THE ASSOCIATION OF MINING AND EXPLORATION COMPANIES

SUBMISSION:

JOINT STANDING COMMITTEES ON TREATIES

Agreements Between Australia and the People's Republic of China on the Transfer and Cooperation in the Peaceful Uses of Nuclear Material

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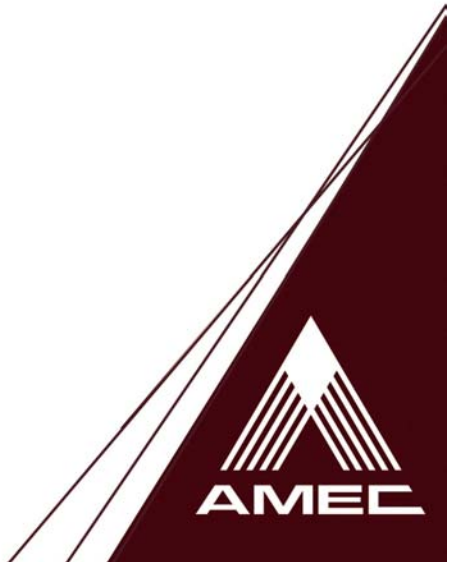
October 2006



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1.0 INTRODUCTION

The Association of Mining and Exploration Companies (AMEC) was formed in 1981 and represents Australia's junior to mid-tier mineral exploration and mining companies. It is regarded as the voice for mineral exploration in Australia.

Included in AMEC's membership are some 20 Australian companies actively exploring for uranium and /or mining uranium. This represents approximately 33% of companies known to be exploring for uranium in Australia and is the single largest grouping of uranium exploration companies within one representative membership.

AMEC's strategic objective is to secure an environment that fosters mineral exploration and mining in Australia in a commercially, politically, socially and environmentally responsible manner.

2.0 GLOBAL MARKET FOR URANIUM

2.1 GLOBAL DEMAND AND CHINA

As at December 2005 the International Atomic Energy Agency (IAEA) and the World Nuclear Association (WNA) reported there were 39 different countries where 675 nuclear reactors are either operating, under construction, planned or proposed. More accurately there were:

- 442 nuclear power plants operating globally. Of these, 10 are operating in China.
- 28 nuclear power plants under construction[1] of which 5 are within China.
- 52 nuclear power plants planned[2] of which 13 are planned by China.
- 153 nuclear power plants proposed[3] of which 50 are proposed by China (IAEA, 2006[a]; WNA, 2006).

To fuel the current operating nuclear power plants, approximately 65,478 tonnes of uranium will be needed in 2006. This facilitates a power generating capacity of 370 Gigawatts electric (GWe) from the existing operating plants that provide at least 16% of the base load electricity supply (on an aggregated basis) across 31 countries. After including all plants (ie operating, under construction, planned and proposed), the International Atomic Energy Agency estimates a growth in power generation capacity of some 75% to 640GWe by 2030 (IAEA, 2006[a]; WNA, 2006).

In summary, and based on the aforementioned information:

- Globally, nuclear power is widely implemented to generate base load electricity and 39 countries either use it or have formal plans to do so.
- China presently has 10 operating nuclear power reactors and intends an almost 7 fold increase to this number. Clearly, China's demand for uranium in the immediate and long term future will be significant.
- With some 39 countries competing in their demand for uranium, there are considerable challenges for countries, including China, to negotiate reliable supplies of uranium to fuel both existing and planned expansion of nuclear power generating capacity.

[1] 'Under construction' means the concrete for the reactor has been poured or major refurbishment underway.

[2] 'Planned' means approval and funding in place or construction commenced but suspended indefinitely.

[3] 'Proposed' means intended for construction but awaiting funding and/or approval.

2.2 GLOBAL SUPPLY OF URANIUM AND AUSTRALIA

As at 28 September 2006, the spot price for uranium was $US135/kgU (Boreham, 2006). Table 1 lists the world's Reasonably Assured Resources and Inferred Resources that can be mined for less than $US130/kgU (Uranium Information Centre (UIC), 2006).

TABLE 1: KNOWN RECOVERABLE URANIUM RESOURCES 2005

Country	Tonnes U	World %
Australia	1,143,000	24%
Kazakhstan	816,000	17%
Canada	444,000	9%
USA	342,000	7%
South Africa	341,000	7%
Namibia	282,000	6%
Brazil	279,000	6%
Niger	225,000	5%
Russian Fed.	172,000	4%
Uzbekistan	116,000	2%
Ukraine	90,000	2%
Jordan	79,000	2%
India	67,000	1%
China	60,000	1%
Other	287,000	6%
World Total	**4,743,000**	100%

Table 1 indicates that Australia possesses 24% of the worlds known recoverable reserves. However, not all these reserves are viewed as economically recoverable. The Federal Government department Geoscience Australia (GA) report that resources recoverable at less than $US40/kgU equate to Economic Demonstrated Resources (EDR) and, in this regard, **Australia possesses 36% of the worlds Economic Demonstrated Resources as at December 2005** (GA, 2006). However, this figure could be significantly higher. Due largely to Australia's regulatory and policy environment, little exploration for uranium was conducted within Australia between 1985 – 2005 and significant increases in Australia's resources could be expected from increased exploration activities.

Australia's resources are presently the lowest cost uranium resources in the world. The Minerals Council of Australia (MCA) report that **98% of Australia's Reasonably Assured Resources of uranium are EDR and recoverable at less than $40/kgU** (MCA, 2006).

Approximately 97% of Australia's uranium resources in EDR are located within six deposits:

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

Of the six deposits listed above, Olympic Dam and Ranger are in production, Kintyre and Yeerilee cannot be developed under current West Australian Government policy and Jabiluka's reserves will

require traditional owner approval before they can be developed. While not included in the above, there is one other operating mine (Beverley in South Australia) and one further mine (Honeymoon in South Australia) is cleared to commence construction having secured all government approvals.

World uranium mine production presently meets 65% of nuclear generator demand. The remaining requirements (some 35%) are met from three secondary sources (MCA, 2006) these being:

- Diluted weapons grade uranium makes up 17% of supply.
- Reprocessed uranium makes up 12% of supply.
- Mined stocks make up 6% supply.

Supplies from secondary sources are dwindling and the common consensus is that they will be almost entirely depleted by 2020. Evidence for this belief is founded in the following:

- Tenex (Russia's nuclear fuel exporter) has confirmed there will be no further selling of Russia's diluted weapons grade uranium (sometimes referred to as 'Highly Enriched Uranium') as from 2013.
- World uranium stocks have fallen from approximately 250kt U3O8 equivalent to 36kt as at December 2005 over a period of 20 years – an average of 10.7kt per annum.

As discussed earlier in this section, the spot price for uranium was $US135/kgU as at 28 September 2006. In less than 6 years, this spot price has experienced a 500% increase having risen from less than $US20/kgU in January 2001. Over same time frame, Australia's production and exports of uranium have almost doubled with the latter moving from 5,989 tonnes (in 2001/2002) to 11,489 tonnes in 2005/2006. Despite the increased exports, the price increase over the same time frame reflects a perceived widening in the supply-demand chain[4].

In summary then:

- Australia possesses 36%, ie the largest single source, of the world's lowest cost Economic Demonstrated Resources of uranium.
- Physical stocks and other secondary sources of world uranium are dwindling and existing mine production currently meets 65% of nuclear generator demand.
- International demand for uranium is increasing and appears likely to continue. Importantly, the number of China's nuclear power generators is planned to increase by almost 700% in the next 25 years.
- From an economic standpoint, Australia is well placed to negotiate agreements with China for the supply of uranium on terms that are commercially, politically, socially and environmentally attractive.

[4] The price increases may, at least in part, also be reflective of an overall increase in energy fuel prices.

3.0 AUSTRALIAN EXPORT POLICIES

3.1 EXPORT POLICIES AND USE OF AUSTRALIAN URANIUM

Nuclear power has been used for almost 50 years to produce electricity. In the past few years, Australia has provided some 20-22% of the uranium used for these purposes, and as a major supplier, Australia has had considerable influence in non-proliferation and the continued development of nuclear fuel safeguards.

Australia's uranium is exported exclusively for peaceful non-explosive purposes. As a condition to import uranium from Australia:

- Countries must have a bi-lateral agreement with Australia to cover Australian Obligated Nuclear Material (AONM). This agreement mandates that Australia's nuclear exports remain in exclusively peaceful use and may only be transferred to a State that also has a bi-lateral AONM agreement with Australia; and
- Non-nuclear weapon States must be a party to the International Atomic Energy Agency (IAEA) and have concluded a full scope Safeguards Agreement with the IAEA. These agreements apply to existing and future nuclear activities;
- Nuclear weapon States (such as China) must be a party to the Nuclear Non-Proliferation Treaty (NNPT).

With reference to AONM, and as noted above, bi-lateral agreements ensure Australia's nuclear material exports remain in exclusively peaceful use. This surety is facilitated by the practice of tracking quantities of uranium (exported by Australian exporters) under the principles of equivalence and proportionality:

- The principle of equivalence provides that, if an AONM loses its identity (because of mixing with other material during conversion or enrichment), an equal quantity of that mixed material is designated AONM. The principle does not permit substitution of lower quality material.
- The principle of proportionality provides that where AONM is mixed with other nuclear material and is then processed or irradiated, a corresponding proportion of the resulting material is to be regarded as AONM.

Each of Australia's bi-lateral Agreements is also supplemented by an Administrative Arrangement to ensure efficient and effective implementation of the bi-lateral Agreement. These provide for physical security arrangements and:

- Coverage of exported uranium by IAEA safeguards from the time they leave Australian ownership and continuation of this coverage for the life of the material or until it is legitimately removed from the safeguards.
- Fallback safeguards in the event that IAEA safeguards no longer apply.
- Australian consent prior to: (i) any enrichment beyond 20% of uranium 235; (ii) any reprocessing of AONM; and (iii) any transfer of AONM to a third party.

The safeguards attaching to NNPTs have also been complemented by Additional Protocol to strengthen the efficacy of the safeguards system. Australia signed and ratified the Additional Protocol in 1997 and appears to have been the first State to do so. China has also signed and ratified the Additional Protocol which, for China, came into force in 2002 (IAEA, 2006[b]).

In summary, Australia should continue to use its influence over non-proliferation and the continued development of nuclear fuel safeguards and no departure from these policies should be needed to negotiate satisfactory and responsible treaties with China.

3.2 TRANSPORT OF URANIUM

Since 1961 the IAEA has published regulations for the safe transport of nuclear materials. These regulations are recognised as the uniform safety requirements for both national and international transport.

IAEA regulations have been adopted in almost 60 countries as well by the International Civil Aviation Organisation and the International Maritime Organisation (Uranium Information Centre (UIC), 2005). The IAEA regularly revisits and, where necessary, revises regulations in order to ensure they are contemporary.

The primary objectives of the IAEA regulations are to protect people and the environment from radiation during the transport of radioactive material. The fundamental principle applied in the transport of radioactive material is that protection is attained by the design of the packaging irrespective of the manner in which it is transported.

Nuclear materials have been transported for well in excess of 40 years and some twenty million packages containing radioactive materials are now routinely transported (worldwide) annually. It is important to note that:

- Most transport of nuclear materials **is not related to the nuclear fuel cycle.** Rather it is transported for use in medicine, research, agriculture, non-destructive testing, manufacturing and minerals exploration.
- In the transport of nuclear materials, there is no recorded accident in which a container has been breached or leaked (UIC, 2005).

With respect to the nuclear fuel cycle, specialised facilities have been developed in various locations around the world to provide fuel cycle services. As a consequence, nuclear fuel cycle materials are transported to and from these facilities, are frequently international and transported by specialised transport companies.

Uranium oxide concentrate (or 'yellowcake') is generally transported from mines to conversion plants in 200 litre steel drums packed into normal shipping containers. This is barely radioactive and no radiation protection is required beyond ensuring the steel drums being clean and within a steel shipping container.

Following conversion, the uranium is in the form of uranium hexafluoride. Uranium hexafluoride is again barely radioactive but, due its significant chemical toxicity, is transported in special containers.

4.0 CONCLUDING COMMENTS

Nuclear power is a reality within the mix of energy options planned for and implemented globally. Opposition to its use typically focuses on matters pertaining to environmental concerns which, while laudable, are not supported by scientific evidence.

For example, the process of operating a nuclear power generator produces no CO_2. Even when analysing the entire nuclear chain (ie CO_2 emissions arising from mining, transport, construction of nuclear power plant, uranium enrichment and conversion into nuclear fuel) the use of nuclear power, from a CO_2 emission reduction perspective, is compelling.

As a case in point, the audited environmental product statement of Vattenfall Energy (a Swedish energy supplier) reports that over the entire nuclear power lifecycle (including decommissioning of plant and disposal of nuclear waste):

- The total amount of CO_2 emitted was 3.3grams per kW/hr of produced power.
- Using natural gas as a fuel source, Vattenfall Energy measured CO_2 emissions to be 400 grams per KW/hr power produced and, using coal, 700 grams per kW/hr power produced. In other words, **nuclear power generates less than one hundredth of the CO_2 generated by fossil-fuel based energy production**.
- Vattenfall Energy's nuclear plants emit less CO_2 than any of its other energy production mechanisms which included fossil fuel, hydro, wind, solar and biomass (NuclearInfo.Net, 2006).

Clearly, the exporting of uranium to countries that have implemented nuclear power is a significant step forward in addressing climate change and reducing CO_2 emissions globally. Similar evidence exists in regard to storage of nuclear waste and, despite the protestations of those opposing the use of uranium for nuclear energy, nuclear waste has been transported and stored safely for the past 30 years without incident.

At present there are 442 nuclear power plants operating globally of which 10 operate within China. Globally, a further 233 nuclear power plants are under construction, planned or proposed. Of these, some 68 pertain to China's needs meaning it is likely, *ceteris paribus*, to construct almost 30% of the world's new nuclear power stations over the next 25 years.

Australia possesses some 36% of the worlds' economic demonstrated resources and has a solid history in influencing both non-proliferation and the continued development of nuclear fuel safeguards. Consequently, even those who oppose nuclear power should acknowledge that:

- Nuclear energy in China is a reality. Therefore, the most responsible position Australia can adopt is to ensure it can influence where and how China sources its nuclear fuel and what safeguards are in place to secure non-proliferation and environmental protection.
- The negotiation and existence of treaties is the optimal method of securing the aforementioned influence. Given the strength of Australia's position, it should negotiate and establish treaties with China under terms that are commercially, politically, socially and environmentally attractive.

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