



# AN ILLUSION OF PROTECTION

Executive Summary

*The unavoidable  
limitations of safeguards  
on nuclear materials  
and the export of  
uranium to China*



MAPW



AUSTRALIAN  
CONSERVATION  
FOUNDATION



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uranium to China*

**A report prepared for the  
Australian Conservation  
Foundation and the Medical  
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The full report of  
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*The unavoidable limitations  
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is available at the  
ACF and MAPW websites:  
[www.acfonline.org.au](http://www.acfonline.org.au)  
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## Foreword

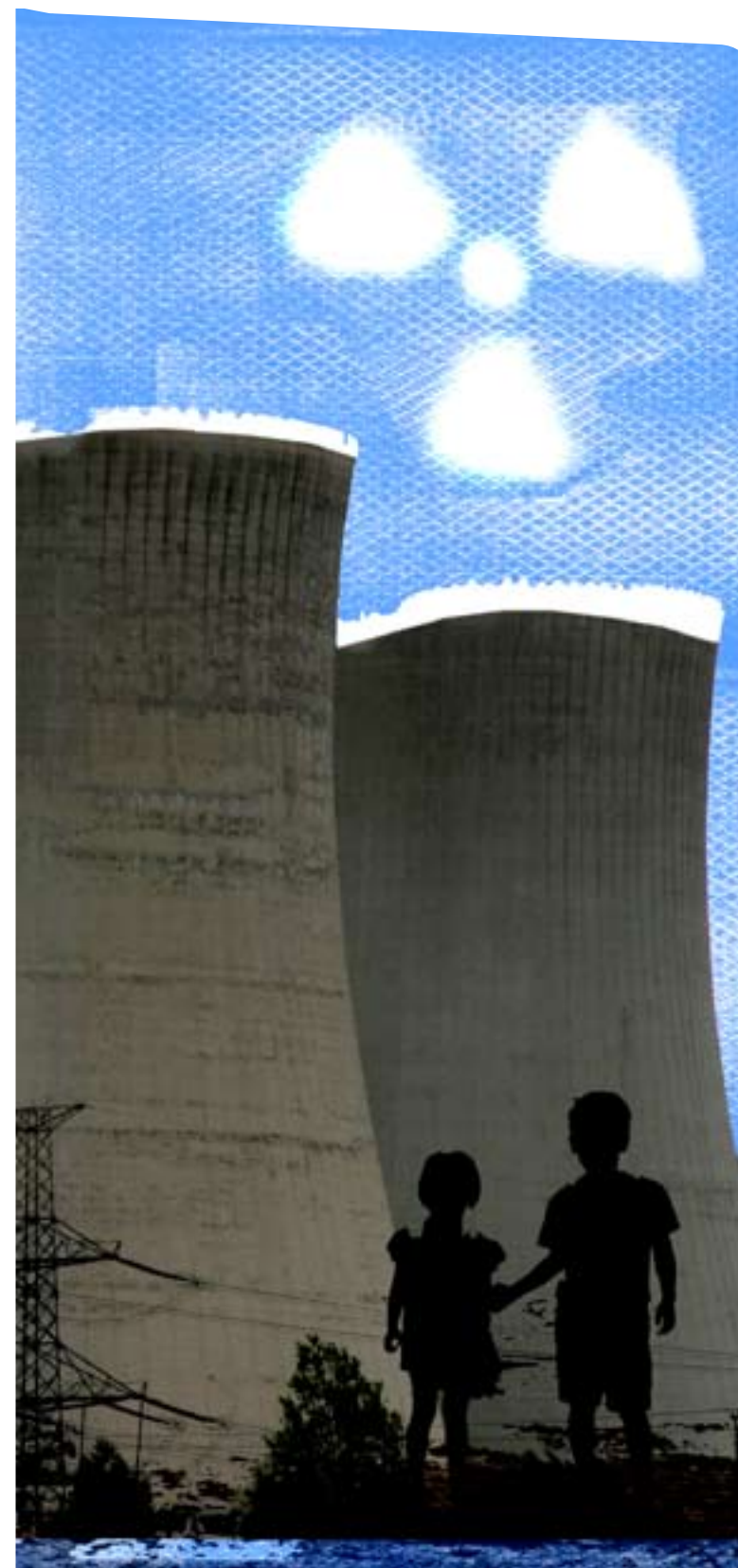


Image: Nuclear Future? Source: © Natalie Lowrey

*An Illusion of Protection* includes a critique of the international nuclear safeguards system. It deals in particular with the proposed sale of Australian uranium to China. The report is an extremely valuable and topical one. It comes at a time when the world is on the brink of a rapid expansion of the use of nuclear-power reactors for the generation of electricity. Exporters of uranium, of which Australia is one of the largest, have the power to determine the extent and nature of any nuclear renaissance.

The nuclear fuel for many of the new reactors will contain a mixture of uranium and plutonium dioxides. The plutonium could easily be chemically removed from the fuel and could be used, by governments or terrorist groups, to fabricate nuclear weapons.

Given the dire consequences that could follow a large expansion of the global use of nuclear power, uranium exporters have a special responsibility to consider whether they should continue to mine and trade in uranium. They should, above all, ask themselves: Will systems for the international control of nuclear materials, usually called nuclear safeguards, be adequate in tomorrow's world? The information in *An Illusion of Protection* will help them work out the answer. It should be read by all those involved in the uranium business and by all people interested in global security issues.

The concept of 'safeguards' dates back to November 1945, when the term was used in a document, called the "Three Nation Agreed Declaration" on international nuclear energy policy, by the American President and the Prime Ministers of Canada and the United Kingdom. In December 1953, US President Dwight Eisenhower, in a speech before the



United Nations, proposed, as part of his “Atoms for Peace” programme, the creation of a new International Atomic Energy Agency to take custody of nuclear material, ensure its safe keeping, and use it for peaceful purposes.

In 1954, the US started to enter into bilateral nuclear cooperation agreements with other countries. These agreements included provisions, called safeguards, by which the USA could be assured that nuclear material and technology it provided to other countries was not diverted to military use. At the same time, the US began negotiations to create the International Atomic Energy Agency (IAEA). The IAEA was given the authority to enter into safeguards agreements with individual nations to ensure that any nuclear materials, equipment or facilities offered up for inspections were not diverted to military purposes.

The non-nuclear-weapon parties to the NPT (defined as states that had not manufactured and detonated a nuclear device by 1 January 1967) have assumed obligations vis-à-vis the IAEA under safeguards agreements, which under the NPT itself they are obliged to conclude with the Agency.

As described in *An Illusion of Protection*, the goal of the IAEA is to verify that for a given period, “no significant quantity of nuclear material has been diverted or that no other items subject to safeguards have been misused by the State”. A ‘significant quantity’ is the amount of nuclear material for which “the possibility of manufacturing a nuclear explosive device cannot be excluded”.

For plutonium, a significant quantity is defined as eight kilograms; for highly enriched uranium (enriched to 20 per cent or more in the isotope uranium-235) it is defined as 25 kilograms; for low-enriched uranium (enriched to less than 20 per cent in uranium-235) it is 75 kilograms; and for uranium-233 it is 8 kilograms. The significant quantities are, on today’s standards, far too high. There is no difficulty in fabricating a nuclear weapon

with an explosive power equivalent to that of 20,000 tonnes of TNT using about 4 kilograms or less of suitable plutonium. A country with access to medium level technology could do so. A good designer could get an explosive power equivalent to that of about 1,000 tonnes of TNT with just one kilogram of such plutonium. To be credible, the ‘significant amounts’ used by the IAEA should be redefined and considerably reduced.

In the concept of IAEA safeguards, the timeliness of detection of the diversion of nuclear material from peaceful to military purposes is crucial. The Agency’s objective is defined as “the timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and deterrence of such diversion by the risk of early detection”.

The guidelines established for effective safeguards are that the diversion of a significant quantity should be detected, with a 90-95 per cent probability, within a ‘conversion time’ with a false-alarm rate of no more than 5 per cent. The concept of a conversion time is based on the time likely to be required to convert diverted fissile material into a form that could be used in a nuclear weapon.

The times are: for each of plutonium and highly-enriched uranium, 7-10 days; for plutonium in spent nuclear-reactor fuel, 1-3 months; for low-enriched and natural uranium 12 months; and for plutonium oxide 1-3 weeks. Again, on today’s standards these times are too long. In fact, the cases of Iraq, North Korea, and South Africa have put paid to the expectation of timely detection.

The fact is that the IAEA cannot ensure timely detection. If a country decided to divert plutonium or highly enriched uranium from its civil nuclear programme to fabricate nuclear weapons, it could assemble nuclear weapons very quickly. The country could first produce all the non-nuclear components

of nuclear weapons. The diverted fissile material could be fabricated into the nuclear components for the weapons and these components assembled into the weapons in a short time. The Agency’s timeliness goal is simply not attainable, even with the best will in the world. But undoubtedly the most serious problem facing a nuclear safeguard system is that the most sensitive plants so far as the diversion of weapon-usable materials - particularly plutonium reprocessing plants (in which plutonium is chemically separated from unused uranium and fission products in spent nuclear-power reactor fuel elements) – are impossible to safeguard effectively. Using existing and foreseeable safeguards technology, it is not possible for a safeguards agency to detect the diversion of quantities of weapon-usable plutonium from a reprocessing plant that could be used to fabricate one or more, or even many, nuclear weapons.

The IAEA was lulled into a false sense of security by the assumption that any clandestine programme to manufacture nuclear weapons could be detected at an early stage by national intelligence agencies, particularly by the use of satellite surveillance. The nuclear-weapon programmes of Iraq and North Korea showed that this assumption was false.

The truth is that international safeguards can only be effectively applied if the country concerned is not intent on violating its obligations under the NPT or its safeguards agreement with the Agency. In other words, safeguards depend on the country behaving lawfully. The IAEA cannot be expected to discover clandestine nuclear facilities - such as a relatively small hidden nuclear reactor and a small facility to separate plutonium from spent reactor fuel - in a country that deliberately sets out to deceive the Agency.

The results of IAEA safeguards inspections are kept closely guarded secrets. The ostensible reason is to protect sensitive commercial information. But the effect is to prevent commentators from judging the adequacy of

safeguards. As always, secrecy breeds suspicion. Making safeguards information publicly available would significantly improve the credibility of the international safeguards system.

*An Illusion of Protection* states that, “there is much that could be done to improve the international safeguards system, however its fundamental flaws and the pervasive interconnections between the civil and military application of nuclear technologies and materials mean that the most prudent and responsible position is to oppose the mining and export of uranium”. I agree entirely with this conclusion. The world would be a much safer place if the Australian government acted on this advice.

**FRANK BARNABY, BSc, MSc, PhD, DSc (Hon)**

Frank Barnaby is a nuclear physicist by training. He worked at the Atomic Weapons Research Establishment, Aldermaston (1951-57) and was on the Senior Scientific Staff of the Medical Research Council at University College, London (1957-67). He was the Executive Secretary of the Pugwash Conferences on Science and World Affairs (1967-70) and Director of SIPRI, the Stockholm International Peace Research Institute (1971-81). He was Professor at the Free University, Amsterdam (1981-85) and Visiting Professor, Stassen Chair, at the University of Minnesota (1985). He currently works for the Oxford Research Group on research into the civil and military uses of nuclear energy and the terrorist use of weapons of mass destruction. He has honorary doctorates in Science from the Free University, Amsterdam and the University of Southampton.

He is the author of many books including: **Man and the Atom** (Thames and Hudson, 1971); **The Nuclear Age** (MIT Press, 1974); **The Automated Battlefield** (Sidgwick and Jackson, 1987); **How Nuclear Weapons Spread** (Routledge, 1993); **The Invisible Bomb** (Tauris, 1989); **Instruments of Terror** (Vision Books, 1996); **How to Make a Nuclear Weapon and other Weapons of Mass Destruction** (Granta, 2004), and editor of **Plutonium and Security** (MacMillan, 1992).

He has published a number of research reports on civil and military nuclear issues, including reprocessing and mixed-oxide fuel plants, and was a co-author of the **International Mixed-Oxide Fuel Assessment Report** (1997).

The full report of **An Illusion of Protection: The unavoidable limitations of safeguards on nuclear materials and the export of uranium to China** is available at the ACF and MAPW websites: [www.acfonline.org.au](http://www.acfonline.org.au) and [www.mapw.org.au](http://www.mapw.org.au)



# Executive Summary

This report addresses the flaws and limitations of the international nuclear safeguards system with particular reference to the proposed sale of Australian uranium to China, a declared nuclear weapon state. The report highlights the limitations of the global nuclear safeguards regime, an issue of particular importance in the context of current moves to dramatically expand the Australian uranium industry.

The Medical Association for the Prevention of War and the Australian Conservation Foundation maintain that there is a serious and unavoidable risk that Australian uranium exports to China will directly or indirectly support Chinese nuclear weapons manufacture, and potentially nuclear weapons proliferation in other countries.

There is much that could be done to improve the international safeguards system, however its fundamental flaws and the pervasive interconnections between the civil and military applications of nuclear technologies and materials mean that the most prudent and responsible position is to phase out the mining and export of uranium.

Supporters of Australia’s uranium export industry claim that the safeguards applied to Australia’s uranium exports are the equal of, or better than, safeguards applied by other uranium exporting nations. This claim ignores the problem that all uranium-exporting nations are reliant on the inadequate and under-resourced safeguards system of the IAEA, and it cannot be credibly advanced to justify Australian uranium exports.

Claims that Australia would have no leverage in relation to international nuclear safeguards in the absence of a uranium export industry are false. Australia’s moral and political authority to actively pursue a strengthened non-proliferation and safeguards regime would be enhanced by such an approach.



**“No system of safeguards that can be devised will of itself provide an effective guarantee against production of atomic weapons by a nation bent on aggression.”**

Harry S Truman, CR Attlee & WL Mackenzie King.  
“Declaration on atomic bomb by President Truman and Prime Ministers Attlee and King.”  
15 Nov 1945.

Furthermore, non-nuclear and non-uranium exporting states can and do influence international safeguards through the Board of Governors of the International Atomic Energy Agency (IAEA) and by engagement with a range of other international fora and mechanisms.

## Abbreviations

AA	Administrative Arrangement
ACF	Australian Conservation Foundation
ANZUS	Australia, New Zealand, United States Security Treaty
AONM	Australian Obligated Nuclear Material
ASNM	Australian Sourced Nuclear Material
ASNO	Australian Safeguards and Non-Proliferation Office
ASO	Australian Safeguards Office
ASTEC	Australian Science and Technology Council
CTBT	Comprehensive Test Ban Treaty
FMCT	Fissile Material Cut-off Treaty
HEU	Highly Enriched Uranium
IAEA	International Atomic Energy Agency
ICBM	Intercontinental Ballistic Missile
LAO	Limited Attack Options
MAPW	Medical Association Prevention of War (Australia)
MBA	Material Balance Area
MC&A	Material Control and Accountancy
MIRV	Multiple Independently Targetable Re-entry Vehicles
NATO	North Atlantic Treaty Organisation
NWS	Nuclear Weapon State
NNWS	Non-Nuclear Weapon State
NPT	Nuclear Non-proliferation Treaty
NSA	Negative Security Assurance
NSPD	National Security Presidential Directive
NWS	Nuclear Weapons State
SIOP	Single Integrated Operational Plan
SIPRI	Stockholm International Peace Research Institute
SQ	Significant Quantities
VOA	Voluntary Offer Agreement
WMD	Weapons of Mass Destruction
WMDC	Weapons of Mass Destruction Commission



## A dose of reality on the IAEA and nuclear safeguards; IAEA Director-General Dr Mohamed ElBaradei

- “The IAEA’s Illicit Trafficking Database has, in the past decade, recorded more than 650 cases that involve efforts to smuggle such [nuclear and radioactive] materials.” <sup>(1)</sup>
- “Today, out of the 189 countries that are party to the NPT, 118 still do not have additional protocols in force.” <sup>(1)</sup>
- “IAEA verification today operates on an annual budget of about \$100 million – a budget comparable to that of a local police department. With these resources, we oversee approximately 900 nuclear facilities in 71 countries. When you consider our growing responsibilities – as well as the need to stay ahead of the game – we are clearly operating on a shoestring budget.” <sup>(1)</sup>
  - “... we are only as effective as we are allowed to be.” <sup>(1)</sup>
- “In specific cases of arms control, the Security Council’s efforts have not been very systematic or successful.” <sup>(1)</sup>
- “If a country with a full nuclear fuel cycle decides to break away from its non-proliferation commitments, a nuclear weapon could be only months away.” <sup>(2)</sup>
- “... the Agency’s legal authority to investigate possible parallel weaponisation activity is limited ...” <sup>(2)</sup>

## Regarding protecting nuclear material:

“... experts estimate that  
perhaps 50 per cent  
of the work has  
been completed.” <sup>(1)</sup>

“... We are in a race against time.” <sup>(2)</sup>

<sup>(1)</sup> Putting teeth in the nuclear non-proliferation and disarmament regime. 2006  
Karlsruhe Lecture, Karlsruhe, Germany, 25 March 2006

<sup>(2)</sup> Reflections on nuclear challenges today. Alistair Buchan Lecture,  
International Institute for Strategic Studies, London, UK 6 Dec 2005

These and other statements available at [www.iaea.org](http://www.iaea.org)

## Nuclear Weapons and Nuclear Proliferation

A strong nexus exists between the use of uranium for civil and military purposes. Nobel Prize winning physicist Hannes Alven described the peaceful and military atom as “Siamese twins”.

This link has resulted in the international community putting in place a non-proliferation regime that is meant to halt the spread of nuclear weapons and to provide a framework for disarmament by the nuclear weapons states. The key platform for this regime is the nuclear Non-Proliferation Treaty (NPT).

The NPT recognises two forms of state— Nuclear Weapon States (NWS) and Non-Nuclear Weapon States (NNWS). The treaty takes the form of a three-way bargain between these states. The Non-Nuclear Weapon States, in Articles I and II, agree not to acquire or manufacture nuclear weapons. In Article VI the Nuclear Weapon States pledge to work to eliminate their nuclear arsenals. As confirmed by the 1996 International Court of Justice Advisory Opinion, the obligation to achieve nuclear disarmament is legally binding. Article IV allows for the use of nuclear technologies for peaceful purposes and provides for international trade in nuclear materials and technology, subject to Articles I and II.

The integrity of the NPT regime itself is currently very fragile and indeed fractured. As the 2004 report of the UN Secretary-General’s High Level Panel on Threats, Challenges and Change noted, “We are approaching a point at which the erosion of the non-proliferation

regime could become irreversible and result in a cascade of proliferation”.

The underlying flaw in the regime lies in the consanguineous relationship between civil and military nuclear operations. Article IV enables a NNWS to acquire nuclear materials, technology and infrastructure. However, once such a nuclear capacity is realised the potential for NNWS to acquire nuclear weapons is inescapable. There are clear examples demonstrating that NNWS can become nuclear weapons capable relatively quickly. By legitimising and encouraging the expansion of nuclear fuel cycle capabilities around the world the NPT has the perverse effect of promoting the means for a cascade of proliferation.

The declared Nuclear Weapon States — the USA, Russia, the UK, China and France — are another part of the same problem. Their refusal to seriously pursue nuclear disarmament undermines the wider regime. In February 2004 the Director General of the International Atomic Energy Agency, Dr Mohamed ElBaradei, noted, “We must abandon the unworkable notion that it is morally reprehensible for some countries to pursue weapons of mass destruction yet morally acceptable for others to rely on them for security – indeed to continue to refine their capacities and postulate plans for their use”.

The June 2006 ‘Weapons of Terror’ report of the Weapons of Mass Destruction Commission (WMDC) chaired by Dr Hans Blix drew similar conclusions:

*The Commission rejects the suggestion that nuclear weapons in the hands of some pose no threat, while in the hands of others they place the world in mortal jeopardy. ...The three major challenges the world now confronts – existing weapons, further proliferation and terrorism – are interlinked politically and also practically: the larger the existing stocks, the greater the danger of leakage and misuse.”<sup>(1)</sup>*

<sup>(1)</sup> Weapons of Mass Destruction Commission final report, Weapons of Terror Stockholm, Sweden, 1 June 2006. [www.wmdcommission.org](http://www.wmdcommission.org) pp 60- 62.





Image: nuclear missile Source: shutterstock.com

**“The development of atomic energy for peaceful purposes and the development of atomic energy for bombs are in much of their course interchangeable and interdependent. ... Fear of such surprise violation of pledged word will surely break down any confidence in the pledged word of rival countries developing atomic energy if the treaty obligations and good faith of the nations are the only assurances upon which to rely.”**

Dean Acheson & David Lilienthal  
“A report on the international control of atomic energy.”  
16 March 1946

## International Safeguards System

The NPT system provides for the use of nuclear materials and technology in civil nuclear energy programs under a system of safeguards. These are supposed to provide assurance that nuclear materials and technology are not being diverted from civil to military uses. The IAEA administers this system, which does not seek to prevent diversion, merely to detect and deter diversion.

The safeguards system arises from Article III of the NPT. This requires that nuclear trade is to be conducted only when safeguards are in place, and requires NNWS to accept IAEA safeguards on their nuclear infrastructure. The NWS are not obliged to accept the same level of safeguards, and choose to which of their nuclear facilities safeguards will apply.

The IAEA system of safeguards relies upon three methods, known as material accountancy, containment and surveillance. Material accountancy is the primary method, with containment and surveillance being secondary or complementary methods. Material accountancy is essentially a book-keeping exercise to ensure that nuclear materials flowing through a safeguarded plant are not being diverted. On-site inspections are used to verify that nuclear materials stay within the production pipeline.

The details of the way in which the IAEA implements these safeguards in a given state and in a given facility is via subsidiary arrangements, in effect providing safeguards ‘action plans’. These are confidential

**“It is clear that no international safeguards system can physically prevent diversion or the setting up of an undeclared or clandestine nuclear programme.”**

IAEA  
“Against the Spread of Nuclear Weapons: IAEA Safeguards in the 1990s”, 1993.



Image: Nuclear Future? Source: © Natalie Lowrey

agreements between the IAEA and the safeguarded state; essentially action plans that provide the working details and institutional arrangements for how safeguards are implemented in practice. They are of first importance in any assessment of the effectiveness of safeguards in a given state or facility.

The Office of Technology Assessment of the United States Congress has demonstrated that the technical goals that the IAEA has set itself in relation to safeguards are faced with “unavoidable limitations”. This is because the IAEA system of safeguards is not able to meet the IAEA’s own criteria in relation to the detection of diversion of “significant quantities” of nuclear materials in a “timely fashion”. In addition, it is possible to develop a nuclear weapon with materials less than the significant quantity provided for by the IAEA.

Nuclear technology is progressing rapidly, making it easier to develop nuclear weapons. The IAEA system of already inadequate safeguards is lagging further behind the developing technology. One example of this can be seen with the laser enrichment of uranium. Traditionally uranium has been enriched in huge plants, which are easy

to detect. However, moves to develop laser enrichment, including the Australian-based Silex process, would not only make enrichment of uranium cheaper and easier, but at the same time make detection more difficult.

The ineffectiveness of the safeguards approach was recognised by former IAEA Director General Dr Hans Blix in the important Weapons of Mass Destruction Commission report (2006). It documents that Iraq, Libya and North Korea were all able to effectively hoodwink the IAEA while being NPT signatories.

Due to the inadequacy of the safeguards system, following the 1991 discovery of Iraq’s advanced nuclear weapons program, the international community put in place a series of *additional protocols* to enhance the safeguards regime. These are not a fundamental change in the safeguards system *per se*; they are merely add-ons to the traditional system. The additional protocols fail to address the fundamental limitations and flaws of the safeguards system, particularly the permissibility and indeed encouragement of the spread of nuclear facilities and materials.

# Australian Safeguards



Photo: Entrance to Olympic Dam uranium mine, South Australia Source: © Martin Wyness

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In the 1970s successive governments came under increasing pressure from mining corporations to allow the mining and export of Australian uranium. This became a major political issue and in 1974 the Whitlam government set up an inquiry chaired by Justice Russell Fox to examine the matter, a process continued by the Fraser government. The subsequent Fox Report was ambiguous and cautious about proceeding with the export of uranium. The report:

- stated that the major hazard of the nuclear industry was its unintentional contribution to, "an increased risk of nuclear war"
- recognised that the IAEA system of safeguards provided only "an illusion of protection"
- recognised that Article IV confers upon Australia no obligation to export uranium, contrary to the claims made by mining advocates.

In 1977 the Fraser government decided to allow uranium mining in Australia. The government stated that the decision

was made to strengthen the goal of non-proliferation and had nothing to do with commercial gain. It announced a system of bilateral safeguards that would regulate the export of Australian uranium. The main provisions were:

- the recipient state must pledge not to divert Australian uranium into military programs and to accept a number of safeguards provisions governing its use in a bilateral agreement
- uranium would only be sold to those States that are party to the NPT
- no enrichment of uranium to higher than 20% U-235 could occur without Australian consent
- Australia would need to give prior written consent for any reprocessing of nuclear material derived from the use of Australian uranium
- Australia would oppose the stockpiling of plutonium
- there would be no further transfer of Australian uranium or nuclear material derived from the use of Australian uranium without Australia's prior consent.

The history of Australian safeguards policy is one of progressive weakening of already inadequate provisions. An example is the Howard Government's exporting of uranium to Taiwan in the absence of a bilateral safeguards agreement and despite advice from the Department of Foreign Affairs and Trade that this could in no way meet the criteria of Australian safeguards policy. The Fox Report also recommended that Australian uranium should only be sold to a state that is party to the NPT — Taiwan is not a signatory to the NPT.

The Fraser Government watered down the Fox Report recommendations to allow the export of Australian uranium to France, a nuclear weapon state that only subsequently joined the NPT (in 1992) and has a strong link between its civil and military nuclear programs.

The prior written consent clause for reprocessing has also been watered down by a policy known as "programmatic consent". Programmatic consent means that Australia gives long-term consent to the reprocessing of spent fuel derived from the use of Australian uranium. This has led to the stockpiling of Australian-obligated plutonium in Japan and the European Union.

A 2003 Massachusetts Institute of Technology multi-disciplinary study on nuclear power recommended that, given the proliferation risk, there should be a global ban on the reprocessing of spent nuclear fuel. A supplier state of uranium, should it value non-proliferation, would refuse to supply uranium to any state that expresses an interest in developing a plutonium fuel cycle. There exists no record of Australia using its leverage as a supplier of uranium to strengthen safeguards.

Australia allows for the "flag-swapping" or "flag transferring" of Australian uranium. This makes accounting of Australian Obligated Nuclear Material (AONM) apply to an equivalent quantity and not to actual nuclear material of Australian origin (which is indistinguishable from uranium from anywhere else).

In essence Australia's system of safeguards is a book-keeping exercise that relies upon the importing state to adhere to the material accountancy system. This can be murky in the case of nuclear weapon states because of the clear and proven linkages between civil and military facilities, including in the USA where a power reactor is used to produce tritium for nuclear weapons.

Australia's Safeguards and Non-proliferation Office (ASNO) has no substantive verification capacity to add to limited IAEA safeguards. The government's Regulation Impact Statement for its two nuclear agreements with China foreshadows only that "...ASNO officials visit bilateral counterparts annually to reconcile nuclear material transfer reports in detail."<sup>[2]</sup>

[2] [www.aph.gov.au/house/committee/jsct/8august2006/index.htm](http://www.aph.gov.au/house/committee/jsct/8august2006/index.htm)



Photo: Uranium Street, Broken Hill, NSW Source: Friends of the Earth

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**"...the Nuclear Non-proliferation Treaty disintegrates before our very eyes ... the current non-proliferation regime is fundamentally fracturing. The consequences of the collapse of this regime for Australia are acute, including the outbreak of regional nuclear arms races in South Asia, North East Asia and possibly even South East Asia. The impact on Australia's long term national security interests is immense"**

Kevin Rudd, Shadow Minister for Foreign Affairs, Trade & International Security.  
"Leading, not following. The renewal of Australian middle power diplomacy." Sydney Institute, 19 Sep 2006.



# Non-proliferation and the Export of Uranium to China

In April 2006 Australia and the People's Republic of China signed two nuclear agreements. The first is a bilateral safeguards agreement that allows the export of Australian uranium to China. The second is a broader nuclear cooperation agreement.

The IAEA administers safeguards in China according to the provisions of a 1988 Voluntary Offer Agreement (VOA). The IAEA safeguards only three nuclear facilities in China - a nuclear power reactor, a uranium enrichment plant and a research reactor. Of these three facilities, only the power reactor actually has a safeguards action plan in force. The application of international safeguards to the Chinese nuclear industry is more symbolic than real and cannot deliver the required levels of transparency and certainty.

The bilateral agreement between Australia and China recognises that the 1988 agreement between Beijing and the IAEA provides the safeguard system to be applied to Australian uranium in the first instance. It will cover an equivalent amount rather than Australian uranium *per se*. In other words, Australian uranium can be used in Chinese nuclear weapons without breaching the agreement, despite statements to the contrary from the Australian Government.

The way in which the bilateral agreement is to be implemented is via an administrative arrangement - a detailed plan outlining how the safeguards are to work in relation to Australian uranium. The administrative agreement will be secret, will not be subject

to parliamentary approval (as its status is less than a treaty document), is subject to change at any time and is yet to be negotiated. Should the Australian Parliament ratify the bilateral safeguards agreement, it will lose effective oversight of ongoing negotiations between Canberra and Beijing.

The agreement allows for use of Australian derived nuclear materials in plutonium reprocessing plants. Currently no reprocessing plants are safeguarded in China. The IAEA global fuel cycle profile states that China currently has no reprocessing plant save for a pilot reprocessing facility. This refers only to the civil sector—reprocessing plants in China are associated with the Chinese nuclear weapons program.

China has an experimental fast breeder reactor outside Beijing where plutonium is used to make more plutonium, and is keen to develop a plutonium economy based on breeder reactors. This policy flows from an energy strategy that is designed to maximise China's autonomy in the global energy market. By enshrining its support for reprocessing of spent nuclear fuel to extract plutonium in the bilateral agreement, Australia undermines its declared commitment to nuclear non-proliferation.

Essential to the working of safeguards will be China's material accounting system for fissile materials. There are serious deficiencies in China's fissile material accounting system. A US analysis of the Chinese nuclear industry stated: "China may not even have

a precise inventory of the amount of nuclear materials in its facilities" and that "without this knowledge there is no way to detect the disappearance of any material". Furthermore, the study noted that it would seem that China's nuclear facilities have not been designed to measure the "amount of fissile materials accurately, easily and frequently".

If China does not have a precise inventory, it is simply not credible to accept the proposition that the Australian Government will be able to satisfactorily ensure material accountancy.

The bilateral agreement can be changed over time and does not actually lock China in to a system of safeguards over the thirty year life span of the agreement. On past experience, any change is likely to weaken rather than strengthen safeguards.

China currently relies heavily upon oil and coal for its energy needs. It is a net oil importer and its reliance upon Middle East oil is expected to grow rapidly. China is currently making large investments in oil and other resources in Iran and seeks to be as free as possible from outside (particularly US) interference in its energy and industrial policies.

Iran has an interest in nuclear power and technology and its nuclear compliance record is patchy. China's nuclear know-how is creating a strategic relationship that is problematic from a proliferation perspective as China may assist Iran, both overtly and covertly, in the development of its nuclear capabilities. China's poor record in fuelling nuclear weapons proliferation, most notably through export of nuclear weapons plans, highly-enriched uranium, plutonium production and reprocessing capacity to Pakistan, is cause for serious concern.

China's looming energy crisis means it is embarking on an ambitious expansion of its domestic nuclear industry. The World Nuclear Association estimates that based on the projected expansion targets, the annual amount of spent nuclear fuel arising from

China would be 600 tonnes in 2010 and 1000 tonnes in 2020, with the cumulative amounts increasing to 3800 tonnes and 12 300 tonnes respectively. These are sobering numbers. The large annual throughputs for reprocessing that could result from this magnify the inevitable safeguards measurement uncertainties.

Based on current plans, China cannot meet its ambitious nuclear plans by relying upon domestic sources of uranium. Australia has the largest reserves of economically recoverable uranium in the world. It is estimated that Australia will export several thousand tonnes of uranium per year to China. The large amounts of uranium to be exported, the large annual throughputs in reprocessing facilities, the limitations of safeguards and the long-term consent to reprocessing of Australian nuclear material, lead to the distinct possibility that China could divert fissile materials from civil to military programs.

A consistent non-proliferation policy would see Australia refuse to supply uranium to China, in the context of phasing out uranium mining and exports.



**"Reprocessing provides the strongest link between commercial nuclear power and proliferation."**

US Congress, Office of Technology Assessment Nuclear proliferation and safeguards. June 1977:12.



# The Balance of Leverage and Safeguards

China is Australia's second largest trading partner and as such holds significant leverage over the Australian government. In addition, it is expected that much of the proposed uranium supply from Australia to China would come from BHP Billiton's Olympic Dam mine in South Australia. BHP Billiton has become heavily reliant upon the Chinese market to sustain its record rates of profit. Commercial imperatives and a weak international safeguards regime combine to mean that Australia is in a weak negotiating position and will be unlikely to influence Chinese nuclear conduct.

The bilateral safeguards agreement with China is a living document that does not lock China over the life of the agreement to current safeguards policy. China's leverage over Canberra and BHP Billiton means that should the agreement be revised, it is likely to be in the direction of weakening of safeguards.

In addition, Australia's bilateral safeguards agreements lack enforceability and any degree of effective sanction for breaches, even if they could be detected and proven. Under Article XII of the Australia-China Transfer of Nuclear Material Agreement, the supplier has the right to suspend or cancel further transfers of nuclear material, to require corrective steps to be taken, and potentially require the return of nuclear material, for breaches of the agreement or IAEA safeguards. It is highly improbable that in reality Australia would be in a position to enforce anything further in response to an identified safeguards breach other than suspension of further supply; in effect closing the stable door after the horse has bolted.



Photos: BHP Billiton's Olympic Dam mine in South Australia Source: © Martin Wyness

**"We are approaching a point at which the erosion of the non-proliferation regime could become irreversible and result in a cascade of proliferation."**

High-level Panel on Threats, Challenges and Change.  
A more secure world: Our shared responsibility. Report to the Secretary-General. 30 Nov 2004:39

# Chinese Nuclear Modernisation and the Potential for Conflict



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The relatively low number of warheads in China's arsenal means Beijing maintains a policy of ambiguity in relation to fissile material production and its nuclear policies more broadly. This poses a problem for Australian safeguards because China would seek to maximise secrecy in relation to its nuclear potential. During the bilateral safeguards agreement talks the Australian Government unsuccessfully sought clarification from Beijing on this key issue.

China is currently engaged in a nuclear weapons modernisation program. Initially China was interested in replacing older missile systems for more modern designs but increasingly China has predictably become concerned about US plans to construct a ballistic missile defence system and to place other weapons in space, and is likely to increase its nuclear arsenal in response.

Current levels of military-grade plutonium create an upper bound on how many new warheads China can produce quickly. A US National Security Presidential Directive (NSDP 23) stipulates that as any state develops its response to the US missile defence system, the US will expand the system to meet the new challenge to its integrity. This means that should Beijing manufacture more warheads, the US will upgrade its missile defences. A likely scenario is that Beijing would manufacture more warheads in response to any US move. Such an escalation could propel a potential arms race and increase regional insecurity.

Such an arms race would take place in the context of the ongoing dispute regarding Taiwan. Recently the US military drew up formal plans (OPLAN5077) for a major military conflict with China that would include the use of nuclear weapons. Zhu Chenghu, a senior Chinese general responded to this development by warning that Beijing is ready to use nuclear weapons in response.

China does not have enough uranium to meet its civil and military plans simultaneously. This was made clear in a mining industry address given by Madame Fu Ying, the Chinese ambassador to Australia in Melbourne on 1 December 2005. Madame Fu indicated that while China has sufficient uranium reserves to support its nuclear weapons program it needed imports to meet power demands. At best, this means that the export of uranium to China will free up Chinese uranium for warhead modernisation. At worst, Australian uranium would be diverted directly to nuclear weapons production. Clearly neither outcome is in Australia's national interest or the wider interests of the region.



Image: children on beach Source: shutterstock.com



# Recommendations:

1. Australia should stop its contribution to the global nuclear chain by phasing out mining and export of uranium.

2. Australia should not export uranium to China. On such a serious matter as proliferation of nuclear weapons, China's poor non-proliferation record and lack of transparency – and indeed active contribution to horizontal nuclear proliferation – warrants the disqualification of China as an appropriate recipient of Australian uranium on these grounds alone.

3. Massive resources and government support in Australia and China, as elsewhere, should be directed as an urgent priority to research, development and deployment of safe and renewable sources of energy, in combination with improved efficiency of energy use; and not to nuclear power. China has made clear a substantial financial and planning commitment to developing renewable energy technologies over the coming decade, and should be encouraged to replace their plans for nuclear power with an expanded commitment to energy efficiency and deploying a mix of renewable energy sources.

4. IAEA safeguards should be strengthened through universal, mandatory and permanent application, including the full application of Additional Protocols, to Nuclear Weapon States including China, to the same degree as to Non-Nuclear Weapon States.

5. Australia should withdraw from agreement to export uranium to Taiwan and fully enforce and maintain restrictions against nuclear trade including uranium sales to any non-NPT signatory entities, including India, Pakistan and Israel.

6. Proposed administrative arrangements to enact the Australian bilateral

safeguards agreement with China should be made public and be subject to parliamentary scrutiny as part of the process of formal consideration of the proposed Nuclear Cooperation Treaty with China.

7. The Australian Government should withdraw consent in existing bilateral treaties, and not provide any future agreements or consent, including to China, for reprocessing of Australian Obligated Nuclear Materials or for any use of such materials in mixed oxide (MOX) or other plutonium-based fuels.

8. Australia should require verifiable cessation of production of missile material and support for a Fissile Material Cut-Off Treaty that prohibits reprocessing and the separation of weapons-usable fissile materials, from all countries with which Australia currently has bilateral nuclear cooperation agreements.

9. Application of IAEA safeguards should be extended to fully apply to mined uranium ores, to refined uranium oxides, to uranium hexafluoride and to uranium conversion facilities, prior to the stages of enrichment or fuel fabrication.

10. Australia should not enter into additional bilateral agreements allowing for conversion and enrichment of Australian uranium in countries, including China and India, where such safeguards arrangements are not in place.

11. Australia should withdraw uranium sales from all Nuclear Weapon States that have breached their non-proliferation obligations, or continue to fail to comply with their nuclear disarmament obligations under the Non-Proliferation Treaty, and that fail to ratify and abide by the Comprehensive Test Ban Treaty including verifiable closure of nuclear weapons testing facilities.

The full report of **An Illusion of Protection: The unavoidable limitations of safeguards on nuclear materials and the export of uranium to China** is available at the ACF and MAPW websites [www.acfonline.org.au](http://www.acfonline.org.au) and [www.mapw.org.au](http://www.mapw.org.au)



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MAPW

The Medical Association for Prevention of War (MAPW) Australia is a national organisation of health professionals dedicated to the prevention of armed conflict and the abolition of nuclear, biological and chemical weapons.

MAPW is affiliated with and shares the aims of the International Physicians for the Prevention of Nuclear War (IPPNW), an international federation with affiliates in 58 countries around the world. IPPNW was awarded the Nobel Peace Prize in 1985.

[www.mapw.org.au](http://www.mapw.org.au)



*“In the eight years I served  
in the White House, every  
weapons proliferation issue  
we faced was linked with a  
civilian reactor program.”*

Al Gore  
Guardian Weekly 2006;  
174 (25):17-18 (9-15 June 2006)



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