Uranium

Uranium: a new start for Western Australia

by Ivor Roberts

Abstract

Uranium mineralization is widespread in Western Australia, with 28 known uranium deposits hosting at least 200 000 t of U_3O_8. Renewed granting of mining leases for uranium in Western Australia provides new opportunities for resource companies and the resulting new mine development should lead to added economic growth and higher employment, particularly in regional areas. The requirement to reduce greenhouse gas emissions from power generation will lead to higher demand for uranium as a feedstock for nuclear power generation overseas, thus providing a market opportunity for aspiring Western Australian uranium miners. Western Australia is highly prospective but under-explored and opportunities still exist for the discovery of more uranium deposits in a variety of geological settings.

KEYWORDS: Uranium deposits, uranium resources, uranium exploration, uranium policy, radioactivity, calcrete-hosted uranium, roll-front uranium, unconformity-associated uranium, carbonatite-hosted uranium

Uranium is a naturally occurring radioactive element and radioactivity is a normal part of the natural environment. Uranium is a relatively common element and has the same abundance as tin with an average crustal abundance of 2–3 ppm. It is a lot more abundant than the precious metals gold, platinum, and silver.

In Australia, limited quantities of uranium ore were mined more than seventy years ago for medical purposes and as a pigment, but from the 1950s, Australia has produced significant quantities from operations in South Australia, Northern Territory, and Queensland. Uranium has never been mined in Western Australia. Currently there are only three operating uranium mines in Australia; : Ranger in the Northern Territory, and Olympic Dam and Beverley in South Australia. Honeymoon and Four Mile mines, also in South Australia, are approved but not yet in production. All of Australia's production is exported solely for the generation of electricity.

Policy reform

On the 17 November 2008, the Western Australian Government announced that new mining leases granted in the State would include the right to produce uranium. This decision overturned a policy in place since 2002 that had prohibited holders of new mining leases from developing uranium deposits. Between June 2002 and September 2008 the right to mine uranium was excluded from the 1475 mining leases issued during that period. However, during this same period exploration for uranium was not prohibited and exploration did take place, but not at a level that reflected Western Australia's high prospectivity.

Western Australia's change in policy brings it into line with South Australia, the Northern Territory, and the Australian Government, which all encourage responsible uranium exploration and mining. Community concerns about the uranium industry started in the late 1970s with the Ranger Inquiry in the Northern Territory in 1976–77. In 1984, the Australian Government adopted the 'three mine policy' that limited the industry to the three existing mines: Ranger and Nabarlek in the Northern Territory and Olympic Dam in South Australia. With the closure of the Nabarlek mine, the policy changed to become the 'no new mines policy'. The consequence of these policies, together with low uranium prices, was to discourage further exploration and to prevent the development of Western Australian uranium deposits, such as Yeelirrie by Western Mining Corporation (now BHP Billiton) and Kintyre by CRA Exploration (now Rio Tinto). It was not until April 2007 that the Australian Government changed its restrictive uranium position and encouraged the State governments of Queensland and Western Australia to remove their ban on uranium mining.

Uranium exploration and production

For 2008–09, uranium exploration expenditure in Australia dropped by 20% from the previous year (Australian Bureau of Statistics, 2009). However, in Western Australia there was a rise of 7%, attributed to potential uranium miners increasing their exploration activity to validate resources at

Table 1. Uranium exploration in Australia (A$ millions)

Year	Queensland	Western Australia	Northern Territory	South Australia	AUSTRALIA
2003–04	0.2	0.2	4.8	5.3	**10.5**
2004–05	0.4	0.3	6.9	13.1 (est)	**20.7**
2005–06	4.6	2.2	19.1	30.3	**56.1**
2006–07	9.0 (est)	11.2 (est)	30.1	63.8	**114.1**
2007–08	38.1	26.8 (est)	48.7	118.0	**231.5**
2008–09	29.5 (est)	28.6 (est)	54.5	72.6	**185.3**

NOTES: Exploration for uranium is prohibited in NSW and Victoria and exploration in Tasmania is negligible.
Reference: Australian Bureau of Statistics (2009)

Table 2. Uranium resources in Australia at December 2008

	Total resources (t U)	Percentage of Australia's total resources (%)
South Australia	1 240 593	77
Northern Territory	246 045	15
Western Australia	88 132	6
Queensland	37 947	2
New South Wales	0	-
Victoria	0	-
Tasmania	0	-
Australia: total (rounded)	**1 613 000**	**100**

Reference: Geoscience Australia (2009)

a number of deposits following the policy shift to allow uranium production (Australian Uranium Association, 2009).

In 2008–09 South Australia still dominated Australia's uranium exploration, followed by Northern Territory. Surprisingly Queensland, despite a decline in exploration activity in 2008–09, retained third place, with Western Australia fourth. Exploration for uranium is banned in NSW and Victoria (Table 1).

In terms of Australia's identified uranium resources, Western Australia has 6%, placing it after South Australia (77%) and Northern Territory (15%) but ahead of Queensland (2%). South Australia's large resource is predominantly from Olympic Dam — the largest uranium deposit in the world (Table 2). According to Geoscience Australia (2009), Australia has 38% of the world's low-cost uranium (reasonably assured resources recoverable at less than US$80/kg U), but produced only 19% of the world's uranium during 2008. Australia, including Western Australia, clearly has the potential to mine greater quantities of uranium.

Annual world uranium consumption is forecast to be about 78 000 t U_3O_8 in 2009, with annual uranium production of about 56 000 t U_3O_8 (Lampard, 2009). The shortfall is being met by production from decommissioned nuclear warheads, stockpiles, and reprocessing of spent fuel. The uranium spot price rose to over US$130/lb during the latter half of 2007; for many years it was between US$10 and US$15/lb. Currently it is about US$45 (December 2009), with long-term projections for a price of between US$70 and US$80/lb. This projected price rise takes into account both existing and planned construction of nuclear power reactors. There are 436 operational nuclear power plants, 43 under construction, 106 at an advanced stage of planning, and 266 are proposed (World Nuclear Association information as at January 2009, *in* Rio Tinto, 2009). This could lead to a shortage of uranium in the next decade.

Uranium was first discovered in Western Australia in 1910 associated with pegmatites in the Pilbara region, when the mineral's radium content was actively sought for its therapeutic properties (Carter, 1981). In the late 1940s to mid-1950s exploration was prompted by the demand for uranium for military purposes, but no significant Western Australian deposit was discovered. From the late 1960s to the 1970s uranium exploration increased due to the anticipated demand from nuclear power generation. With the introduction of airborne radiometric surveys, new deposits — particularly uraniferous calcrete drainage systems — were discovered, for instance the

Uranium

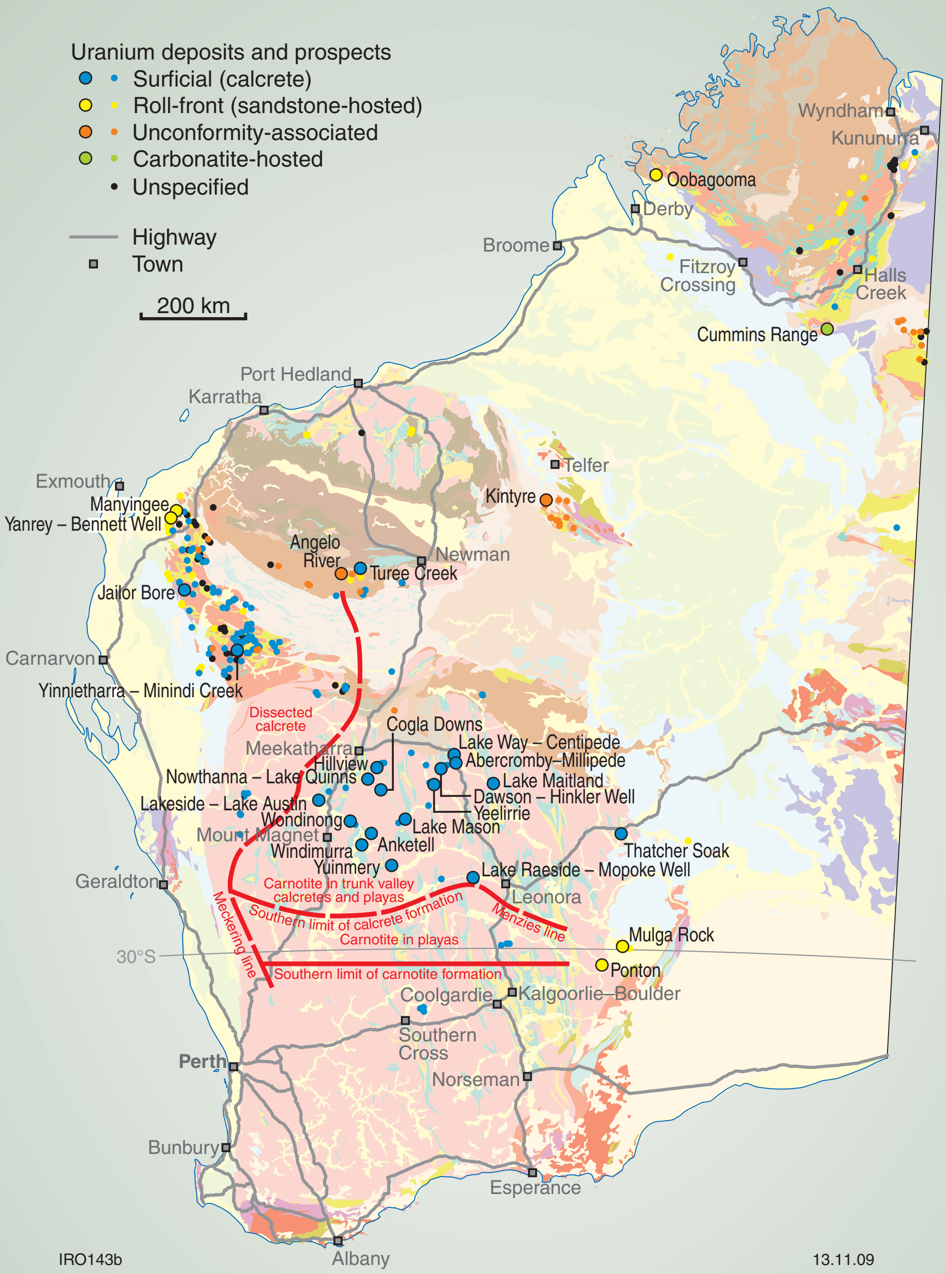

Figure 1. Uranium deposits and prospects in Western Australia

Yeelirrie deposit in the northern Yilgarn Craton. Between 1973 and 1979 and from 1984 to 2008 uranium exploration and mining developments were constrained by either Federal and State Government policies or low uranium prices.

Western Australian deposits

Uranium deposits are widespread in Western Australia: from the Proterozoic Halls Creek Orogen and Paleozoic Canning Basin in the Kimberley, to the Paleozoic Southern Carnarvon Basin and the Cainozoic paleodrainage systems overlying the northern Yilgarn Craton (Fig. 1) Western Australia is well endowed, and currently known resources are about 200 000 t U_3O_8 in 28 deposits.

The main uranium mineralization styles are: unconformity-associated (such as Kintyre), roll-front or sandstone-hosted (such as Mulga Rock, Manyingee, Oobagooma, and Ponton), and surficial or calcrete-hosted (such as Yeelirrie, Lake Maitland, Lake Way – Centipede, and Thatcher Soak). Styles of lesser importance are carbonatite-hosted (such as the Cummins Range deposit), pegmatite-hosted, and vein- and conglomerate-hosted prospects (Table 3). Australia is under-represented in several types of uranium deposits. Skirrow et al. (2009) noted that Australia has no giant uranium deposit hosted in sedimentary basins, nor, given the abundance of unusually uranium-rich igneous rocks in Australia (including Western Australia), does it have magmatic deposits directly related to magmatic processes. Skirrow et al. (2009) also highlighted the importance of understanding uranium mineral systems as a tool for targeting area selection for exploration: i.e. to understand key processes controlling where and how uranium is deposited. Using such a uranium systems-based approach, combined with empirical data, previously unrecognized uranium provinces or districts may be identified.

The A$80 million 'Exploration Incentive Scheme' (EIS) recently announced by the Western Australian Government will encourage exploration in Western Australia, particularly in under-explored ('greenfields') regions. Funded over five years beginning in 2008–09, EIS will stimulate increased private sector resource exploration and, together with the Australian Government's Onshore Energy Security Program of Geoscience Australia, will provide pre-competitive geoscientific data and new area selection concepts for the targeting of uranium mineralization.

The new Geoscience Australia radioelement map of Australia, produced from public-domain airborne radiometric surveys and adjusted to the International Atomic Energy Agency's Global Radioelement Data, provides a valuable exploration tool to identify potential uranium deposits (Wilford et al., 2009). For example, the U^2/Th ratio is clearly effective in separating the primary uranium in uranium-rich granites from secondary uranium in calcrete-hosted deposits (Wilford et al., 2009). This U^2/Th ratio is also useful for deposits of other styles, such as unconformity-associated and roll-front or sandstone-hosted, that are at or near the surface.

Unconformity-associated deposits

The Kintyre unconformity-associated uranium deposit was discovered by CRA Exploration (now Rio Tinto) in 1985, when the first drillhole into the prospect intersected 77 m of mineralization averaging 0.25% U_3O_8 (McKay and Miezitis, 2001). Kintyre is similar to the Proterozoic Ranger and Jabiluka deposits in the Northern Territory.

The Kintyre deposit is hosted by metasedimentary rocks of the Yandagooge Formation in the Rudall Complex (of the Paterson Orogen) adjacent to the unconformity with the Neoproterozoic Coolbro Sandstone (Jackson and Andrew, 1990; Hickman and Clark, 1994; Ferguson et al., 2005). The favourable lithologies for mineralization are interbedded chlorite schist and chert, with uranium present as pitchblende within a system of narrow, closely spaced veins (Jackson and Andrew, 1990). Associated with the pitchblende veins are minor amounts of bismuth, bismuthinite, chalcopyrite, bornite, galena, and gold (Jackson and Andrew, 1990). The main gangue minerals are chlorite, dolomite, ankerite, and calcite. Within the metasedimentary rocks enclosing the ore zones chlorite alteration is widespread, and cherts are red to brown in colour due to the presence of hematite (Jackson and Andrew, 1990). In section, the Kintyre deposit is a shallow-dipping lens with a maximum depth of 150 m below the surface (Jackson and Andrew, 1990).

A number of areas of the State have potential for unconformity-associated uranium deposits. They include: other areas of the Rudall Complex, although access is restricted in the Rudall River National Park; the Turee Creek area, where unconformity-associated mineralization is associated with the unconformity between the Paleoproterozoic metasedimentary rocks of the

Uranium

Wyloo Group of the Ashburton Basin and the Mesoproterozoic Bresnahan Group (McKay and Miezitis, 2001); the unconformable contact between the Edmund and Collier Basins with the underlying basement, mainly the Gascoyne Province (Cooper et al.,1998); and the unconformity between the Kimberley Group sedimentary rocks and the deformed basement of the Lamboo Complex in the Halls Creek area (Hassan, 2000; McKay and Miezitis, 2001).

Roll-front deposits

Roll-front uranium is a type of sandstone-hosted uranium deposit that is crescent-shaped in cross section, with mineralization cutting across the sedimentary layering. Typically, sandstone-hosted deposits are contained in fluvial or marginal-marine sandstones that are medium- to coarse-grained, poorly sorted, and contain pyrite and organic matter, either as disseminations or lignite seams (McKay and Miezitis, 2001).

Roll-front deposits are formed at the interface between rocks or groundwater under reduced conditions and oxidized, uranium-enriched groundwater, thus marking the oxidation interface or redox boundary (McKay and Miezitis, 2001; Hou et al., 2007). Major deposits of this type include Manyingee, Oobagooma and, possibly, Mulga Rock.

Roll-front uranium deposits are present within Permian and Cretaceous sandstone formations

Table 3. Western Australia uranium deposits

Project name	Project owner	Ore (Mt @ kg/t)	Contained U_3O_8 (kt)
Yeelirrie	BHP Billiton	35.0 @ 1.50	52.5
Kintyre	Cameco, Mitsubishi	23.3 @ 1.50	35.0
Mulga Rock	Energy and Minerals Australia	44.6 @ 0.56	24.8
Lake Maitland	Mega Uranium, Itochu Corp Japan, Australia Uranium Resources Development Co.	31.2 @ 0.36	11.4
Lake Way – Centipede	Toro Energy	20.2 @ 0.55	11.1
Manyingee	Paladin Energy	13.4 @ 0.8	10.7
Oobagooma	Paladin Energy	8.3 @ 1.2	10
Ponton	Manhattan Corporation, Deep Yellow	16.0 @ 0.31	5
Thatcher Soak (Uranex)	Uranex	17.0 @ 0.29	4.9
Hillview	Encounter Resources, Avoca Resources	27.6 @ 0.17	4.8
Dawson – Hinkler Well	U3O8	20.6 @ 0.23	4.7
Nowthanna – Lake Quinns	Impact Minerals	10.4 @ 0.45	4.7
Windimurra	Maximus Resources, Apex Minerals, Windimurra Resources	19.1 @ 0.18	3.5
Thatcher Soak (Eleckra)	Electra Mines	16.1 @ 0.17	2.8
Anketell	Energy Metals	16.3 @ 0.17	2.7
Abercromby – Millipede	Barrack, Norilsk/MPI	3.4 @ 0.66	2.3
Yanrey – Bennett Well	Cauldron Energy	7.3 @ 0.3	2.2
Lake Raeside – Mopoke Well	Energy Metals	7.0 @ 0.26	1.8
Lake Mason (Energy Metals)	Energy Metals	7.9 @ 0.17	1.3
Wondinong (Aura)	Aura Energy	6.5 @ 0.19	1.2
Lakeside – Lake Austin	Energy Metals	2.6 @ 0.32	0.8
Angelo River	Danny Smith	0.6 @ 1.24	0.8
Cummins Range	Navigator	3.6 @ 0.22	0.8
Jailor Bore	Matsa Resources, William Robert Richmond	1.4 @ 0.50	0.7
Yuinmery	Aldershot Resources	1.6 @ 0.37	0.6
Yinnietharra – Minindi Creek	U3O8	3.5 @ 0.12	0.4
Turee Creek	Aldershot Resources, Cameco	1.1 @ 0.35	0.4
Cogla Downs	Citic Nickel Australia	0.1 @ 0.78	0.1
Lake Raeside (Red Oak)	Red Oaks	0.1 @ 0.41	0.05
	TOTAL	**365.8**	**202.05**

Surficial (calcrete-hosted) Roll-front (sandstone hosted) Unconformity-associated Carbonatite-hosted of the Southern Carnarvon Basin, particularly adjacent to the Gascoyne Province. Discovered in 1974, the largest deposit is at Manyingee. It is in the Cretaceous fluviodeltaic Birdrong Sandstone, filling a paleochannel eroded in the basement granite with the uranium accumulated at a redox boundary in the sandstone (Brunt, 1990).

Located in the Canning Basin adjacent to the King Leopold Orogen, the Oobagooma deposit was discovered in 1983 and is hosted by the Lower Carboniferous Yampi Sandstone on the Lennard Shelf. Uranium mineralization at Oobagooma is in the form of uraninite and pitchblende and, as reported by Keats (1990), contains two mineralized levels, with the upper level containing higher grade zones in classic roll-fronts.

The Mulga Rock deposit, discovered in 1978, is hosted by organic-rich clay within a buried Eocene paleochannel along the southwestern margin of the Gunbarrel Basin. The paleochannel sediments overlie the Yilgarn Craton and the Albany–Fraser Orogen (Fulwood and Barwick, 1990). The uranium mineralization is the result of the absorption of uranium-bearing complexes by fine-grained carbonaceous sediments, and is spatially controlled by redox boundaries (Keats, 1990). Further research needs to be carried out on Mulga Rock as it is an unusual deposit and is the host for a variety of elements besides uranium.

Significant potential appears to exist for the discovery of new uranium deposits in the Canning Basin along the margin of the King Leopold Orogen, in the Carnarvon Basin adjoining the Gascoyne Province, and in the Gunbarrel Basin adjacent to the Yilgarn Craton.

Surficial uranium deposits

Surficial uranium deposits are surface or near-surface uranium concentrations in sediments or soils of Eocene to Recent age (Hou et al., 2007; McKay and Miezitis, 2007).

The most important type of surficial deposit is calcrete-hosted, the dominant type of mineralization with identified uranium resources in Western Australia (Fig. 2). Carnotite is the main uranium mineral in the calcrete. The term ‘calcrete’ is used for limestone (calcium and magnesium carbonate) deposits associated with valley-fill sediments in ancient valleys and existing trunk-drainage systems. The calcrete is typically interbedded with sand and clay. Calcrete occurrences are concentrated in the northeast of the Yilgarn Craton, north of the so-called ‘Menzies line’, which is an arbitrary line of separation between groundwaters of different compositions (Fig. 1). North of the line the groundwater is typically neutral to alkaline and less saline than groundwater south of the line. The calcrete has been eroded west of the ‘Meckering line’ (see Fig. 1) due to rejuvenated south- and west-flowing river systems (Butt et al., 1977).

Uranium enrichment takes place at the final stage of calcrete formation by the precipitation of carnotite. Occurrences are generally restricted to areas of granitic bedrock containing high background levels of uranium (‘hot’ granites). Western Australia has large areas of Archean and Proterozoic granitic and associated volcanic rocks known to have high background levels of uranium, i.e. >10 ppm U — 4 times average crustal abundance (Schofield, 2009). North of about latitude 30°S, but south of the ‘Menzies line’, carnotite mineralization is present within playa lakes without the development of calcrete.

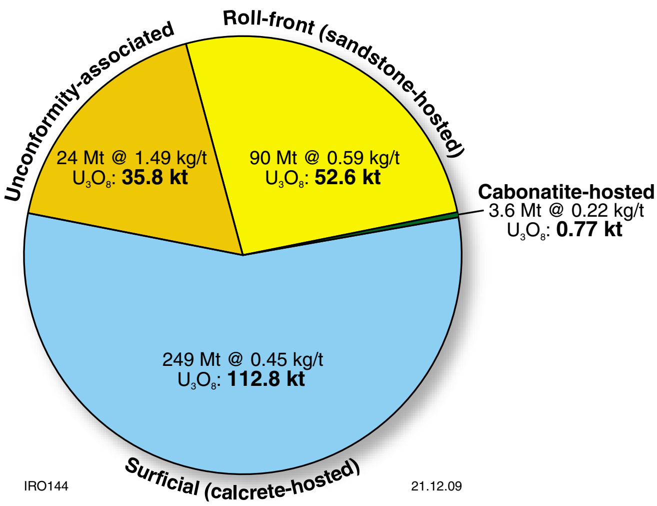

Figure 2. Resources and styles of uranium mineralization in Western Australia

Three types of calcrete-hosted mineralization have been documented by Butt et al. (1977):

a) trunk-valley calcrete, with mineralization in channels, platforms, and channel deltas;

b) playa lakes with near-surface gypsiferous and calcareous clays or carbonaceous sediments below the surface enriched in uranium; and

c) dissected calcrete containing uranium mineralization in terraces above the present watertable.

Uranium

Most of the calcrete-hosted uranium deposits were discovered in the late 1960s and early 1970s. Yeelirrie is the largest, containing an estimated 35 Mt indicated resource of uranium, with an average grade of 1.5 kg/t U_3O_8, to give a total of 52 000 t of contained U_3O_8: it is the State's largest uranium deposit. Other major calcrete-hosted uranium deposits include Lake Maitland, Lake Way – Centipede, Thatcher Soak, Hill View, Dawson – Hinkler Well, and Nowthanna – Lake Quinns.

Despite the number of calcrete-hosted deposits in the northern Yilgarn Craton, there is potential for further discoveries in this region, as well as in the Gascoyne Province and Ashburton Basin.

Carbonatite-hosted deposits

Carbonatite-hosted is another style of uranium mineralization with known resources. The Proterozoic Cummins Range carbonatite hosts rare earth oxide and phosphate mineralization with associated uranium (Andrews, 1990). The rare earth oxide mineralization was discovered in the late 1970s (Andrews, 1990). However, recent exploration has highlighted the significant uranium potential of this unusual intrusion (Navigator Resources Ltd, 2009).

Potential for other styles

Western Australia hosts a diverse and significant number of uranium deposits, but could there be other deposit types yet to be found?

Quartz-pebble conglomerate deposits make up a major proportion of the world's uranium resources. However, they are among the lowest grade deposits mined, with grades as low as 0.01% U_3O_8. Major examples are the Elliot Lake deposits in Ontario, Canada and the Witwatersrand gold–uranium deposits in South Africa where uranium is recovered as a byproduct of gold mining. The uraninite-bearing conglomerates are highly pyritic and usually crop out around the edges of Archean and Paleoproterozoic basin sequences.

Quartz-pebble conglomerates containing uranium (and gold) are known in Western Australia. In the Hamersley Basin several zones of low-grade uranium and gold mineralization are in Archean quartz-pebble conglomerate beds of the lower Fortescue Group. The Mesoarchean Lalla Rookh Sandstone of the Pilbara Craton also has exploration potential (McKay and Miezitis, 2007). In the Halls Creek Orogen low-grade uranium and gold mineralization is in quartz-pebble conglomerate of the Saunders Creek Formation. Another example is low-grade uranium mineralization intersected during exploration in quartz-pebble conglomerates in the Yerrida Basin. Thus, the Hamersley Basin, Halls Creek Orogen, and the Yerrida Basin all appear to be prospective areas to find quartz-pebble conglomerate uranium deposits.

Pegmatites in the Gascoyne Province host a multitude of uranium occurrences. Resources have not been estimated. For example, the Mortimer Hills uraninite-bearing pegmatite has been compared to the Rossing uranium deposit in Namibia, south west Africa, and the suggestion made that the region could be classed as a uranium province (Carter, 1984).

Resource development

Currently, four uranium projects are significantly advanced, with the proponents aiming to commence mining between 2012 and 2014.

Mega Uranium Ltd was granted a mining lease over the Lake Maitland deposit in October 2009 and is progressing definitive feasibility studies. Application for environmental assessment has been submitted to Commonwealth and State Governments with production planned to commence in 2012 (Mega Uranium Ltd, 2009).

Toro Energy Ltd (2009) has indicated that it has completed an optimization study for the Lake Way – Centipede project and that a risk review will be completed prior to a bankable feasibility study. Applications for environmental assessment have been submitted to Commonwealth and State Governments, and first production is planned for 2012–13.

An openpit scoping study for mining the Ambassador orebody of the Mulga Rock project is in progress and environmental and heritage surveys are underway. Uranium production from Ambassador is targeted for 2013 (Energy and Minerals Australia Ltd, 2009).

Production from the Yeelirrie deposit is expected in 2014 and will be under the *Uranium (Yeelirrie) Agreement Act 1978*. This State Agreement is between the State and BHP Billiton (originally Western Mining Corporation) and permits BHPB to mine and treat uranium ore, and transport and ship uranium oxide concentrate (yellowcake) through a port or ports in Western Australia. However, the Government has stated that it will not permit the transport of uranium oxide concentrate through any residential area. As all ports with container facilities in Western Australia have adjacent residential developments, it is anticipated that the export of uranium oxide concentrate will be through either South Australia or the Northern Territory. BHPB is currently at the pre-feasibility stage and has recommenced drilling to confirm the resource. Community consultations are in progress, and investigations for the Environmental Impact Statement and options to export uranium oxide concentrate via established and approved routes from South Australia or the Northern Territory have commenced (BHP Billiton, 2009).

It is expected that other major deposits, such as Kintyre, Manyingee, and Oobagooma, will not be developed until after 2015.

Legislation

Uranium mining and export requires approval under both Commonwealth and State legislation. Besides the usual State mining requirements under the *Mining Act 1978*, *Mines Safety and Inspection Act 1994,* and the *Radiation Safety Act 1975*, approvals are required under Australia's *Environmental Protection and Biodiversity Conservation Act 1999*, the *Nuclear Non-Proliferation (Safeguards) Act 1987*, and the *Radiation Protection and Nuclear Safety Act 1998*. Under the Customs (Prohibited Exports) Regulations of the *Customs Act 1901*, an export licence is necessary for the export of radioactive material and the transport of uranium must be conducted in accordance with the Commonwealth Radiation Protection and Control (Transport of Radioactive Substances) Regulations.

The requirements for approval need to address actual risks, while taking into account community concerns, and cover exploration and mining, the transportation of uranium concentrate or yellowcake, the management of waste material from the mining operation, and export controls. Australia's uranium resources are strategic commodities that are treated differently from other minerals due to the risk of nuclear proliferation. The Customs (Prohibited Exports) Regulations 1958 require export approval by the Commonwealth Minister for Industry, Tourism and Resources. Exporting uranium can only take place if the uranium is solely used for peaceful, non-explosive purposes, it is exported only to countries that are party to the Non-Proliferation Treaty and have a bilateral safeguards agreement with Australia, and the countries are responsible for the management of waste produced from the use of Australian uranium.

Using best practice developed in other Australian jurisdictions, the Western Australian Department of Mines and Petroleum will ensure that all State and Federal approvals are integrated.

The approach being followed by the State Government is based on principles outlined by the Uranium Industry Framework Steering Group (Uranium Industry Framework, 2006).

Conclusion

Western Australia is entering a new era where a projected increase in demand for the State's widespread uranium resources coincides with encouragement of uranium mining by the State and Commonwealth governments. Currently, there are a number of projects at an advanced stage of planning and moving through the stringent approvals process to have uranium mining approved.

Despite the significant potential for new discoveries, exploration activity in the past has not reflected Western Australia's level of uranium prospectivity.

The release of new pre-competitive information over the coming years by both the Geological Survey of Western Australia and Geoscience Australia will assist in identifying areas of potential, particularly unconformity-associated and roll-front or sandstone-hosted deposit styles that are important producers elsewhere in Australia and overseas. With uranium mining now encouraged by the State Government, there is a new start for explorers and miners in Western Australia.

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