commonwealth would leave the administration to the state or territory.

On the Ranger mine and the sensitive environment of the Alligator Rivers region, the government adopted the inquiry recommendations on environmental controls and recommendations for a National Park to be established to preserve the ecosystem, sacred Aboriginal sites and cave paintings. As envisioned in the *National Parks and Wildlife Conservation Act of 1975*, Kakadu was created in stages, starting in 1979.<sup>77</sup> The Government also accepted recommendations on the granting of land to Aboriginals and the legislative changes that were required for Aboriginal land to become part of a National Park. No exploration or exploitation, at least for the moment, was allowed within the park. The Ranger mine then became 'surrounded by, but separate from' Kakadu National Park. Jabiluka and Koongarra were also excluded from the park from the outset.

The Fox Report recommended not to use the Atomic Energy Act for granting authority to Ranger to mine uranium, but the government noted that the inquiry stated that the use of the AEA would be less if the proposed Uranium Advisory Council were established, which the government then did. Royalties were also to be used for the welfare of Aboriginals in the Northern Territory generally, and not just for those in local communities. A part of the revenues was also to be used to fund solar energy research as part of the Fraser government's National Energy Programme. In a statement on Australian uranium policy on 24 May 1977, Prime Minister Fraser declared:

It is our strong desire that the management of the region should become not a national but a world-wide model of how forethought and planning, good management and goodwill can lead to natural resources being obtained with a minimum interference to a region's inhabitants and its environment.<sup>78</sup>

<sup>77</sup> 'Ranger Uranium Environmental Inquiry: Second report', Presiding Commissioner: R.W. Fox; Commissioner: G.G. Kelleher, Commissioner: C.B. Kerr, Canberra: Australian Government Publishing Service, 1977.

<sup>78</sup> Statement by Prime Minister Malcolm Fraser on Australian Uranium Policy, 24 May 1977.

The government also established the Supervising Scientist Division (SS) by an Act in 1978 to serve as the observer for the Commonwealth on environmental impacts in the Alligator region. Its role is to set limits while the NT Department of Mines and Energy is the delegated authority for regulation. The work of the Supervising Scientist therefore not only looks at Ranger mine but also at other sites in the region such as Jabiluka, Nabalek, Koongara, and South Alligator Valley Mines. The SS is mandated to protect the Alligator Rivers Regions environment from the impacts of uranium mining. It does this through research into the impacts of uranium mining on the environment, and is also required to set standards for the protection of the environment through this research. This includes research on uptake factors, i.e. looking at radiation classes specific to each Aboriginal community (i.e. diet, water quality, etc.) to provide locally derived limits and more locally appropriate systems. The SS also does research into Aquatic Ecosystem Protection, Geomorphology and Landform Evolution and Ecotoxicology. The SS carries out monthly inspections and yearly audits.<sup>79</sup> The SS is unique in that it is the only one in the country. Today it has a total of 45 staff in Darwin and six field staff located at Jabiru, which is situated seven kilometres from the Ranger mine.

While new legislation and policy addressed issues surrounding mining uranium within the Commonwealth, Australia's policy also extended to its uranium exports. With the Alligator Rivers Region on its way to becoming one of the most regulated mining areas in the world, the Fraser government put Australia on the path to setting the world's 'uranium gold standard' by attaching a range of domestic safeguards and conditions of supply to the sale of Australian yellowcake. Australia installed a number of 'conditions of supply', allowing sales to only non-nuclear weapons states party to the NPT and requiring prior consent to be obtained from Canberra before Australian uranium could be transferred to a third country or be enriched beyond 20% U<sup>235</sup> with consent requirements for reprocessing following in 1980.<sup>80</sup> Adequate physical security of the nuclear industries of importing countries was also required. The government noted its safeguards policy was one of 'great stringency' and more rigorous than other nuclear suppliers at the time (but similar in approach to those of Canada and the US). Prime Minister Fraser stated in 1977 that: 'Our aim is to minimise the risk of nuclear weapons proliferation' and that '[o]nly as a producer and supplier of uranium can Australia be an effective force in achieving improved

<sup>79</sup> Supervising Scientist: <https://www.environment.gov.au/science/supervising-scientist>. Accessed 10 August 2015.

<sup>80</sup> See: House of Representatives, Nuclear Material Reprocessing, Hansard, 27 November 1980, pp. 136-139.

international safeguards and controls'.<sup>81</sup> From then on, Australia's uranium became 'obligated'.

Another inquiry and constraints on new mines were put in place when the ALP returned to government in 1983. The ALP adopted a party platform in 1977 in support of a moratorium on uranium mining (including repudiating any contracts the Fraser government were planning to sign). The new government prohibited uranium exports to France in opposition to French nuclear testing in the South Pacific, leading the government to purchase uranium from Nabarlek which was contractually destined for Electricité de France (EDF) and, in November 1983, it launched Australia's second inquiry into uranium. This time the focus was on issues of non-proliferation, safeguards and waste management. The inquiry was headed by Chairman Professor R.O. Slatyer of the Australian Science and Technology Council (ASTEC).<sup>82</sup>

The Slatyer Inquiry argued that Australia could make a direct contribution to the development of the civilian nuclear fuel cycle in ways that would increase global energy security, strengthen the non-proliferation regime and reduce the risks of misuse and diversion of nuclear materials and technology to military purposes. It recommended not only proceeding with uranium mining, but also becoming involved with other stages of the fuel cycle such as enrichment. Similar to the Fox Commission, the Slatyer Report concluded that denial of supply to nuclear weapons states (NWS) would not affect in any way their weapons programmes and that Australia would be best positioned to contribute to non-proliferation and international peace if actively involved in the fuel cycle.

The inquiry made 25 recommendations in all, with the government rejecting only two of them. Making its responses to each recommendation public, the government decided 'that the mining and export of uranium will continue subject to strict safeguards conditions, but only from the Nabarlek, Ranger and Olympic Dam (Roxby Downs) mines. And that the development of further stages of the fuel cycle in Australia not be permitted'.<sup>83</sup> This then became known as the 'three mines policy'.

<sup>81</sup> Statement by Malcolm Fraser, Prime Minister, on Australian Uranium Policy, 24 May 1977.

<sup>82</sup> Australian Science and Technology Council (ASTEC), *Australia's role in the nuclear fuel cycle — A report to the Prime Minister*, Australian Government Publishing Service, Canberra, 1984, p. 5. Commonly referred to as the 'Slatyer Report', after the Chairman of the Council, Professor R.O. Slatyer.

<sup>83</sup> Prime Minister: Tabling Statement on ASTEC Report on Australia's Role in the Nuclear Fuel Cycle, 31 May 1984.

The report encouraged the government to ratify the Convention on the Physical Protection of Nuclear Material (CPPNM), promote NPT status as a condition of supply within the Nuclear Suppliers Group (NSG), continue support and pursue the establishment of an NWFZ in the South Pacific (SPNFWZ) and to maintain the existing moratorium on ocean dumping. Australia signed the CPPNM in February 1984, and it entered into force in October 1987. It also followed Recommendation 14 for Australia to enter into bilateral agreements with governments to which Australia's obligated nuclear material (AONM) was transhipped, and to frame physical protection measures for such material.<sup>84</sup> The government began discussions with Singapore, the only country where transhipments occurred at the time without a bilateral agreement.<sup>85</sup>

Where the ALP diverged from the Slatyer recommendations was Recommendation 9 that Australia allow the nuclear industry to expand to other stages of the nuclear fuel cycle. The government disagreed, stating that other stages of the fuel cycle could have non-proliferation advantages, but that the government needed more evidence for any specific case before reviewing its position.

By 1986 exports were worth AUD\$373 million.<sup>86</sup> By August 1986 the embargo on exports to France was lifted and supplies from Nabarlek to EDF resumed. In 1987 ERA signed a contract with EDF for the supply of uranium from the Ranger mine. However, early in 1988 the Labor Party again banned further uranium contracts with France, or the extension of existing contracts. The ban was later (in 1994) made more specific – to ban further contracts until France entered the Comprehensive Nuclear Test Ban Treaty (France ratified the CTBT in 1998).

In 1987 the Nuclear Non-Proliferation (Safeguards) Act and the Australian Nuclear Science and Technology Organisation Act replaced the 1953 Atomic Energy Act and Australian Atomic Energy Commission. ANSTO replaced the AAEC and the Safeguards Act made policy the legislative basis for the implementation of nuclear safeguards and security of all nuclear material and related equipment and activities in Australia, across all jurisdictions. It gave ASO a legal basis, backed up by inspection

<sup>84</sup> Slatyer Report, p. 18.

<sup>85</sup> This led to the Exchange of Notes constituting an Agreement between the Government of Australia and the Government of the Republic of Singapore concerning Cooperation on the Physical Protection of Nuclear Materials, which entered into force on 15 December 1989.

<sup>86</sup> DFAT, *Exports of major commodities time series: 1978 to 1995*, Commonwealth of Australia, Canberra, 1996, p. 18.

power to ensure compliance with the Act. It also established the statutory position of Director of Safeguards, now known as the Director General of ASNO. The position includes ensuring effective operation of the permit system, carrying out Australia's safeguards obligations under its agreement with the IAEA and its bilateral agreements, and monitoring compliance by Australia's partners in those agreements.

In 1988 the ALP established a committee to review the 'three mines' policy (only Nabarlek and Ranger had been operating, with Olympic Dam coming online in 1988). The committee recommended that the policy be relaxed to allow for more projects and that uranium enrichment be allowed in Australia. At its National Conference in 1991 the government left its three mines policy unchanged. Meanwhile, a report of the Industry Commission the same year reviewed access to land, addressing issues of mining on Aboriginal land such as Crown ownership of mining rights or Aboriginal land rights, as well as processes for resolving conflict. It also submitted evidence of dissatisfaction with NT land councils and contained proposals for new land councils.<sup>87</sup>

The Industry Commission highlighted that the insistence that consent to explore implies agreement to mine was an unnecessary complication and did not appear to have benefitted negotiations, and that the right to explore was not automatically tied to the right to mine and the parties should determine whether agreements were disjunctive or conjunctive. It also recommended that if agreement with a prospective miner is not be able to be reached, the traditional owners should be able to open negotiations with another company while giving power to the owners to specify when prospective miners can re-apply for permission to explore, rather than following statutorily determined periods, thereby allowing traditional owners to refuse indefinitely any access to part of their land. It also asserted that Aboriginal associations should be able to negotiate with mining companies directly or by the appointment of an agent. Where associations did not exist, the relevant land council should determine who the traditional owners are. On royalties, it recommended the share of royalties equivalent to that paid to the Land Council should be paid to the traditional owners on whose land mines are established, seen as a step to providing greater incentives to agree to exploration and exploitation. Land councils should be funded from the Commonwealth budget; the Northern Territory government should fund a proportion of the royalty equivalent payments which could be negotiated as

<sup>87</sup> Irene Wilson, *Impact of Uranium Mining on Aboriginal Communities in the Northern Territory*, *Committee Office, Department of the Senate*, April 1997, p. 50.



part of the Commonwealth Grants Commission process; and the Northern Territory and Commonwealth governments should investigate transferring mineral rights on Aboriginal land to the traditional owners. The Commission saw this as a possible solution to many of the problems being experienced as a result of poorly defined property rights.<sup>88</sup>

Only a few minor amendments have been made to the Safeguards Act since. In 2003, it was strengthened with arrangements and offences for the protection and safeguards of nuclear material, facilities and associated information, and a permit requirement was introduced for the establishment of any new nuclear facility. In 2007 the amended act gave legal effect to Australia's obligations under the 2005 amended Convention for the Physical Protection of Nuclear Material (CPPNM) and introduced a permit requirement for the decommissioning of nuclear facilities and extended the geographical jurisdiction for some offences. Additionally, in 2012, domestic offences provisions were aligned with the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), which was brought into force in Australia on 15 April 2012.

### 3.2 Australia and Nuclear Power

Nuclear energy has been raised as an option for the country over the years but dismissed as non-commercial for Australia. In 1998, the federal government listed nuclear power as a proscribed activity under the Australian Radiation Protection and Nuclear Safety Act and in 1999, the Environmental Protection and Biodiversity Conservation (EPBC) Act classified uranium as a commodity of 'national significance.' In March 2005, then-Prime Minister John Howard initiated another inquiry into the uranium mining and export industry by the House of Representatives' Standing Committee on Industry and Resources. A request by the committee to expand its terms of reference to include nuclear power was rejected by the government.<sup>89</sup>

In June 2006, however, the Commonwealth initiated a broad inquiry to investigate Australian potential involvement in all aspects of the civilian nuclear fuel cycle, known as UMPNER (Uranium Mining, Processing and Nuclear Energy Review). The task force concluded that the country could have nuclear power plants up and

<sup>88</sup> The commission's recommendations and the discussion of the issue of mineral rights and Aboriginal land rights is found on pages 15–26 of vol. 1 of the Industry Commission report on *Mining and Minerals Processing in Australia*.

<sup>89</sup> Falk, Green and Mudd, 2006, p. 849.



running within 15 years, but found that nuclear would only become competitive for the country if low-to-moderate costs were imposed on carbon emissions.<sup>90</sup>

The issue of nuclear power faded for a decade then, in February 2015, the government of South Australia announced it would carry out a first-of-a-kind Royal Commission into the nuclear fuel cycle. This in-depth independent inquiry will focus on the future role of South Australia in waste storage, uranium enrichment and nuclear power generation. Once begun, royal commissions cannot be stopped by the government – they must be completed. They are also appointed under legislation, allow for public involvement and can last for several years.<sup>91</sup>

On 19 March 2015, the Nuclear Fuel Cycle Royal Commission was established. The commission is undertaking a series of public sessions from September to December 2015 with experts from Australia and overseas called. The eventual report (and its recommendations) is to be provided to the Governor of South Australia no later than 6 May 2016.<sup>92</sup>

<sup>90</sup> Government of Australia, *Uranium Mining, Processing and Nuclear Energy – Opportunities for Australia?* 2006.

<sup>91</sup> 'South Australia calls inquiry into nuclear future', *World Nuclear News*. 9 February 2015.

<sup>92</sup> Nuclear Fuel Cycle Royal Commission website: <http://nuclearrc.sa.gov.au/about-the-commission/>. Accessed 10 October 2015.

## 4. Australian Regulation Today

### *A Federal System*

Australia's federal system includes six states, two territories and the Commonwealth – nine jurisdictions each with their own regulations. The Department of Infrastructure, Industry and Science (formerly the Department of Resources, Energy and Tourism, DRET) dictates nationwide policy on mining, while the regulation of the mining industry is the responsibility of state and territory government agencies. These agencies administer a range of mining and health and safety regulations, and legislation relevant to the mining industry.

On environmental regulation, each state also has its own environmental assessment act, but 'nuclear matters' are also considered matters of 'National Environmental Significance,' which triggers the Environmental Protection and Biodiversity Conservation (EPBC) Act. Under the Act, mining and milling of uranium is included as a controlled action and thus considered nationally significant. Environmental assessments therefore require approvals from both state and federal ministers for environment. Nuclear safety is under the ambit of Safe Work Australia – specifically the Occupational Health and Safety Act of 2002. The Australian Maritime Safety Authority (AMSA) is the competent authority for packaging and securing shipments while the Australian Safeguards and Non-Proliferation Office (ASNO) regulates the possession and transport of nuclear material, bilateral safeguards agreements and the national safeguards system required by Australia's own agreement with the IAEA. ASNO's predecessor, the Australian Safeguards Office (ASO), was established in July 1974 in the Primary Industries and Energy Portfolio (what would now be the Department of Infrastructure, Industry and Science.). From 1974 to 1987 ASO operated under an administrative order from the minister responsible for the Atomic Energy Act. The 1987 Nuclear Non-Proliferation (Safeguards) Act gave statute to ASO as the national authority for implementing Australia's obligations under the NPT, its safeguards agreement and additional protocol with the IAEA and the Convention on the Physical Protection of Nuclear Material (CPPNM).

In 1994 ASO was moved to the Department of Foreign Affairs and Trade (DFAT). Earlier that year, the Chemical Weapons Convention (CWC) had opened for signature, which Australia signed (on 13 January 1993) and ratified four months later. At the same time, negotiations were underway in the Conference on Disarmament towards the Comprehensive Nuclear Test Ban Treaty (CTBT).

Responsibility for these treaties was added to ASO's portfolio. The 1994 Chemical Weapons (Prohibition) Act and the 1998 Comprehensive Nuclear Test-Ban Treaty Act designated ASO as the national authority to implement Australia's additional treaty obligations.<sup>93</sup>

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) carries out minimal regulation of mining as it only regulates nuclear safety for Commonwealth organisations. All other nuclear safety is regulated by state and territory legislation. ARPANSA does, however, provide advice on radiation protection. In 2005 ARPANSA produced the *Code of Practice and Safety Guide on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing* which was adopted by state and territory governments. It has also maintained an Australian Radiation Incident Register since 1971, which produces an annual summary report detailing all reported incidents across 31 categories. In 2010 ARPANSA established the Australian National Radiation Dose Register (ANRDR) for the uranium mining and milling industry. ANRDR provides a centralised, electronic register of workers' lifetime radiation exposure irrespective of the mines an individual works in.<sup>94</sup> Dose limits are 20 microservits per year over a period of five consecutive calendar years.<sup>95</sup> Australian uranium mining workers are far below the dose limit, with an annual exposure of 1 mSv per year.<sup>96</sup> ARPANSA also remediated the Maralinga Nuclear Test Site in South Australia where the British Government had carried out nuclear tests between 1952 and 1963.<sup>97</sup>

### *The States and Territories*

State government mines departments are responsible for granting exploration and mining tenements and for collecting royalty payments from the companies. Until recently, only South Australia and the Northern Territory had allowed uranium mining. Western Australia lifted a moratorium on uranium mining in 2008 and

<sup>93</sup> Supplementary submission by John Carlson, Director General of Australian Safeguards and Non-Proliferation Office, on: 'Role of the Australian Safeguards and Non-Proliferation Office (ASNO) in the Department of Foreign Affairs and Trade', 28 April 2009, p. 2.

<sup>94</sup> ARPANSA, 'The Australian National Radiation Dose Register': <http://www.arpansa.gov.au/services/ANRDR/index.cfm>. Accessed 10 October 2015.

<sup>95</sup> National Occupational Health and Safety Commission, Recommendations for Limiting Exposure to Ionizing Radiation [NOHSC: 3022 (1995)] and National Standard for Limiting Occupational Exposure to Ionizing Radiation [NOHSC:1013 (1995), republished March 2002, p. 25.

<sup>96</sup> ARPANSA, 'Ionising Radiation and Health,' [http://www.arpansa.gov.au/radiationprotection/Factsheets/is\\_ionising.cfm](http://www.arpansa.gov.au/radiationprotection/Factsheets/is_ionising.cfm). Accessed 10 November 2015.

<sup>97</sup> For further information on the remediation of Maralinga see: 'Maralinga', published by ARPANSA: <http://www.arpansa.gov.au/pubs/basics/maralinga.pdf>. Accessed 14 October 2015.

Queensland followed suit in 2012, only to change policy in 2015 (exploration however continues).

In Western Australia, a six-year ban on uranium mining was lifted after the 2008 state elections which saw the Liberal Party replace the Labor Party.<sup>98</sup> The Department of Mines and Petroleum (DMP) is the primary state government agency responsible for regulating the uranium mining industry in Western Australia. The DMP regulates uranium mining safety together with the Radiological Council, which adopts radiation protection standards. In May 2013 the Guide to Uranium Mining in Western Australia was published. According to DMP, Western Australia has known deposits of about 211,000 tU (as of June 2012).<sup>99</sup> There are about 36 companies currently exploring for uranium in Western Australia.<sup>100</sup>

There has been no uranium mining in Queensland since the Mary Kathleen mine closed in 1982. Seven years later, the state's Labor Party-led government installed a moratorium on uranium exploration and mining which lasted until October 2012 when the then elected Liberal National Party (LNP) of Queensland overturned the ban.<sup>101</sup> In 2013 a uranium strategy action plan was issued, outlining the best practice regulatory framework for uranium mining, including environmental standards, safety and health, economic and community development, indigenous opportunities and native title. Queensland also established the Uranium Mining Oversight Committee (UMOC) to review and monitor the action plan and take a lead role on technical oversight and project governance.<sup>102</sup> However, the policy did not last long. The centre-left ALP defeated the LNP in state elections on 31 January 2015. A couple of months later, the new minister for resources and mines, Anthony Lynham, announced that while uranium exploration could continue, mining would not.<sup>103</sup> Queensland's potential uranium projects are located in the north-west. No applications for mining were submitted to the Queensland government during the lifting of the moratorium.

Until 2012 the *Uranium Mining and Nuclear Facilities (Prohibitions) Act 1986* prohibited uranium mining in New South Wales. The UMNFP Act had made it

<sup>98</sup> 'Guide to Uranium Mining in Western Australia', May 2013.

<sup>99</sup> 'Guide to Uranium Mining in Western Australia', May 2013, p. 6.

<sup>100</sup> Department of Mines and Petroleum: <http://www.dmp.wa.gov.au/10002.aspx>. Accessed 30 July 2015.

<sup>101</sup> 'Queensland to recommence uranium mining', *Australian Mining*, 23 October 2012.

<sup>102</sup> 'Queensland Government's new uranium mining framework opens the state to yellowcake exploration', *ABC Rural*, 1 August 2014.

<sup>103</sup> 'Investor confidence shaken after QLD uranium mining ban', *Australian Mining*, 18 March 2015.

an offence to prospect for, or to mine, uranium in the state. In 2012 the O'Farrell government proposed the repeal of selected provisions of this act, by means of the Mining Legislation Amendment (Uranium Exploration) Bill 2012, which passed on 28 March 2012, and received royal assent on 4 April 2012. The 2012 bill removed the general prohibition on prospecting for uranium in New South Wales. It also enabled exploration licences and associated permits (but no other licences or authorities) to be granted under the Mining Act 1992 to prospect for uranium and to apply the same state environmental planning policy applicable to other mineral exploration to uranium prospecting. It vests all uranium in NSW in the Crown and excludes compensation for that vesting. The UMNFP Act still prohibits state authorities from constructing or operating nuclear reactors for the production of electricity. In 2014 the state invited six companies to apply for uranium exploration licenses.<sup>104</sup>

In the state of Victoria the Nuclear Activities (Prohibitions) Act of 1983 has prohibited exploration for uranium and thorium. There are no legislative restrictions on uranium exploration and mining in Tasmania or the Australian Capital Territory (ACT). There are known uranium deposits in Tasmania, particularly in the Rossarden district, that were initially prospected in the 1950s. Uranium exploration took place in 2007 for the first time since, by Minemakers Ltd to explore the north-east of the island, close to Prospect Creek.<sup>105</sup> According to Minemaker's 2009 Annual Report, their uranium interests would be farmed out, in order for them to focus instead on their Wonarah Phosphate project in Australia's Northern Territory and a marine phosphate project 600 km offshore of Namibia.<sup>106</sup>

In South Australia uranium mining is subject to the Mining Act of 1971, the Radiation Protection and Control Act (1982), the Roxby Downs (Indenture Ratification) Act (1982), the Development Act (1993), and the Environmental Protection Act (1993). In June 2013, ministers for mineral resources in South Australia and NSW announced an agreement to facilitate exploration across their borders. Mr Hartcher said. "Both States have much to gain from an MOU which

<sup>104</sup> The companies were: Australian Zirconia, Callabonna Resources, EJ Resources, Hartz Rare Earths, Iluka Resources and Marmota Energy. See: 'Uranium mining a step closer to reality in NSW', *Australian Mining*, 12 September 2014.

<sup>105</sup> 'Door opens for uranium explorers in Tasmania', *Sydney Morning Herald*, 24 September 2007.

<sup>106</sup> Minemakers Ltd, '2009 Annual Report', [http://www.minemakers.com.au/downloads/Minemakers\\_09\\_ReportFinalLodgedwithASX.pdf](http://www.minemakers.com.au/downloads/Minemakers_09_ReportFinalLodgedwithASX.pdf). Accessed 30 July 2015.

will encourage co-operation between agencies in respect to infrastructure access and development, policies on best practice regulation and planning processes.”<sup>107</sup>

In the Northern Territory, authorisations for Ranger and Jabiluka are issued under the *Northern Territory Mining Management Act 2001* through the Department of Mines and Energy (DME) which considers applications after the Supervising Scientist, the Northern Land Council (NLC) and Gundjeihmi Aboriginal Corporation (GAC) have assessed the proposal and provided feedback. This provides the primary mechanism for the Supervising Scientist’s participation in the regulatory processes of the Northern Territory Government and is supported by section 34 of the Act, which requires the NT government to act in accordance with the advice of the Commonwealth Resources Minister for issues related to uranium mining.<sup>108</sup>

Minesite Technical Committees (MTCs) are also in place for Ranger, Jabiluka and Narbalek to provide a forum for stakeholders to discuss technical environmental management issues, particularly in connection with the assessment of applications and reports submitted by mining companies for approval under NT legislation. MTCs are made up of representatives from the DME, (which is the chair of the MTC), the NLC, the Supervising Scientist and the relevant mining company. Other organisations or experts may also be represented to assist as requested.<sup>109</sup> In 1978 the Alligator Rivers Region Advisory Committee (ARRAC) was established under the *Environment Protection (Alligator Rivers Regions) Act 1978*. The ARRAC is a stakeholder forum for information exchange and policy consultation in relation to the effects of uranium mining on the Alligator Rivers Region environment. ARRAC members include representatives from ARPANSA, the Australian Department of Infrastructure, Industry and Science, DME, NT Department of Health, NT Environment Protection Authority, Environment Centre Northern Territory, GAC, NLC, Parks Australia, and the Supervising Scientist, as well as uranium companies Uranium Equities Limited, Afmeco Mining and Exploration Pty Ltd (AREVA Group), ERA and Cameco Australia.<sup>110</sup>

<sup>107</sup> ‘NSW government approval for uranium exploration one step closer’, *The Australian*, 11 June 2013.

<sup>108</sup> Supervising Scientist, *Annual Report 2013–2014*, 2014, p. 10.

<sup>109</sup> Australian Government, Department of the Environment, ‘Supervision and Assessment’: <https://www.environment.gov.au/science/supervising-scientist/supervision>. Accessed 14 October 2015.

<sup>110</sup> Australian Government, Department of the Environment, ‘The Alligator Rivers Region Advisory Committee’: <http://www.environment.gov.au/science/supervising-scientist/communication/committees/arrac>. Accessed 14 October 2015.

In 1993 the Alligator Rivers Region Technical Committee (ARRTC) made amendments to the *Environment Protection (Alligator Rivers Region) Act 1978* (EPARR Act). The membership and function of ARRTC was revised in 2001 to meet the recommendation of the Independent Science Panel (ISP) for an independent scientific advisory panel to review the research activities in the Alligator Rivers region and the scientific basis for assessing mining operations. The ARRTC has 14 members, including seven independent scientists nominated by Science & Technology Australia, who review the quality and appropriateness of research by the Environmental Research Institute of the Supervising Scientist, ERA and other relevant stakeholder organisations. ARRTC also reviews the quality of science used to inform the environmental regulation of uranium mining and exploration activities in the region. ARRTC reports openly, independently and without restriction.<sup>111</sup>

#### **4.1 Australia's Uranium Exports and Safeguards**

As set out previously, Australia's current uranium export policy was framed in 1977 and has evolved over the years to reflect the increasing number of international treaty obligations (such as the Additional Protocol, CPPNM and ICSANT) that Australia has signed and ratified. The policy allows Australian uranium to be exported only for peaceful non-explosive purposes under Australia's bilateral nuclear cooperation agreements (NCAs) to non-nuclear weapon states (NNWS) (and nuclear weapons states, NWS) that are party to the NPT and have concluded a comprehensive safeguards agreement with the IAEA which in turn provides assurances that AONM will be safeguarded by the IAEA and not diverted to non-peaceful or explosive uses. At the 2005 NPT Review Conference, Australia added the Additional Protocol (AP) as a pre-condition of uranium supply.<sup>112</sup> In 2008-09, the AP condition was extended to transshipment through a country with which Australia does not have a bilateral nuclear cooperation agreement.<sup>113</sup>

The Department of Infrastructure, Industry and Science issues the first export permit, usually a long-term, ten-year customs export permit. ASNO is responsible for the application of safeguards in Australia; the physical protection and security of

<sup>111</sup> Australian Government, Department of the Environment, 'The Alligator Rivers Region Technical Committee: <https://www.environment.gov.au/science/supervising-scientist/communication/committees/arrtc>. Accessed 14 October 2015.

<sup>112</sup> Statement by the Australian Minister for Foreign Affairs, the Hon Alexander Downer MP at the Seventh Nuclear Non-Proliferation Treaty Review Conference, New York, 2 May 2005.

<sup>113</sup> Australia Safeguards and Non-Proliferation Office, ASNO Annual Report 2008-2009, p. 26.



nuclear items (in use and transport); the operation of Australia's bilateral safeguards agreements; and contributes to the operation and development of IAEA safeguards and strengthening the international nuclear non-proliferation regime. Accordingly, ASNO and the Department of Infrastructure, Industry and Science work closely together to ensure all exports of Australian Obligated Nuclear Material (AONM) are implemented according to Australia's NCAs.

As stipulated by its safeguards agreement with the IAEA (INFCIRC/217 of 1974) and the 1987 Safeguards Act, ASNO keeps account of nuclear material and associated items and provides information to the IAEA (and the Australian parliament) on the materials subject to safeguards, and on uranium exports. It also facilitates IAEA inspections and complementary access under the Additional Protocol. Australia was the first country to sign and ratify the Additional Protocol in 1997.<sup>114</sup>

Australia's permitting system sets material accountancy requirements, which include establishing an accounting system, physical protection requirements, material measurements, record keeping and preparation and submission of reports. All permit holders for uranium mines are required to implement accountancy measures that have uncertainties of 0.1% for the mass of yellowcake in a drum and 0.2% for determining the total uranium concentration in the product.<sup>115</sup> Canberra requires export permits for uranium-bearing ores and UOC over 500 ppm, whether for nuclear or non-nuclear purposes.<sup>116</sup> Risk assessments are performed by ASNO and other ministries as necessary. In Australia, these risk assessments are based on four factors: quantity of nuclear material, extractability of nuclear material, the purpose of the export, and the nature of the safeguards that would apply should uranium be extracted.<sup>117</sup> This process is similar to approaches to exports of dual-use goods under the Nuclear Suppliers Group (NSG).

Industry reports its uranium production, transfers and overseas sales to ASNO and the Department of Infrastructure, Industry and Science. ASNO manages the Nuclear Material Balances and Tracking (NUMBAT) database system to maintain a register of permit-holders and track AONM domestically and overseas. Initiated

<sup>114</sup> Australia signed the Additional Protocol on 23 September 1997 and ratified it on 12 December 1997.

<sup>115</sup> Brent McGinnis, 'An Overview of Process Monitoring Related to the Production of Uranium Ore Concentrate', *Innovative Solutions Unlimited*, LLC, January 2013, p. 9.

<sup>116</sup> Schedule 7 of the Customs (Prohibited Exports) Regulations 1958.

<sup>117</sup> Craig Everton, 'Safeguarding Uranium Production and Export – Conventional and Non-Conventional Resources', *Journal of Nuclear Materials Management*, Vol. XLIII (4), 2015, p. 47.



in February 1981, the NUMBAT programme has evolved over the decades and is presently undergoing a major digital upgrade, creating a new database to cover permit-holders, nuclear material in-country and overseas, and reporting on exports (including those under the voluntary reporting scheme).<sup>118</sup> Australia then reports exports for nuclear purposes to the IAEA on a monthly basis, but it does not report exports for non-nuclear purposes because it has an export control system in place to satisfy itself that these exports are for 'specifically non-nuclear purposes' At the end of 2013, ASNO moved to a system of reporting containers shipped as well as the volumes (tonnage) of exports.<sup>119</sup> As the container number is the same for both the shipper and receiver, containers are easier for the IAEA to track – and transit match - than tonnage.

Australian industry also refers to product stewardship in its corporate materiality assessments. Paladin mentions product stewardship 'throughout the lifecycle of product', while Rio Tinto refers to the importance of product stewardship in its materiality analysis.<sup>120</sup> The Minerals Council of Australia (MCA) also publishes the Uranium Forum Code of Practice and Stewardship, which defines principles of behaviour and standards of best practice to guide improvements for the industry to operate 'with discipline in establishing and maintaining a strong record of performance'.<sup>121</sup> It calls for the implementation of effective and transparent engagement and independently verified reporting arrangements with stakeholders.

### *Nuclear Cooperation Agreements*

Australia's export policy is formalised in its bilateral NCAs which provide AONM coverage by IAEA safeguards, prior consent for any transfer of AONM to a third party, for enrichment beyond 20% of uranium-235 and for reprocessing. They also provide for physical security requirements and ways of exchanging information. Commercial contracts for the export of Australian uranium are required to include a clause that the contract is subject to the relevant bilateral nuclear cooperation agreement.

Given that uranium is fungible, its individual atoms cannot be physically identified and tracked once they have been mixed with material from other countries. Bilateral

<sup>118</sup> Australian Safeguards and Non-proliferation Office, *Annual Report 2013–2014*, Section 2.

<sup>119</sup> Discussion with Australian official, June 2013.

<sup>120</sup> France Bourgoïn, 'Governing Uranium and Corporate Security', *DIIS Report*, 2015:04, p. 24.

<sup>121</sup> The Minerals Council of Australia – Uranium Forum Code of Practice and Stewardship: [http://www.minerals.org.au/file\\_upload/files/resources/uranium/Code\\_of\\_Practice\\_and\\_Stewardship.pdf](http://www.minerals.org.au/file_upload/files/resources/uranium/Code_of_Practice_and_Stewardship.pdf). Accessed 15 June 2015.

accounting is thus based on equivalent quantities (and quality), calculated by data on fuel burn-up rates, process losses and other operating plant parameters, as the uranium supplied changes chemically and physically as it moves through the fuel cycle. A proportionality principle provides that, where obligated material is mixed with other nuclear material and is processed or irradiated, a proportion of the resulting material will be regarded as obligated corresponding to the same proportion as was obligated initially. This has led to a system of multiple flagging where, for example, when Australian obligated material becomes enriched in the US, it also acquires a US flag, and thus subsequent use will have to meet the NCA requirements for both Australia and the US.

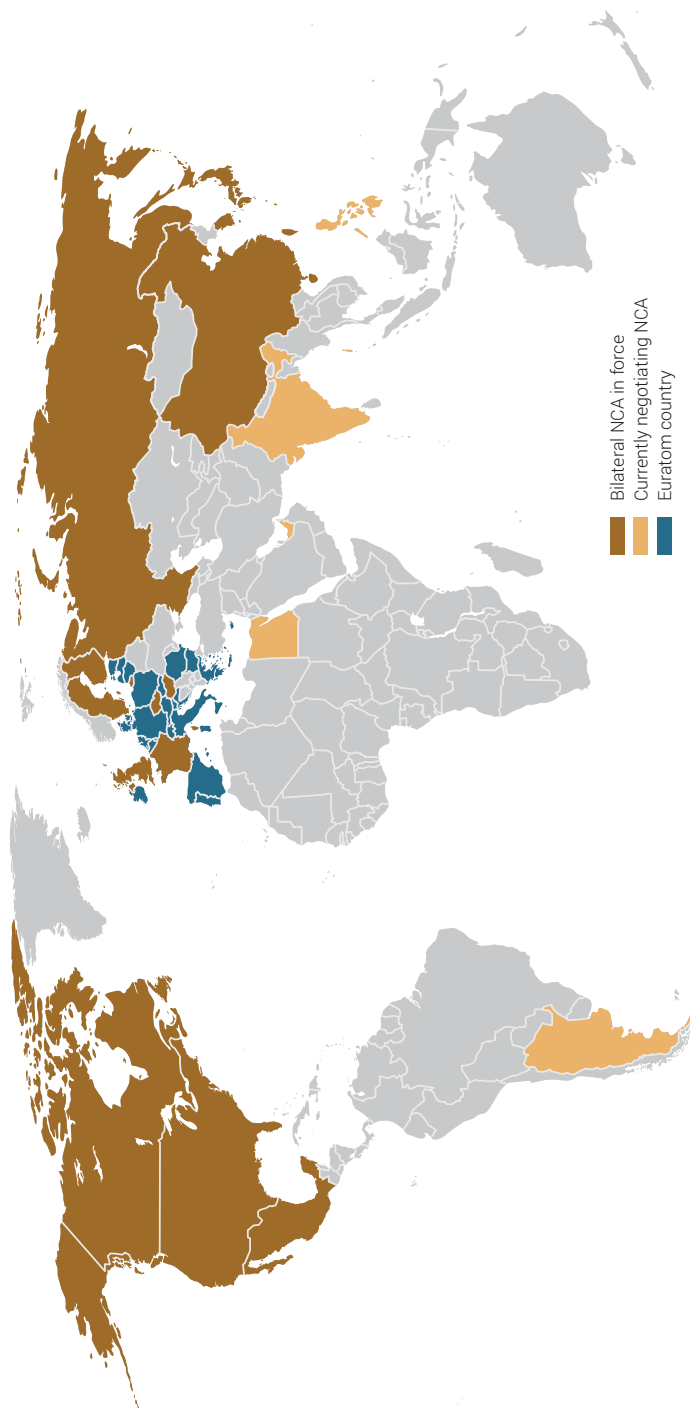
As of 1 October 2015 Australia has 23 bilateral NCAs in force, covering 41 countries. This includes the two agreements Australia has with China (one covering nuclear material transfers and the other covering nuclear cooperation) and the agreement with Euratom which covers all 28 Euratom member states.<sup>122</sup> These 23 NCAs are coloured brown in the map below (dark blue for Euratom countries) with the orange representing countries with which Australia is currently negotiating an NCA, namely Argentina, Egypt, India, the Philippines and the United Arab Emirates.

All of Australia's NCAs are subject to IAEA safeguards with the fundamental difference between non-nuclear weapons states and nuclear weapons states being that NNWS are actually inspected whilst NWS select facilities eligible for IAEA safeguards on a voluntary basis. Australia relies on IAEA safeguards for monitoring and ASNO has access to information in the IAEA's annual Safeguards Implementation Report, reporting from counterparts and annual consultations with counterparts on the Australian accounts.

Australia's NCA with China, for example, requires that any uranium supplied is used peacefully and exclusively in IAEA-safeguarded facilities. However, China does not list conversion facilities in its voluntary offer agreement. Given that the uranium supplied will undergo conversion (in unsafeguarded plants) before being transferred to safeguarded facilities, the substitution principle applies: for every receipt of Australian uranium, China provides an equivalent quantity of converted natural uranium (i.e.  $UF_6$ ), which will be added to the inventory of a facility designated for

<sup>122</sup> 'Australia's Network of Bilateral Nuclear Cooperation Agreements', ASNO: <http://dfat.gov.au/international-relations/security/non-proliferation-disarmament-arms-control/policies-agreements-treaties/Pages/australias-network-of-nuclear-cooperation-agreements.aspx>. Accessed 1 October 2015.

Figure 5. Countries with which Australia has (or is negotiating) an NCA<sup>123</sup>



<sup>123</sup> Source: 'Australia's Regulatory Perspective – Security and Export Controls on Uranium Production, Transport and Export for Conventional and Non-Conventional Resources', Presentation by ASNO at the IAEA Regional Workshop on Implementing Prudent Management Practices for Uranium Ore Concentrate, 8–12 June 2015, Livingstone, Zambia.

safeguards. According to the Australian Government, this ‘will have the same effect as if the yellowcake had moved through the conversion plant, and will ensure that after receipt in China, AONM remains in a facility designated for safeguards and listed under the agreement at all times’.<sup>124</sup> The Canadian agreement with China differs in that the China Atomic Energy Authority (CAEA) is obligated to report Canadian UOC when it passes through the gates of one of its conversion facilities and when it leaves the plant, as well as declaring its destination.<sup>125</sup> Such an agreement is characterised as a ‘black box’ arrangement where access is granted access to specific processes or portions of a facility, but not to the entire facility.<sup>126</sup>

Australia’s NCA with Russia states that Australian uranium must be stored, processed and used only at facilities on the IAEA safeguards eligible list. Similar to China, Russia does not offer its conversion facilities for IAEA inspection and the substitution principle is also allowed.<sup>127</sup> The agreement with the United States applies safeguards in accordance with the provisions of the United States–IAEA Safeguards Agreement and the Australia–IAEA Safeguards Agreement.<sup>128</sup> The United States has volunteered all of its civilian facilities as eligible for safeguards under the IAEA–US Agreement.<sup>129</sup> The conversion facility in Metropolis, Illinois is included. Sales to France and the United Kingdom are covered by the Australia–Euratom NCA which applies IAEA safeguards agreements with Australia and Euratom as well as the IAEA–Euratom–France Safeguards Agreement and IAEA–Euratom–United Kingdom Safeguards Agreement.<sup>130</sup> AREVA’s conversion plant in France is not a facility offered to the IAEA but it is covered by Euratom safeguards and inspections. The Springfields conversion facility in the United Kingdom was shut down in 2014.

<sup>124</sup> Australian Government, Department of Foreign Affairs and Trade, Australia–China Nuclear Material Transfer Agreement and Nuclear Cooperation Agreement, November 2007: <http://www.dfat.gov.au/geo/china/treaties/faq.html>.

<sup>125</sup> Discussion with Canadian official, 3 July 2013.

<sup>126</sup> The determination of whether a black box process or facility is safeguardable is dependent upon the details of the process type, design, and layout; the specific limitations on inspector access; and the restrictions placed upon the design information that can be provided to the IAEA. For a good discussion on ‘black box’ arrangements, see: H. Diaz Marciano, E. Miller, E.T. Gitau, J. Wylie and J. Hockert, ‘Safeguards Approaches for Black Box Processes or Facilities,’ Pacific Northwest Laboratory, PNNL-22797, September 2013.

<sup>127</sup> Anton Khlopkov and Valeriya Chekhina, *Governing Uranium in Russia*, DIIS Report 2014:19, p. 54.

<sup>128</sup> Agreement between the Government of Australia and the Government of the United States of America Concerning Peaceful Uses of Nuclear Energy, New York: 4 May 2010. Entry into force, 22 December 2010.

<sup>129</sup> Text of the Agreement of 18 November 1977 between the United States of America and the Agency for the Application of Safeguards in the United States of America, IAEA Doc INF/CIRC/288 (December 1981) (entered into force 9 December 1980), Article 1.

<sup>130</sup> Agreement between the Government of Australia and the European Atomic Energy Community (Euratom) for Co-operation in the Peaceful Uses of Nuclear Energy, Canberra: 5 September 2011. Entry into force: 1 January 2012.

It was covered by Euratom and was also on the United Kingdom's voluntary offer list. Australia also participates at the IAEA on issues related to safeguards. As noted by John Carlson, former Director General of ASNO

“...Australia has a major place in the international fuel cycle. It is a place which has given us very strong standing to pursue non-proliferation objectives. We are a permanent member of the IAEA board of governors. We are very active in the development of non-proliferation mechanisms. We are particularly active in the development of IAEA safeguards. I have a personal appointment as the chairman of the international advisory group that advises the IAEA in the development of safeguards and making safeguards more effective. We have substantial influence through our position as a major uranium exporter.”<sup>131</sup>

## 4.2 Australia–India Nuclear Cooperation Agreement

In response to the 1974 test of a nuclear explosive device by India, a group of seven nuclear supplier states (Canada, France, West Germany, Japan, the Soviet Union, the United Kingdom, and the United States) established the Nuclear Suppliers Group (NSG) to harmonise exports of nuclear technology and ensure their use for peaceful purposes. In 1978, Australia participated in the NSG for the first time<sup>132</sup> and announced it had aligned itself with the NSG guidelines.<sup>133</sup>

On 18 July 2005 a joint India-US statement proposed to separate India's nuclear facilities into civilian and military/strategic, placing more Indian facilities and materials under IAEA safeguards.<sup>134</sup> A year later the joint agreement was finalised. The next day Foreign Minister Downer welcomed the agreement, stating that it would draw ‘India into the mainstream of the international community’.<sup>135</sup> The Howard government, however, still maintained that it would abide by Australia's

<sup>131</sup> Commonwealth of Australia, Official Committee Hansard, House of Representatives Standing Committee on Industry and Resources: Developing Australia's non-fossil fuel energy industry, Canberra, 10 October 2005, p. 17.

<sup>132</sup> On 21 February 1978. See: ‘Communication Received from the Permanent Mission of Argentina to the International Atomic Energy Agency on behalf of the Participating Governments of the Nuclear Suppliers Group, INFCIRC/539/Rev.6. 22 January 2015.

<sup>133</sup> INFCIRC/254/Add.1 of March 1978.

<sup>134</sup> Joint statement by President George W. Bush and Prime Minister Manmohan Singh, 18 July 2005: <http://2001-2009.state.gov/p/sca/rls/pr/2005/49763.htm>. Accessed 19 May 2015.

<sup>135</sup> Michael Clarke, ‘The Third Wave of the Uranium Export Debate: Towards the Fracturing of Australia's Nuclear ‘Grand Bargain’ in *Australia's Uranium Trade: The Domestic and Foreign Policy Challenges of a Contentious Export*, Michael Clarke, Stephan Fruhling and Andrew O'Neil eds. Surrey, England: Ashgate Publishing, 2011, p. 118.

long-standing policy to only supply uranium to NPT parties and would not conclude an agreement with India. Nevertheless, by 2007 statements by the government began to signal a shift in policy where bilateral safeguards agreements with India were viewed as better than nothing at all. In January 2007 Downer noted that one could take the view that because India is not a party to the NPT and has nuclear weapons and technology that it should not be engaged in international nuclear trade. “Or you can take the view that the Bush Administration has taken that, well, at least you can embrace some of India’s nuclear industry and you can have inspections by the IAEA of some of those nuclear facilities. And some inspections and some transparency is better than none, isn’t it?”<sup>136</sup> On 15 August 2007, the Howard government agreed to proceed with negotiating an agreement with India.

The election of Kevin Rudd and the ALP in November 2007 signalled a return to Australia’s traditional approach and in January 2008 the Rudd government overturned the 2007 uranium deal. Australia however supported the NSG decision in September 2008 to grant India an exemption from its rules requiring a comprehensive safeguards agreement as a condition of nuclear trade. The 2008 decision was based on a formal pledge by India stating that it would not share sensitive nuclear technology or material with others, would uphold its voluntary moratorium on nuclear testing, work towards a Fissile Material Cut-off Treaty, separate civil and military nuclear materials in a phased manner and place civil facilities under IAEA safeguards and negotiate an additional protocol. Australia’s support for the NSG exemption was in part due to the desire by Canberra to develop a strategic partnership with New Delhi, while further boosting its strategic partnership with the United States which considered the NSG exemption a matter of ‘high importance’.<sup>137</sup>

The 2008 decision made India the only non-NPT state engaged in the global trade of civilian nuclear technology. That same year India signed an umbrella safeguards agreement with the IAEA (INFCIRC/754), placing ten nuclear power reactors under safeguards (the list has since been added to and includes 22 facilities as of February 2015).<sup>138</sup> It provides that any nuclear (including source) material subject to IAEA or bilateral agreement may be further produced, processed, used or stored in a facility not listed on the IAEA’s safeguards list, provided the material is placed

<sup>136</sup> Alexander Downer, Speech and Question and Answer Session, Energy Environment and Air Quality Policy Forum, Los Angeles, 13 January 2007.

<sup>137</sup> ‘WikiLeaks shows US push behind Australia–India nuke deal’, *Green Left Weekly*, 30 November 2014.

<sup>138</sup> INFCIRC/754/Add.7, 5 February 2015.

under temporary safeguards while present in the facility.<sup>139</sup> The importation of uranium is to be notified within four weeks of its arrival, and India has to inform the IAEA of all facilities which are using imported uranium and the precise amount in each facility.<sup>140</sup> In short, this means that foreign-sourced uranium imported into India *must* be IAEA-safeguarded but the IAEA does not consider the origin of the uranium subject to safeguards.

In 2010 Julia Gillard became leader of the ALP, replacing Rudd as prime minister and soon afterwards forming a minority government following the August 2010 federal election. Initially maintaining the Rudd position on India, Gillard decided in 2012 to allow negotiations with India to begin, stating that the ALP's ban on uranium sales to India had become an obstacle in Australia–India relations.<sup>141</sup> Negotiations continued after the election of the Liberal Party of Australia (LPA) in September 2013. A year later, Prime Minister Tony Abbott and Indian Prime Minister Narendra Modi signed the deal in New Delhi.<sup>142</sup>

While agreements with China and Russia for supply by Australia are recent, both have accepted bilateral reporting requirements on the supplier's flag. India, however, does not. New Delhi argues that, because all imported uranium will be used in safeguarded facilities and thus reported to the IAEA, there is no need for bilateral reporting. As noted by John Carlson, former Director General of ASNO in a statement submitted to the Australian parliament's Joint Standing Committee on Treaties (JSCOT) in September 2014:<sup>143</sup>

In 2006, when discussions between Australia and India on a nuclear agreement first started, India insisted on being treated the same as Australia's other agreement partners. But now India has moved the goal posts, expecting an agreement that contains less than all other Australian partners have agreed to. Far from building confidence in its intentions, India's position has the opposite effect. [...] The fact that India wants to weaken Australia's longstanding safeguards conditions shows it is not thinking in terms of

<sup>139</sup> International Atomic Energy Agency, 'Agreement between the Government of India and the International Atomic Energy Agency for the Application of Safeguards to Civilian Nuclear Facilities: Addition to the List of Facilities Subject to Safeguards under the Agreement', INFCIRC/754/Add.1, November 12, 2009.

<sup>140</sup> Rajiv Nayan, *Governing Uranium in India*, DIIS Report 2015:02, p. 32.

<sup>141</sup> 'Prime Minister Julia Gillard will start negotiations to sell uranium to India', *The Australian*, 16 October 2012.

<sup>142</sup> 'Australian PM visits India, Signs Nuclear Deal', *The Diplomat*, 6 September 2014.

<sup>143</sup> Mark Hibbs, 'India's Bilateral Obligations', *Arms Control Wonk*, 7 February 2015.



assuming the same responsibilities and practices as other leading countries – this is not an encouraging start either for this agreement or for a closer bilateral relationship.

Australia is bound by its 1987 Safeguards Act which requires annual reporting by the Director General of ASNO,<sup>144</sup> including information on the total quantities of Australian uranium under each agreement at each stage of the nuclear fuel cycle. On 12 February 2015 Dr Rob Floyd, Director General of ASNO, testified at the Joint Standing Committee on Treaties (JSCOT) that New Delhi and Canberra are currently negotiating an administrative agreement that “sits with the [NCA] that would meet those [reporting] requirements” and that “could be slightly different in the way it is implemented while still getting the same outcome that we need to meet the legislated requirements”.<sup>145</sup> The details of these reporting requirements will remain confidential under the Administrative Arrangement.

Reportedly the bilateral tracking provisions in the US–India Administrative Arrangement (finalised in February 2015) have been weakened, although there seems to have been a breakthrough on tracking US-exported materials and retransfers within India, including items sourced from third countries but processed in the United States.<sup>146</sup> This breakthrough was only possible because the material covered is not bulk material (i.e. not UOC). Suppliers (and consumers) may therefore find it desirable to have the US process uranium eventually destined for India. The report of the JSCOT noted that Australian uranium purchased by India will be processed into fuel assemblies in the United States before being exported to India for use.<sup>147</sup> In other words, AONM will be ‘flagged’ as it moves from the US through Indian safeguarded facilities.

Australia’s agreement with India is also unlike any other of its NCAs in that it does not include any provision for dealing with the consequences of non-compliance with the NCA or the IAEA, nor fallback safeguards which would be similar to

<sup>144</sup> Specifically Section 51(2).

<sup>145</sup> Official Committee Hansard (JSCOT), 12 February 2015, page 3: [http://parlinfo.aph.gov.au/parlInfo/download/committees/commjnt/4e154c16-3030-400c-893f-28c3701bdd90/toe\\_pdf/joint%20Standing%20Committee%20on%20Treaties\\_2015\\_02\\_12\\_3186\\_Official.pdf;fileType=application%2Fpdf#search=%22committees/commjnt/4e154c16-3030-400c-893f-28c3701bdd90/0001%22](http://parlinfo.aph.gov.au/parlInfo/download/committees/commjnt/4e154c16-3030-400c-893f-28c3701bdd90/toe_pdf/joint%20Standing%20Committee%20on%20Treaties_2015_02_12_3186_Official.pdf;fileType=application%2Fpdf#search=%22committees/commjnt/4e154c16-3030-400c-893f-28c3701bdd90/0001%22).

<sup>146</sup> Brahma Chellaney, ‘The US–India nuclear breakthrough that wasn’t’, *The Japan Times*, 11 February 2015.

<sup>147</sup> The Parliament of the Commonwealth of Australia, Report 151, Treaty Tabled on 28 October 2014: Agreement between the Government of Australia and the Government of India on Cooperation of Peaceful Uses of Nuclear Energy, Canberra, September 2015, p. 3.



IAEA safeguards should the IAEA not be able to monitor Australian material for any reason. The Australia–India agreement calls instead for undefined ‘appropriate verification measures’ and contains no arbitration clause.<sup>148</sup> The agreement does have a dispute resolution and, importantly, does provide for the cessation of cooperation or termination of the agreement.<sup>149</sup> The agreement also gives India advance consent to reprocess Australian uranium before the reprocessing plant has been built, and without requiring consent for downstream facilities using the separated plutonium. This provision exists in one other Australian NCA, specifically with Japan, in which Canberra gave its consent to reprocessing at the Japan Nuclear Fuel Services plant (i.e. the Rokkasho Nuclear Fuel Reprocessing Facility) and the Monju reprocessing plant.<sup>150</sup>

In September 2015, the report of the JSCOT supported the bilateral Australia–India NCA. The Committee noted that ‘the agreement represents a different approach to non-proliferation in India; using engagement to bring India into the nuclear non-proliferation mainstream’.<sup>151</sup> On accounting, the Committee was satisfied that Australian nuclear material in India can be accounted for and tracked. The Committee did identify terminology used in the consent mechanism for the refinement of nuclear materials (more specifically the enriching of uranium to between 2–5% U235) which raised the question of whether the proposed NCA breaches the South Pacific Nuclear Weapons Free Zone established by the Treaty of Rarotonga. This treaty entered into force on 11 December 1986 and includes Australia and twelve other states. It requires that no state party provide source or special fissionable material unless subject to the IAEA safeguards applicable to a NNWS.<sup>152</sup> The Committee noted that it was not in a position to make an informed decision regarding the advice provided to it and recommends that the Australian government outline the legal advice it has received on these matters in its response to the JSCOT report. The same recommendation was made regarding the consent

<sup>148</sup> Kalman A. Robertson, ‘Submission to the Joint Standing Committee on Treaties Agreement between the Government of Australia and the Government of India on Cooperation in the Peaceful Uses of Nuclear Energy: Interpreting the Australia–India Nuclear Cooperation Agreement’, 27 November 2014.

<sup>149</sup> The Parliament of the Commonwealth of Australia, Report 151, Treaty Tabled on 28 October 2014: Agreement between the Government of Australia and the Government of India on Cooperation of Peaceful Uses of Nuclear Energy, Canberra, September 2015.

<sup>150</sup> Agreement between the Government of Australia and the Government of Japan for Co-operation in the Peaceful Uses of Nuclear Energy, Canberra, 5 March 1982. Australian Treaty Series, No. 22, 1982.

<sup>151</sup> The Parliament of the Commonwealth of Australia, Report 151, Treaty Tabled on 28 October 2014: Agreement between the Government of Australia and the Government of India on Cooperation of Peaceful Uses of Nuclear Energy, Canberra, September 2015.

<sup>152</sup> Treaty of Rarotonga, Article 4.

for the reprocessing provisions (article VI) in the NCA. The government usually treats its legal advice as confidential and therefore is unlikely to reveal the full advice it has received.

The JSCOT made further recommendations that the government bring the agreement into force but not approve any sales of uranium to India until the following conditions are met:

- India has achieved full separation of civil and military nuclear facilities as verified by the IAEA.
- India has established an independent nuclear regulatory authority under law.
- The Indian nuclear regulator's existing policies and arrangements have been reviewed to ensure its independence.
- The frequency, quality and comprehensiveness of onsite (safety) inspections at nuclear facilities have been verified by the IAEA as being best practice standard.
- The lack of sufficient planning for the decommissioning of nuclear facilities has been rectified.

Many of these recommendations were unexpected. The separation of civil and military powers has been a long-standing desire supported by Australia (and also a recommendation made by the Committee to the Australian NCAs with Russia and China). The other recommendations, however, particularly on safety go beyond what NCA provisions stretch to. Particularly here, in that if they were to be included, they would be provisions included in an NCA, not afterwards.<sup>153</sup>

JSCOT's advice must be 'taken into account' though it is not legally required that it is acted upon. The NCAs with Russia and China for example went ahead despite opposition from JSCOT. In the Government's response to the JSCOT report, it was noted that an Integrated Regulatory Review Service (IRRS) mission was held by the IAEA in March 2015 at India's invitation. The IRRS concluded that there is a strong commitment to safety in India. The response notes that the:

'Government stresses the importance of ongoing review and improvement of nuclear safety. However this does not warrant delaying, and potentially lessening, the benefits offered by nuclear cooperation. Accordingly, the

<sup>153</sup> 'Australia-India nuclear deal: Parliamentary treaties committee recommends tough conditions', *The Interpreter*, 11 September 2015.

Government does not accept the Committee's recommendation that exports of uranium to India should be deferred.<sup>154</sup>

The Government also does not accept the JSCOT's recommendation that the supply of AONM be approved only for uranium that is enriched and fabricated into fuel assemblies in the United States and transferred to India under the US-India NCA. It rejected the recommendation 'as an important intention of the NCA is to enable the use of Australian uranium in India's own fuel fabrication facilities.'<sup>155</sup> Overall, the Government does not accept JSCOT's recommendation that the NCA with India not proceed.<sup>156</sup> On 16 November 2015 Prime Ministers Narendra Modi and Malcolm Turnbull announced the completion of procedures, including the administrative arrangements, for the India-Australia Civil Nuclear Agreement to enter into force in a meeting held on the margins of the G20 summit in Antalya, Turkey.<sup>157</sup>

### 4.3 Uranium Security

In Australia standards are set in permits (rather than by regulations) to provide flexible and tailored security requirements in line with legislative and policy changes. Australia's performance-based approach is able to accommodate changes in operational requirements and arrives at security standards through a consultative rather than a prescriptive process. In general, two layers of security are applied to UOC packed in drums at mines with authorised access controls and cameras installed, and the other involving dual communications systems on approved transport routes. ASNO requires (and approves) security plans for mines (and transport) every five years and on an as needs basis.<sup>158</sup>

Australia's system of security for UOC is based on a graded approach (security levels scaled with concentration/purity) and is risk-informed. Physical protection measures are based on a scalable threat model which in turn is designed to protect against theft and sabotage, and to locate and recover missing material. Industry is thus required to establish plans and procedures to provide timely detection of security-significant events; install access delays such as fences, and to initiate response upon

<sup>154</sup> Australian Government response to the joint Standing Committee on Treaties report: Report 151 Agreement between the Government of Australia and the Government of India on Cooperation in the Peaceful Uses of Nuclear Energy, 11 November 2015, p. 4.

<sup>155</sup> *Ibid.*, p. 5.

<sup>156</sup> *Ibid.*, p. 8.

<sup>157</sup> 'India-Australia agreement complete,' World Nuclear News, 16 November 2015.

<sup>158</sup> Discussion with ASNO official, 18 June 2013.

detection. Permits require that personnel with accountancy and security functions are appropriately trained.<sup>159</sup>

The graded and scalable approach include the use of a ‘secure compound’. For example, centrifuge, calciner / dryer, and drum filling along with UOC compounds, storage incidental to transport and emergency storage must be carried out in secured compounds which must be protected by barriers consisting of either a security fence, building fabric or other barrier with access controls, and either 24 hour security guards or other authorised personnel, or perimeter intrusion detection systems, or video motion detection or a combination of the above.<sup>160</sup>

### *Transport Security*

Yellowcake is packaged in 200 litre drums, with seals on containers and these are trucked to Darwin in the Northern Territory or Adelaide in Southern Australia – the only two ports in Australia that accept Class 7 radioactive materials. The ports of Adelaide and Darwin have secure storage areas for UOC and every UOC shipment is approved by ASNO. ASNO also certifies the use of seals.<sup>161</sup> The states and territories have authority over their roads.

The Australian Maritime Safety Authority (AMSA) is the competent authority for packaging, specifically securing containers and drums in shipments. AMSA visits each mine once a year. For a new producing mine, AMSA will visit the site before the mine’s first shipment to inspect its method of securing containers. AMSA also does training for packing and shipper declarations, with drivers and packers all trained in the IMOG code. The course content can be developed by another group/entity, but it has to be approved by AMSA. AMSA will sit in on the course and issues numbered certificates upon completion.<sup>162</sup> The Office of Transport Security (OTS) is the port authority and implements the port security code (in line with the International Ship and Port Facility [ISPS] Code). OTS appoints AMSA as the acting authority which can check certificates, but AMSA has to refer to OTS if there is a security breach.

<sup>159</sup> Australia’s Regulatory Perspective – Security and Export Controls on Uranium Production, Transport and Export for Conventional and Non-Conventional Resources’, Presentation by ASNO at the IAEA Regional Workshop on Implementing Prudent Management Practices for Uranium Ore Concentrate, 8–12 June 2015, Livingstone, Zambia.

<sup>160</sup> Ibid.

<sup>161</sup> Discussion with ASNO official 18 June 2013.

<sup>162</sup> Discussion with AMSA official, 18 June 2013.

While the first shipment from Olympic Dam was trucked with an armed escort (which continued for about a year and was then replaced by security convoys) took place at a time when different risks and public expectations were in play. Today, the transport of yellowcake across Australia may be done without convoy. Across the country it is standard practice that the authorities (usually through ministries of health at state and territory level) are informed when shipments are en route (a requirement since the early 1980s). Drivers are not allowed to deviate from the route (or contingency plan). Each shipment of uranium leaving Australia must also be reported to ASNO. Australian policy also requires that AONM transhipped through third states be protected, specifically requiring that AONM transits through states that have adopted the CPPNM. The Additional Protocol is required for transshipment through a country which Australia does not have a bilateral NCA.

ASNO also directs specific risk mitigating measures, consistent with international codes, to protect Australian UOC exports and to mitigate the risk of piracy in the Gulf of Aden. Few shipping services are available for Australian uranium miners to export UOC to Europe and frequently there is no alternative to using the Gulf of Aden and the Suez Canal. To this end, ASNO consults with the Office of Transport Security, Department of Defence, AMSA and overseas counterparts to determine best practice procedures that should be applied to shipments that may be subject to piracy risks.<sup>163</sup>

Since the early 1980s Australia has shipped some 11,000 containers of yellowcake with no incidents impacting public health.<sup>164</sup> Approximately 60 shipments are made per year. Any significant expansion of uranium exports however will require improved access to transport options. The Adelaide port will continue to grow when planned projects in Western Australia begin shipping through the port. Expansion plans for Olympic Dam (currently on hold due to low spot prices) include transporting uranium by train to both Darwin and Adelaide.

<sup>163</sup> ASNO *Annual Report 2008–2009*.

<sup>164</sup> WNA, 'Transport of Radioactive Materials', <http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Transport/Transport-of-Radioactive-Materials/>. Accessed 10 October 2015.

## 5. Conclusion

Australia's approach to uranium production and trade has evolved from its initial focus on contributing to nuclear weapons to one which uses its resource muscle to promote domestic and international nuclear non-proliferation objectives. It is active internationally and within the IAEA on the development and implementation of safeguards and nuclear security with its industry applying a safeguards and security culture within their UOC operations and transport. Its global reputation is based on these attributes with a number of new and potentially new suppliers looking to Australia for inspiration on best practices.

India's exemption from the NSG guidelines is challenging Australian policy as it extends beyond fundamental Australian NCA practices and permissions, providing India with a country-specific exemption to Australia's long-standing uranium supply policy. The Australian example demonstrates how India's exemption is encouraging India to apply a number of mainstream safeguards policies, but also how the mainstream is strategically shifting to accommodate New Delhi. Of all the countries studied in the *Governing Uranium project*, Australia has had the most public debate surrounding its supply, not only of UOC to India, but all of its uranium sales abroad. This experience of national discussion has allowed for ongoing study and evaluation, providing the foundation for Australian policy as it adapts to a shifting global uranium market.

