AUSTRALIAN SAFEGUARDS AND NON-PROLIFERATION OFFICE

ANNUAL REPORT 2005-2006

Director General ASNO

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Cover: Nuclear fuel cask with fuel elements (photo courtesy of INVAP)
Energy Resources of Australia's Uranium Mine, Northern Territory (photo courtesy of ERA)
Xanthates Plant at Coogee Chemicals Pty Ltd, Mt Isa, Queensland
Ammunition Technical Officers from the Directorate of Munitions Operations and Support demilitarising empty WWII 250lb chemical bombs (photo courtesy of Graphics/Guided Weapons Explosive Ordnance (GWEO), Defence Materiel Organisation)

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Australian Government

Australian Safeguards and Non-Proliferation Office

11 October 2006

The Hon. Alexander Downer MP
Minister for Foreign Affairs
Parliament House
CANBERRA ACT 2600

Dear Mr Downer

I submit my Annual Report on the operations of the Australian Safeguards and Non-Proliferation Office (ASNO) for the financial year ended 30 June 2006. This report is made in accordance with section 51 of the *Nuclear Non-Proliferation (Safeguards) Act 1987*, section 96 of the *Chemical Weapons (Prohibition) Act 1994* and section 71 of the *Comprehensive Nuclear-Test-Ban Treaty Act 1998*.

During the reporting period all relevant statutory and treaty requirements were met. In particular, all requirements were met under Australia's safeguards agreement with the International Atomic Energy Agency and under the Chemical Weapons Convention, and good progress was made with activities in anticipation of the entry-into-force of the Comprehensive Nuclear-Test-Ban Treaty. All Australian Obligated Nuclear Material was satisfactorily accounted for, and ASNO found no unauthorised use of nuclear materials or nuclear items in Australia.

As outlined in this Report, ASNO continued our major contribution to advancing Australia's interests in effective measures against the proliferation of weapons of mass destruction, through our activities at the domestic, regional and international levels, and through working closely with colleagues in the Department of Foreign Affairs and Trade in Canberra and Australia's diplomatic missions, and in other departments and agencies.

Yours sincerely
John Carlson

John Carlson
Director General

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Guide to the Report

This report complies with the formal reporting obligations of the Director General ASNO. It also provides an overview of ASNO's role and performance in supporting nuclear safeguards and the non-proliferation of weapons of mass destruction.

The report has five parts:

- a report by the Director General ASNO on key developments in 2005-06 and a preview of the year ahead
- a summary of current major issues
- a functional overview of ASNO, including its operating environment and outcomes-outputs structure—the first outcome demonstrates accountability to Government; the second outlines public outreach and education
- a report on ASNO's performance during 2005-06
- the key features of ASNO's corporate governance and the processes by which ASNO is directed, administered and held accountable.

Because ASNO is funded as a division of the Department of Foreign Affairs and Trade (DFAT), some mandatory annual report information for ASNO is incorporated in the DFAT Annual Report. This includes:

- financial statements
- corporate governance and accountability framework
- external scrutiny
- human resource management, including occupational health and safety
- asset management
- purchasing
- performance against the Commonwealth Disability Strategy
- advertising and market research
- ecologically sustainable development and environmental performance.

A checklist of information included against annual report requirements is set out in the Compliance Index (page 86).

Director General's Report

THE YEAR IN REVIEW

Nuclear Safeguards Developments

The International Non-Proliferation Environment

Nuclear proliferation has remained a significant concern for the international community during the year. The activities of Iran and the Democratic People's Republic of Korea (DPRK), in particular, continue to pose a major challenge to international security.

Iran's long history of safeguards violations, secrecy and obstruction led the International Atomic Energy Agency (IAEA) Board of Governors in November 2005 to determine that Iran was in non-compliance with its safeguards agreement. The United Nations Security Council then called for Iran to suspend its uranium enrichment activities and to engage in negotiations to resolve concerns about its nuclear program. However, at the time of writing this report Iran seemed determined to defy international opinion, and to continue with activities which could support the development of nuclear weapons.

Despite some optimism in mid-2005, efforts to deal with the DPRK's nuclear program have faltered with the stalling of the Six Party Talks. At the time of writing, there were concerns that the DPRK may be preparing for a nuclear test explosion.

Concern about the proliferation of sensitive nuclear technology—principally uranium enrichment and reprocessing—has stimulated debate on how to balance the aspirations of many states to benefit from the peaceful applications of nuclear energy, with preventing the spread of technologies that can underpin a nuclear weapons program. It is neither desirable nor necessary for every state with a nuclear power program to have uranium enrichment and reprocessing facilities, and for the majority of states such facilities do not make economic sense. A discussion of sensitive nuclear technologies can be found at page 8.

A major development is the Global Nuclear Energy Partnership (GNEP) initiative, launched by the United States in February 2006. GNEP is a cradle-to-grave approach to the nuclear fuel cycle, intended to reduce proliferation risks. GNEP has the potential to affect every aspect of the nuclear fuel cycle in the medium to long term. A discussion of GNEP can be found at page 11.

The United Kingdom, United States, Russia, France, Netherlands and Germany have initiated discussions on Reliable Access to Nuclear Fuel—a framework to guarantee the supply of nuclear fuel. This would be open to states which meet certain safeguards and non-proliferation criteria and which elect not to pursue sensitive fuel cycle activities but instead to obtain nuclear fuel on the international market. The guarantee could be invoked in the event of a fuel supply disruption that was not due to questions about a state's adherence to non-proliferation obligations and which could not be resolved through normal commercial or legal processes. In parallel activity, the G-8 (Group of Eight[1]) is exploring ways to similarly guarantee nuclear supply for states that forgo developing enrichment and reprocessing. Further, the Director General of the IAEA has made his own proposals for a nuclear fuel "bank" managed through the IAEA, again with the aim of guaranteeing nuclear supply to

1. Canada, France, Germany, Italy, Japan, Russia, UK and US.

countries in full compliance with their non-proliferation obligations and forgoing enrichment and reprocessing, if all other normal supply mechanisms have failed.

In February 2006 the United States and India released further details of the nuclear agreement announced in 2005. In May 2006 I visited New Delhi and Washington as part of a fact finding mission of senior officials dispatched by the Prime Minister. The mission had the benefit of comprehensive discussions with senior Indian officials and gained a much clearer understanding of India's perspective and the way the US-India agreement was intended to work. Many specifics remain to be developed, including the negotiation of a safeguards agreement between India and the IAEA. The US-India agreement is complex, and is seen by some as potentially damaging the non-proliferation regime. That said, steps by India to irreversibly place designated civil nuclear facilities under IAEA safeguards and align its export control policies and practices with international norms should be supported. While the Australian Government welcomes the US-India agreement, under Australia's current uranium export policy, Australian uranium cannot be supplied to India as it is not a party to the NPT. A discussion of the US-India agreement can be found at page 16.

For the first time in many years the Conference on Disarmament held substantive discussions on a possible Fissile Material Cut-Off Treaty (FMCT), and the United States tabled a draft treaty text in May. It is hoped renewed discussions will pave the way for negotiations to commence on an important, long overdue, non-proliferation instrument which has the potential to cap nuclear arsenals. A discussion of the FMCT can be found at page 19.

International Atomic Energy Agency (IAEA) Safeguards

Practical progress to strengthen the IAEA safeguards system has continued during the year. The number of states implementing the Additional Protocol, which gives the IAEA rights to additional information and increased access, has grown. At 30 June 2006 76 states[2] had an Additional Protocol in force. A further 38 states had Additional Protocols that had been signed or approved by the IAEA Board of Governors. Of the 63 non-nuclear-weapon states (NNWS) with significant nuclear activities party to the Non-Proliferation Treaty (NPT), 45 had an Additional Protocol in force. This is over 70% of all such states. Australia is strongly of the view that the Additional Protocol has become the *de facto* safeguards standard for NNWS, and we require adherence to the Additional Protocol as a condition for supplying uranium to such states.

Arising from implementation of the Additional Protocol, by the end of 2005 the IAEA had made whole-of-state evaluations for 24 states. The IAEA reported in its Safeguards Statement for 2005 that it had found no indication of diversion, or undeclared nuclear materials or activities in any of these states.

The Standing Advisory Group on Safeguards Implementation (SAGSI), which I chair, is an international group of experts advising the IAEA. During the year SAGSI continued its major contribution to developing new safeguards approaches and procedures needed to enhance the safeguards regime.

Australian Developments

At the request of China and Australia's uranium producers, the Government agreed to conclude a Nuclear Materials Transfer Agreement and a Nuclear Cooperation Agreement with China. I led the Australian side in the negotiation of these Agreements. The Agreements were signed by Mr Downer and China's Foreign Minister Mr Li Zhaoxing on 3 April 2006. Read and applied together, these two Agreements fully meet all of Australia's long-standing safeguards requirements. These Agreements will come into force when each

2. In addition AP measures are implemented in Taiwan.

country has completed its domestic ratification process. In Australia this involves Parliamentary and public scrutiny including review by the Joint Standing Committee on Treaties (JSCOT). This process is well advanced in Australia, and China has advised that its ratification processes are complete.

The year has seen a revival of the debate about the place of nuclear energy in Australia. There have been several developments in this regard. The House of Representatives Standing Committee on Industry and Resources has undertaken a study into the strategic importance of Australia's uranium resources. This Committee is due to report towards the end of 2006. The Minister for Industry, Tourism and Resources has established the Uranium Industry Framework to identify opportunities for, and impediments to, the further development of the Australian uranium mining industry. Given that Australia holds 36% of the world's low cost uranium and is set to become the world's largest uranium exporter, this is a significant exercise.

Finally, in May 2006 the Prime Minister commissioned a Taskforce "to undertake an objective, scientific and comprehensive review into uranium mining, processing and the contribution of nuclear energy in Australia in the longer term". The review is to consider economic, environmental, health, safety and proliferation issues relating to uranium mining and nuclear energy, including the potential for establishing nuclear energy and other steps in the nuclear fuel cycle in Australia, and the state of nuclear energy R&D in Australia. The Taskforce is to report by the end of 2006. ASNO has made submissions and provided briefings to all of these reviews.

In July 2005 the Diplomatic Conference on the Convention on the Physical Protection of Nuclear Material (CPPNM) successfully adopted an amendment to the Convention. The amendment will strengthen and broaden the CPPNM's coverage from international transport to domestic use, storage and transport. It will come into force when two-thirds of States Parties have ratified. This amendment is a significant achievement in which Australia played a vital part.

Mr Andrew Leask, Assistant Secretary ASNO, signs the CPPNM Amendment

One of the more demanding tasks undertaken by ASNO this year was approval of the Australian Nuclear Science and Technology Organisation's (ANSTO's) security system for the open pool light-water (OPAL) reactor. In this ASNO has worked closely with the Australian Security and Intelligence Organisation (ASIO) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The security system, designed to protect against theft and sabotage, will be world class for a facility of this type, incorporating features such as defence in depth and scalability—to deal with changing threats.

ASNO has worked with other key agencies to complete the Council of Australian Governments (COAG) review of hazardous goods—chemicals, biological agents and radiological materials—and which considered the regulation, reporting and security surrounding their storage, sale and handling. The aim of this review was to minimise the risk of these materials being used for terrorist purposes. The various reports are close to finalisation and at different stages of final consultation with States, industry and academia.

An important part of ASNO's work during the year has been to promote and strengthen the nuclear non-proliferation regime in Australia's region. This has focused on outreach for adherence to the IAEA's Additional Protocol, strengthening the security of nuclear material and facilities, and improving export control and counter proliferation measures. Details are included in the performance information element of this report. In the 2006 Budget ASNO was allocated an additional $1.4 million over four years to increase our efforts in the region countering nuclear terrorism by strengthening nuclear materials accountancy, safeguards and security, and the security of nuclear facilities. This is an extension of the work which ASNO has undertaken over the last 20 years through special programs and visits funded mostly by AusAID.

As I have reported over a number of years, Silex Systems Pty Ltd is an Australian company working at the cutting edge of laser uranium enrichment research. In mid 2006, the company entered into an agreement with the US company General Electric for the further development of the technology exclusively in the United States.

Chemical Weapons Convention Developments

Australia has intensified its involvement with the Organization for the Prohibition of Chemical Weapons (OPCW) by assuming the rotating CANZ[3] seat for a second four-year term on the OPCW Executive Council. This comes at an opportune time with the Chemical Weapons Convention (CWC) approaching its 10-year anniversary in 2007 and the second review conference in 2008.

Following the CWC's first review conference in 2003, States Parties agreed on two Action Plans to promote universality and full implementation of the Convention. In 2005 a target was set for 180 States Parties by the end of 2006 and full universalisation by 2007. Awareness-raising and outreach by the OPCW and States Parties has brought the total number of States Parties to 178. The prospect of full universalisation by 2007 is more remote. The Action Plan promoting full implementation of Article VII obligations by States Parties has focused on establishment of national authorities and enactment of implementing legislation. In response to this, ASNO has assisted the OPCW on CWC implementation outreach in Australia's region. A discussion on international implementation of the CWC is at page 20.

More needs to be done to achieve implementation of CWC requirements for destruction of chemical weapon (CW) stockpiles. The largest CW possessor states, the United States and Russia, have found it necessary to seek extensions (until 2012) in their programs for the destruction of their stockpiled chemical weapons. The Convention does not allow for any further extension beyond this date. In seeking this extension, the United States has cited technical problems, legal challenges, safety concerns and environmental strictures. It argues, not unreasonably, that the magnitude and complexity of the destruction issues were not understood in the early 1990s when the CWC was negotiated.

During the reporting period, the OPCW conducted two inspections of chemical facilities in Victoria, outside Melbourne. The facilities inspected were "other chemical production facilities" that produce discrete organic chemicals containing phosphorus, sulphur or fluorine. OPCW inspectors verified the accuracy of Australia's declared information and the absence of Schedule 1 chemicals (warfare agents) or activity.

3. Canada, Australia and New Zealand.

Comprehensive Nuclear-Test-Ban Treaty Developments

At 30 June 2006, 175 states had signed the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Regrettably, 10 of the 44 states which must ratify to trigger entry into force (EIF) have yet to do so, so EIF remains some way off.

In September 2005 the Minister for Foreign Affairs chaired a conference in New York on facilitating the entry into force of the CTBT. With that, Australia began a two year period as the co-ordinator of international efforts in this respect. Encouraging countries in Australia's region has been a particular focus of efforts to promote ratification. It was pleasing therefore that Vietnam lodged its instrument of ratification in March 2006—reducing to ten the number of ratifications required to trigger entry-into-force. ASNO assists DFAT in these tasks.

The Minister for Foreign Affairs, Mr Alexander Downer, chairs the Article XIV Conference in New York in September 2005 to facilitate the entry into force of the CTBT (photo courtesy of CTBTO)

This year the CTBT Organization's Provisional Technical Secretariat (PTS) certified three more of Australia's International Monitoring System (IMS) stations as meeting Treaty requirements. Of Australia's 21 IMS facilities 16 have now been certified and one more is operational. The remaining four stations are yet to be installed, in remote locations—Antarctica, Macquarie Island and the Cocos Islands.

Through ASNO, Australia is playing an important role developing tools for CTBT implementation and EIF. Given the Treaty requires verification arrangements to be operational at EIF, Mr Malcolm Coxhead, Head, CTBT Implementation Section, is leading international efforts to produce an operational manual for the conduct of On-Site Inspections (OSI) under the CTBT. As an adjunct to this work, Mr Coxhead chaired additional discussions preparing a Test Manual for use and evaluation at a major inspection exercise to be held in Kazakhstan in 2008.

Following the Indian Ocean tsunami in late 2004, CTBT signatories have agreed to release IMS data, on a trial basis, to regional tsunami warning centres.

In providing strong support for development of CTBT verification mechanisms, ASNO organised three significant activities in Australia. First of all we hosted an OSI equipment testing activity in NSW at natural underground hollows or caves which are not dissimilar in character to those created during underground nuclear testing. We also convened a workshop on OSI. These activities brought together some 50 international and Australian

experts. The work tied in closely with development of the OSI operational manual. The third activity sought to train regional experts in making the best use of IMS data.

Mr Malcolm Coxhead, Head, CTBT Implementation Section (second from right) chairs discussions on On-site Inspections (OSI) at the CTBT PrepCom's technical working group (photo courtesy of the CTBTO)

Other Non-Proliferation Developments

Once again ASNO has made a strong contribution to the continuing effectiveness of the Australia Group (AG). Through chairing the important implementation meeting we were influential in achieving a number of key outcomes at the Plenary in 2006, where the AG added three biological agents to the control list along with certain types of corrosion-resistant chemical manufacturing equipment.

ASNO has been active across a range of tasks designed to counter terrorist activities and strengthen the international non-proliferation regimes. We have strengthened our permit systems and participated in various Government working groups and committees, including the CBRN Strategy Group. Arising from our close engagement over the last three years in the Biological Weapons Convention (BWC) meetings of experts we have been influential in developing Australia's objectives for the BWC review conference scheduled for late 2006. In association with this work, we participated in a study commissioned by the Department of Prime Minister and Cabinet on Ethical and Philosophical Considerations of the Dual-Use Dilemma in the Biological Sciences, being undertaken jointly by the Australian National University, the University of Melbourne and Charles Sturt University. During the year, we worked on non-proliferation issues with the Australian Vice-Chancellors' Committee and Sydney University.

THE YEAR AHEAD

Several important issues will drive ASNO's work in 2006-07.

Internationally we will work with allies and through the IAEA for a resolution of the Iranian nuclear issue. This is an important matter, with the future of the non-proliferation regime and regional and international stability at stake. The DPRK presents similar dangers. The role of the IAEA here is limited, however, and the Six Party Talks appear, at least for now, the only realistic avenue of negotiation outside the UN Security Council.

The United States-India nuclear agreement will move more to centre stage as it progresses through the US Congress, and as India and the IAEA develop a safeguards agreement for India's civil nuclear fuel cycle. The Nuclear Suppliers Group (NSG) will need to consider

how the rules for nuclear supply should apply in India's case. ASNO will contribute to developing Australia's position on the various issues involved.

Although Australia has a modest range of nuclear fuel cycle activities, it is about to commission an advanced research reactor and is set to become the world's largest uranium exporter. Over the next few years Australia might also elect to extend its fuel cycle. Certainly Australia would wish to maintain the controls which ensure that our uranium is used solely for peaceful, non-explosive purposes, and to sustain the nuclear non-proliferation regime which is vital to our national security. Consequently, international nuclear fuel cycle developments are of paramount interest to Australia. ASNO will be closely engaged in these issues. Particular aspects include the development of the GNEP initiative and the various ideas for fuel supply assurances.

Reflecting ASNO's expertise in nuclear fuel cycle issues, we will continue to contribute to Australia's nuclear debate, with particular emphasis on the Prime Minister's Uranium Mining, Processing and Nuclear Energy Review (UMPNER).

We will work to complete ratification of the nuclear agreements with China and to bring these into operation. Further, we will progress ratification of the amended CPPNM and its implementation in domestic law.

A high priority for us will be development and implementation of new programs to reduce the risk of nuclear terrorism in our region. We will further develop our activities, including the strengthening of ties amongst regional safeguards authorities and professionals.

We will pay special attention to the security system at the OPAL reactor during the commissioning phase and early part of its operational life in 2007.

We will be working towards commencement of negotiations for a Fissile Material Cut-Off Treaty.

As we approach the 10-year anniversary of the Chemical Weapons Convention in 2007 and the second review conference in 2008, much effort will be devoted in the coming year to preparations for both occasions. Australia's seat on the Executive Council, due to rotate to Canada in 2010, provides the opportunity to more actively engage in and contribute to international efforts to progress outstanding verification issues in The Hague.

ASNO has a substantial national and international work program on CWC matters. Efforts to promote industry awareness of the CWC will be intensified. Assistance to regional countries with CWC implementation will remain a priority especially building on the positive achievements of the Action Plan on Article VII implementation that was commenced in 2003.

With respect to the Comprehensive Nuclear-Test-Ban Treaty, ASNO's contribution to long running efforts to negotiate procedures for the conduct of On-site Inspections (OSI) is expected to bear fruit in the coming year, through agreement on a "Test Manual" developed for use during a major inspection exercise. Agreement on a final operational manual for OSI will occur only after the CTBT enters into force.

Australia's role as coordinator of efforts to promote entry into force of the CTBT will continue during 2006-07, including through an informal Ministerial Meeting in New York in September 2006.

John Carlson
Director General ASNO

Current Topics

LIMITING THE SPREAD OF SENSITIVE NUCLEAR TECHNOLOGY

Nuclear energy as such—the use of reactors to generate electricity—does not present a proliferation risk. But nuclear energy requires fissile material, and the technologies used to produce fissile material for reactor fuel—uranium enrichment and reprocessing (plutonium separation)—can also be used to produce fissile material for nuclear weapons. Ensuring an effective non-proliferation regime requires effective control over these proliferation-sensitive technologies. This involves both technical and political challenges.

From the outset of the nuclear era—well before the development of the NPT—it was recognised that an effective non-proliferation regime required a limit to the number of countries that have enrichment and reprocessing capabilities. Today, in the light of recent developments, the need to limit the spread of sensitive technology is assuming increasing urgency.

When the NPT was negotiated it was envisaged that the nuclear-weapon states would provide enrichment and reprocessing services for the non-nuclear-weapon states. In fact this has happened—US, Russian, French and UK entities are the leading suppliers of fuel cycle services, on a commercial basis, to the world's civil nuclear industry. Further, in terms of the NPT itself the right to use nuclear energy is not unqualified, but is subject to the other provisions of the Treaty—including the commitment against seeking nuclear weapons and the commitment to place all nuclear material under IAEA safeguards. It is disturbing that the state most vociferous about its "right" under the NPT—Iran—has been selective in its observance of the Treaty's provisions.

Ultimately, the NPT is a treaty on **non-proliferation**, not technology acquisition. Since the NPT does not elaborate on the means of access to the benefits of nuclear energy, however, it is now apparent there is a need to develop an international framework to deal with the issues involved.

Highlighted by the Iranian situation, but underpinned by a broader concern, the international community has been looking at solutions to limit the spread of enrichment and reprocessing technologies.

The principal issues are:

- reducing the availability of sensitive nuclear technologies for misuse now or in the future
- ensuring that states with nuclear power programs have a secure and reliable supply of fuel without any need to develop national enrichment or reprocessing capabilities
- developing proliferation-resistant fuel cycle technologies.

Several proposals and initiatives to address these issues are currently under development, outlined in the following paragraphs.

IAEA

In 2003 IAEA Director General ElBaradei suggested there should be multilateral arrangements for enrichment, reprocessing and spent fuel storage and disposal. In 2004 he established a group of international experts to look at multilateral approaches to the nuclear fuel cycle. This group reported in February 2005, recommending greater transparency of nuclear supply arrangements, plus development of international supply guarantees. Further, it proposed that sensitive facilities be placed under multilateral control, including regional arrangements based on joint ownership, rights to product or co-management.

In June 2006, France, Germany, the Netherlands, Russia, the United Kingdom and the United States circulated a proposal to IAEA members entitled "Concept for a Multilateral Mechanism for Reliable Access to Nuclear Fuel". Their proposal focuses on assurances for reliable supply of enrichment services or enriched uranium, under a mechanism to be coordinated by the IAEA. These assurances would be available for states not pursuing national enrichment or reprocessing projects.

In September 2006, the IAEA will hold a meeting on a "New Framework for the Utilisation of Nuclear Energy in the 21st Century: Assurances of Supply and Non-Proliferation". The objective is to stimulate discussion on new approaches to the nuclear fuel cycle, with a view to developing the outlines of a "new framework" focusing, in the first instance, on assurances of supply of nuclear fuel for power reactors.

G-8

In 2004 the Group of Eight[4] Summit agreed that sensitive nuclear technologies would not be supplied to states that may seek to use them for weapons purposes, or allow them to fall into terrorist hands. The G-8 agreed that the export of such items should occur only pursuant to criteria consistent with global non-proliferation norms and to those states rigorously committed to these norms. These criteria are to be developed in the Nuclear Suppliers Group (NSG). The G-8 agreed not to inaugurate new initiatives involving transfer of enrichment and reprocessing technologies to additional states until these criteria have been established.

These decisions were re-affirmed by the G-8 Summits of 2005 and 2006.

Nuclear Suppliers Group

The NSG has been discussing possible criteria for supply of sensitive nuclear technologies but agreement has not yet been reached. Details are not publicly available, but an indicative list of possible criteria might include:

- the state's non-proliferation and safeguards record, including whether it has an Additional Protocol in place
- whether there is a clear rationale for the proposal in terms of energy requirements and economics
- whether the proposal is wholly national or involves others, e.g. through multination/regional arrangements
- whether the proposal has any implications for international/regional security and stability.

4. Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States.

Russia

In January 2006 President Putin proposed a global infrastructure that would give all interested countries equal access to nuclear energy, while stressing the need for full compliance with the requirements of the non-proliferation regime. He outlined a proposal to create a system of international centres providing nuclear fuel cycle services, including enrichment, on a non-discriminatory basis and under the control of the IAEA. As a first step, he stated that Russia was prepared to establish an international centre of this kind on its territory. President Putin also referred to the need to develop new fuel cycle technologies, and the need for international collaboration in this effort.

USA

In February 2004 President Bush proposed that NSG members should refuse to supply enrichment and reprocessing technology to any state that does not already possess full-scale functioning enrichment and reprocessing facilities. Also, he called on nuclear suppliers to ensure that states renouncing enrichment and reprocessing would have reliable access to fuel for civil reactors.

In September 2005 the United States announced the establishment of a nuclear fuel reserve, to be available for states that forgo establishing enrichment and reprocessing capabilities. Initially this reserve is based on the down-blending of 17.4 tonnes of excess HEU (highly enriched uranium), but additional quantities would be made available as required. Other suppliers were invited to join this initiative. The United States proposed that the IAEA would play an important role as facilitator of nuclear fuel supply.

Perhaps the most significant and far-reaching proposal is the Global Nuclear Energy Partnership (GNEP) announced by the United States in February 2006. This program encompasses elements of President Bush's 2004 proposal for assurance of access to nuclear fuel for reactors in states which forgo enrichment and reprocessing. GNEP also proposes spent fuel take-back, and the development of proliferation-resistant fuel cycle technologies.

The Way Ahead

Australia supports international efforts to strengthen controls on the spread of sensitive nuclear technology. In May 2005 at the NPT Review Conference the Minister for Foreign Affairs, Mr Downer, called for development of a new framework to limit the spread of sensitive nuclear technology while respecting the right to peaceful nuclear energy. Mr Downer said that such an approach could include: enhanced controls on the supply of sensitive nuclear technology; strengthened verification measures in states with such technologies; and internationally guaranteed measures to ensure reliable access to fuel for civil reactors by states that forgo enrichment and reprocessing.

It is likely that over the next few years these various proposals will be refined and coordinated into a consolidated program to both limit the spread of sensitive nuclear technology and to address the related issues of assurance of supply. To achieve these objectives, GNEP partners will have to develop a range of new fuel cycle technologies.

Most states in good non-proliferation standing are likely to support moves to ensure any further spread of sensitive nuclear technologies does not contribute to non-peaceful purposes. Nonetheless, states which secretly seek to possess the technology for nuclear

weapon programs, or wish to keep their options open for such programs in the future will resist any restrictive measures. Although some states will couch their arguments against limitations in terms of "inalienable" rights to nuclear energy, including the development of a complete nuclear fuel cycle, it must be remembered that NPT states have an obligation to prevent the spread of nuclear weapons. States that continue to seek sensitive nuclear technologies without clear energy or economic justification will be viewed, rightly, with suspicion by the international community.

GLOBAL NUCLEAR ENERGY PARTNERSHIP

The Global Nuclear Energy Partnership (GNEP) is a United States initiative announced by President Bush in February 2006, which seeks to bring together in a coherent program a number of technologies which have been under development in several countries (including Russia, France, Germany, United Kingdom, Japan, China, India as well as the United States) over a number of decades. Russia in particular has been developing the concept of a proliferation-resistant fast neutron reactor and advanced spent fuel treatment for some years (see ASNO's 1999-2000 Annual Report, page 68). GNEP is closely linked to the work of the Generation IV International Forum, an international collaborative program developing a new generation of power reactors.

The technological concepts underpinning GNEP are as follows:

- fast neutron reactors would be used for recycle of plutonium produced in spent fuel—thereby substantially improving the efficiency of uranium utilisation and substantially reducing the quantity of high level waste (HLW) relative to the once-through cycle
- recycle would be undertaken using advanced spent fuel treatments that avoid production of separated plutonium, as with the currently-used "Purex" reprocessing technology. Instead, plutonium would remain in a mix with minor actinides (such as neptunium and americium) and some fission products. This mix would be fabricated as "fresh" fuel for fast neutron reactors. Such a mix could not be used in nuclear weapons, and the high radioactivity levels would ensure it is self-protecting against theft or other unauthorised handling
- including longer-lived radioactive materials from spent fuel in fast neutron reactor fuel enables these materials to be transmuted into much shorter-lived materials—reducing the period for which most of the HLW must be isolated from the environment from around 10,000 years to 300-500 years.[5]

A brief discussion of some of the technical issues involved with the use of fast neutron reactors and transmutation can be found in ASNO's Annual Report for 1999-2000 (pages 60-72).

GNEP promises important **non-proliferation** advantages. These include the development of proliferation-resistant technologies, thus enabling plutonium recycling without plutonium separation, and establishing a framework for limiting the spread of enrichment and reprocessing.

5. A very small proportion of the fission products, e.g. technetium-99 and iodine-129 (less than 1% of total fission products), will be difficult to transmute and would be separated for storage and later treatment.

GNEP also promises important **nuclear waste management** advantages, such as reducing the quantity of high level waste (HLW), and substantially reducing the period most HLW must be isolated from the environment.

GNEP is particularly significant in that the United States:

- now recognises that plutonium recycle offers advantages for efficient uranium utilisation and spent fuel management—reversing the Carter era commitment to the "once-through" fuel cycle
- is providing funding that will enable the US to take a technological lead
- is providing focus and leadership for international collaboration in developing advanced nuclear fuel cycle technologies.

GNEP is a long-term project, which has only recently been launched, so it can be expected to evolve considerably over time. Some of the GNEP technologies are already well established, others require major development. A timeframe for introduction of advanced spent fuel treatment, fast neutron reactors, and remotely handled fuel fabrication as envisaged under GNEP may be around 20-25 years.

As currently proposed, the principal institutional features of the GNEP initiative are as follows:

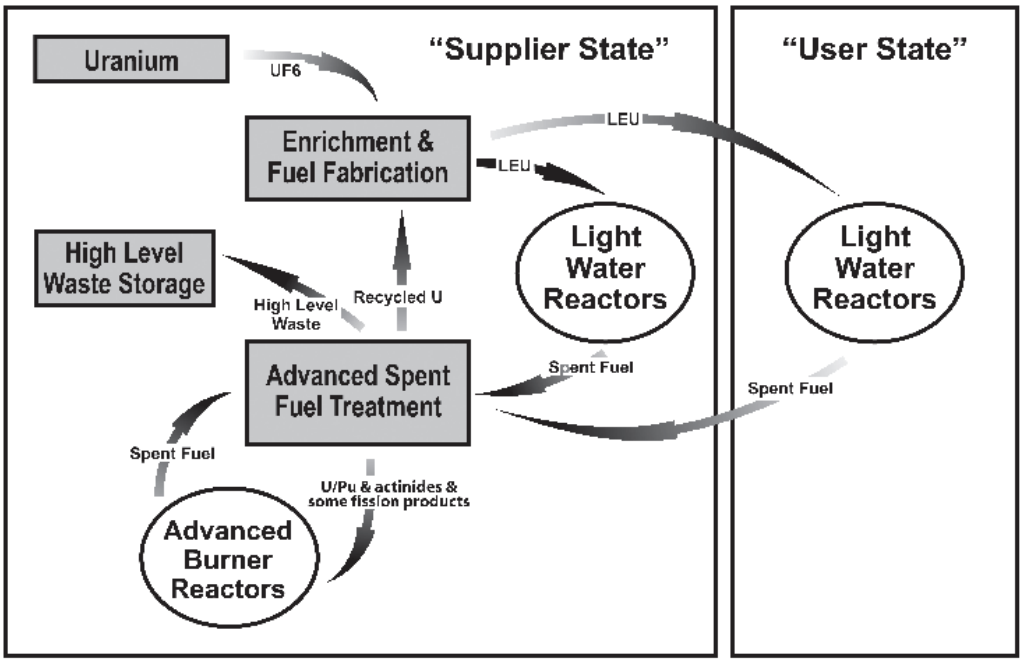
- "**fuel supplier nations**" would undertake to supply "**user nations**" with reactors, and to supply nuclear fuel on a "**cradle-to-grave**" basis. This would include **spent fuel take-back**—users could return spent fuel to a fuel supplier, who would recycle the fuel and treat the eventual HLW. It is most likely that HLW will be returned to the user eventually—but because of the reduced period that HLW would require isolation from the environment, it will be easier to manage than current forms of HLW. Instead of deep geologic disposal, above-ground storage and eventual near-surface burial could be satisfactory—most countries with nuclear power programs should be readily able to manage their HLW
- "user nations" would be given assurances of supply for power reactors and fuel. GNEP envisages that users will operate mainly conventional light water reactors (LWRs), will obtain low enriched uranium (LEU) fuel from a supplier nation, and return the spent fuel to a supplier nation (not necessarily the original supplier). Thus user nations would not need to develop national enrichment or reprocessing capabilities—and would be given a major incentive not to do so
- fuel supplier nations would operate fast neutron reactors and advanced spent fuel treatment facilities, in order to recycle plutonium and to transmute longer-lived radioactive materials. Advanced spent fuel treatment differs from current reprocessing in that plutonium is not fully separated, but remains mixed with uranium and highly radioactive materials. Initially the US is considering using a modified aqueous process, "UREX +", but hopes to develop the more proliferation-resistant pyro-processing. As noted, if the longer-lived materials are transmuted this would reduce the period most HLW has to be isolated from the environment, from say 10,000 years to 300-500 years.

If the technologies proposed under GNEP are successfully established, GNEP would benefit non-proliferation objectives by limiting the spread of enrichment and reprocessing—that is, technologies that could be used for producing fissile material for nuclear weapons. GNEP would reduce holdings of plutonium-bearing spent fuel, and enable the use of plutonium

fuels—essential for efficient use of nuclear energy—without production of separated plutonium.

The basic GNEP concept is outlined in Figure 1.

Figure 1: Basic GNEP Concept



Implications of GNEP for Australia

GNEP is a profoundly important development that has the potential to affect every aspect of the nuclear fuel cycle in the medium to long term. ASNO is closely involved with analysis and advice concerning GNEP and its implications for Australia.

Australia has a close interest, as a major uranium supplier and a potential user of nuclear technology as well as from the perspective of strengthening the non-proliferation regime. The Prime Minister and the Minister for Foreign Affairs have registered with the US Administration Australia's wish to be consulted in the ongoing development of GNEP. US officials have commented that both Australia and Canada are likely to play a special role because they have the majority of the world's economically recoverable uranium reserves.

Some people have questioned whether as a uranium supplier Australia will be obliged to take back spent fuel. This concern is unfounded. The GNEP concept of spent fuel take-back applies to suppliers of fuel cycle services—enrichment and fuel fabrication—and even then not to every "supplier". It is not expected that Japan, for example, would take spent fuel from other countries. The specifics of spent fuel take-back would be a matter for negotiation in each case.

The point of spent fuel take-back is that those countries accepting spent fuel would be operating fast neutron reactors in order to recycle the spent fuel, transmuting long-lived

materials in the process. Australia has no power reactors, and is unlikely to have fast neutron reactors for some considerable time.

PROPOSALS FOR AUSTRALIA TO LEASE FUEL RODS

Is it necessary for Australia to establish the full fuel cycle to be a "responsible" uranium supplier?

There have been some suggestions that, in order to ensure effective control of Australian uranium exports and proper management of spent fuel, Australian uranium should be exported in the form of fuel assemblies, and Australia should require return of spent fuel—an approach described as "fuel rod leasing".

This suggestion is problematic on a number of grounds:

- it implies, incorrectly, that Australia's current safeguards arrangements are deficient
- it is unrealistic—it would not be practicable for Australia to manufacture fuel assemblies for all our uranium customers
- it fails to recognise major changes taking place on spent fuel management (see the discussion on GNEP, above).

Such a proposal would require that Australia establish the entire fuel cycle:

(a) at the "front end" of the fuel cycle, in addition to uranium mining:
  - uranium conversion
  - uranium enrichment
  - fuel fabrication.

(b) at the "back end" of the fuel cycle:
  - reprocessing (but see below)
  - fabrication of plutonium/uranium fuels
  - high level waste (HLW) treatment (vitrification or Synroc)
  - a HLW repository (and disposal of associated LLW and ILW)

or
  - spent fuel conditioning
  - a spent fuel repository.

Under a fuel leasing approach, all of these activities would have to be undertaken wholly in Australia, otherwise the rationale behind the proposal—that Australia should export all uranium in the form of fuel assemblies and require the return of spent fuel—would fail. Clearly the nature and scale of the activities would be very substantial. Putting aside policy considerations, there would be major practical issues of cost, infrastructure, availability of experienced workforce, substantial lead-times, and so on.

Fuel fabrication

Supply of fuel assemblies is a highly specialised operation. There is no standard fuel assembly, every reactor model requires a different type of assembly—and even for the same reactor model, there can be significant technical differences in fuel specification from one operator to another. A fuel fabricator requires safety certification for each type of assembly

from the authorities of each proposed user country, as well as the reactor manufacturer. Obtaining safety certification is a complex, time-consuming and expensive business.

Current Australian uranium customers operate as many as 60 different reactor models. While an Australian fabricator might establish a niche for a particular type of fuel assembly (e.g. if we were fabricating fuel for Australian reactors, it might be possible to also fabricate for others with the same reactor model), realistically Australia could not gain certification for more than a few of the reactor models used by our uranium customers. The more reactor models we attempted to cover, the more we would lose economies of scale—and as noted, the safety certification requirements would be considerable.

Spent fuel treatment

As discussed under GNEP, above, the approach to the "back end" of the fuel cycle is expected to undergo major change. For reasons of uranium sustainability and reduction of HLW, the "once-through" fuel cycle (where spent fuel is regarded as a waste material to be disposed of in repositories) is likely to be abandoned in favour of recycling.

Although these developments will take some time to come to fruition, the implications for the fuel leasing proposal are already apparent. Spent fuel would be a valuable energy resource, and the issue is how best to recycle this fuel. However, recycle should not proceed on the basis of conventional reprocessing and export of MOX fuel—this would run counter to the new fuel cycle concepts, particularly the objective of limiting reprocessing. Rather, countries handling spent fuel on behalf of others would need to operate advanced spent fuel treatment and fast neutron reactors—these technologies would be a major challenge for a country like Australia that presently has no nuclear power experience.

Conclusion

The only country to have practised something like "fuel leasing" was the former Soviet Union. The Soviet Union had the advantage of supplying the reactors as well as the fuel. The concept was practicable because the Soviet Union supplied standard model reactors and standard fuel assemblies—and safety certification was also in Soviet hands.

The proposal for Australia to lease fuel fails to address the real proliferation danger. Actual cases (Iraq, DPRK, Libya, Iran) show the danger lies, not with diversion of declared materials from safeguarded facilities, but with clandestine nuclear facilities and undeclared materials. IAEA safeguards have been demonstrated to be highly effective in deterring diversion of declared materials. Rather, the principal challenge for safeguards is detection of undeclared nuclear activities, particularly centrifuge enrichment plants.

The "cradle-to-grave" fuel management concept that is integral to GNEP is very different to the proposal for Australia to go it alone. GNEP is aimed, not at further strengthening safeguards against diversion of declared material, but at limiting the spread of enrichment and reprocessing to further countries (and at moving away from conventional reprocessing). Australia can contribute to the GNEP objectives without pursuing the vertical integration inherent in the suggestion that all fuel cycle services for Australian uranium should take place solely in Australia.

There is a need for clarity in assessing the case for nuclear development in Australia. The proposition for Australia to export all uranium as leased fuel assemblies is unrealistic and confuses the broader nuclear debate.

UNITED STATES-INDIA NUCLEAR AGREEMENT

On 18 July 2005, President Bush and Prime Minister Manmohan Singh made a Joint Statement that the United States and India would commence negotiations on a nuclear cooperation agreement. On 2 March 2006 the agreement was announced during President Bush's visit to India and some of the details have since been made public.

The Joint Statement recognised that India was ready to assume the same responsibilities and practices as other leading countries with advanced nuclear technology. The statement recognised, also, that India's nuclear program has both a military and civilian component. Both sides had agreed the purpose of the agreement was not to constrain India's strategic program—though the United States, rightly, does not acknowledge India as a nuclear-weapon state as defined by the NPT—but to enable full civil nuclear energy cooperation in order to enhance global energy and environmental security. Any cooperation was predicated on the assumption that it would not be diverted away from civilian purposes or transferred from India to a third country without safeguards.

India is a large democratic nation with strong economic growth. India has not contributed to proliferation by any other country, and is in the process of aligning its nuclear export controls with international norms, principally the NSG. Further, India has significantly upgraded its non-proliferation regulations through its Weapons of Mass Destruction Act of May 2005.

India has ambitious plans to expand its civil nuclear power program. Current nuclear power generation capacity is 2,770 MWe. By 2020 India plans to have installed a nuclear power capacity of 20,000 MWe. India has 14 small power reactors and one medium-sized reactor in commercial operation. Seven power reactors are under construction, one a Russian supplied pressurised light water reactor (PWR), the other six indigenous pressurised heavy water reactors (PHWR). Between 2010 and 2020, India projects construction of four 220 MWe PHWRs, ten 700 MWe PHWRs, three 500 MWe fast breeder reactors, and up to six 1000 MWe PWRs.

India has mastered the full nuclear fuel cycle, now with 4 of its 15 operational nuclear power plants under IAEA item-specific safeguards agreements (INFCIRC/66). For historic reasons relating to the almost parallel development of its civil and military nuclear programs, there are significant interdependencies between these two programs which will be a complicating factor when India comes to identify its civil nuclear facilities.

In broad terms, under this agreement the United States will, *inter alia*:

- seek agreement from Congress to adjust US laws and policies to achieve full civil nuclear energy cooperation
- work with friends and allies to adjust international regimes to enable full civil nuclear energy cooperation and trade with India
- consult with partners to consider India's participation in the International Thermonuclear Experimental Reactor (ITER)

- consult with other participants in the Generation-IV International Forum with a view to India's inclusion.

For its part, India will *inter alia*:

- identify and separate civil and military nuclear facilities and programs in a phased manner
- file a declaration regarding its civil facilities with the IAEA
- voluntarily place its civil nuclear facilities under IAEA safeguards in perpetuity
- sign and adhere to an Additional Protocol on strengthened safeguards with respect to civil facilities
- continue its unilateral moratorium on nuclear testing
- work with the US on a Fissile Material Cut-off Treaty.

The United States has made a commitment to the reliable supply of nuclear fuel to India. *Inter alia*, the United States has committed to work with friends and allies to adjust the practices of the Nuclear Suppliers Group to create the necessary conditions for India to obtain full access to the international fuel market, including reliable, uninterrupted and continual access to fuel supplies from firms in several nations.

India: Nuclear Separation Plan

India has stated its approach to the separation of civil nuclear facilities is guided by the following principles–the plan must be:

- credible, feasible and capable of implementation in a transparent manner
- consistent with the understandings of the 18 July Statement
- consistent with India's national security and R&D requirements as well as not prejudicial to the three-stage nuclear program in India
- cost effective in its implementation
- acceptable to Parliament and public opinion.

Based on these principles, India has said it will include in the civil list only those facilities offered for safeguards that, after separation, will no longer be engaged in activities of strategic significance:

- the overarching criterion would be a judgment whether subjecting a facility to IAEA safeguards would impact adversely on India's national security
- however, a facility will be excluded from the civil list if it is located in a larger hub of strategic significance, notwithstanding the fact that it may not be normally engaged in activities of strategic significance
- a civil facility would, therefore, be one that India has determined not to be relevant to its strategic program.

The total of *thermal* reactors in operation or currently under construction is 22–India has undertaken to place 14 of these under IAEA safeguards between 2006 and 2014. This will include the 4 reactors presently under safeguards. India will also place under safeguards all future civil reactors, both thermal and breeder–with the exception of the currently-operating prototype fast breeder reactor (FBR) and the 500 MWe FBR currently under construction.

IAEA Director General ElBaradei has welcomed the US-India nuclear agreement, saying (on 2 March 2006):

> "This agreement is an important step towards satisfying India's growing need for energy, including nuclear technology and fuel, as an engine for development. It will also bring India closer as an important partner in the non-proliferation regime. It is a milestone, timely for ongoing efforts to consolidate the non-proliferation regime, combat nuclear terrorism and strengthen nuclear safety", and
>
> "The agreement will assure India of reliable access to nuclear technology and nuclear fuel. It will also be a step forward towards universalisation of the international safeguards regime. This agreement will serve the interests of both India and the international community."

Necessary steps for implementation of the US-India agreement

The following steps are involved–the exact sequencing of events has not been agreed.

- Amendment of US legislation, to authorise the President to waive the application of certain requirements of the Atomic Energy Act 1954 to allow nuclear supply to India. This amendment is currently before Congress. Under the amendment, the President may waive the application of the Act on determination that:
  - India has provided the US and the IAEA with a credible plan for separating civil and military nuclear facilities and programs
  - a safeguards agreement has entered into force between India and the IAEA, applying safeguards to India's civil facilities
  - India and the IAEA are making satisfactory progress towards implementing an Additional Protocol that would apply to India's civil program
  - India is working with the US for conclusion of an FMCT
  - India is supporting international efforts to prevent the spread of enrichment and reprocessing technology
  - India is applying comprehensive export control legislation and is adhering to NSG and MTCR guidelines
  - supply to India by the US is consistent with US participation in the NSG.
- Conclusion of a nuclear cooperation agreement between the US and India. Negotiations have commenced, but cannot be concluded until US legislation has been amended.
- Conclusion of a safeguards agreement (and Additional Protocol) between India and the IAEA—consultations have commenced.
- Agreement within the NSG, either to make an exception to NSG conditions to allow nuclear supply to India, or change its conditions.

The Australian Government's views of the US-India agreement

The Australian Government welcomes the US-India agreement. In particular, the Government has taken into account the following factors: (a) the agreement strengthens the strategic relationship between the United States and India; (b) a substantial proportion of India's civilian nuclear facilities will be under international safeguards and subject to inspections by the IAEA; and (c) India, with a vast population and a rapidly growing economy, will have serious challenges in getting sufficient clean energy in the future.

Under Australia's current uranium export policy, Australian uranium cannot be supplied to India as it is not a party to the NPT. Mr Downer stated in Parliament on 28 March 2006 that "We have no current intentions to change our policy on uranium sales, but of course India's plan to bring its civil sector under IAEA safeguards is a matter of considerable interest to us."

FISSILE MATERIAL CUT-OFF TREATY

The Conference on Disarmament (CD) is the UN body responsible for the negotiation of international arms control agreements. The CD and its various predecessor organisations were responsible for the negotiation of the Nuclear Non-Proliferation Treaty, the Chemical Weapons Convention, the Biological and Toxin Weapons Convention and the Comprehensive Nuclear-Test-Ban Treaty. CD negotiations are undertaken on the basis of consensus decisions—in effect every CD member state has the right of veto.

There is consensus among CD members that the Fissile Material Cut-Off Treaty (FMCT)—under which further production of fissile material for nuclear weapons would be prohibited—is an appropriate topic for negotiation within the CD. Under the 1995 CD presidency of Canadian Ambassador Shannon a mandate for FMCT negotiation was agreed within the CD by consensus. The text of the "Shannon mandate" is as follows

> *1. The Conference on Disarmament decides to establish an ad hoc committee on a "ban on the production of fissile material for nuclear weapons or other nuclear explosive devices".*
>
> *2. The Conference directs the Ad Hoc Committee to negotiate a non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices.*
>
> *3. The Ad Hoc Committee will report to the Conference on Disarmament on the progress of its work before the conclusion of the 1995 session.*

Unfortunately some CD delegations have taken the position that progress on the FMCT must be tied to other arms control topics such as the Prevention of an Arms Race in Outer Space (PAROS) and Negative Security Assurances (NSAs). While there is consensus that the CD should discuss FMCT there is no consensus on PAROS or NSAs—as a consequence the CD has been unable to arrive at consensus on a program of work since 1994.

The Shannon mandate served as the basis for FMCT discussions within the CD until 2004, when the United States announced that it had concluded effective international verification of the FMCT was not realistically achievable and called for the negotiation of an FMCT without verification provisions.

Under the leadership of the Romanian presidency of the UN Conference on Disarmament (CD), a thematic week on the FMCT was conducted from 15 to 19 May 2006. The CD Presidency made a concerted effort to have an informed and active debate by encouraging CD member countries to include experts from capitals in their delegations. ASNO provided support for Australia's Geneva Mission by making available Mr Russell Leslie, Director, International Safeguards Section as part of Australia's delegation and by preparing a paper discussing the various FMCT related themes suggested by the CD Presidency.

The US Delegation introduced to the CD an amended form of the Shannon mandate and a draft FMCT text. However, there was insufficient opportunity to discuss the draft text in detail at this meeting.

The US delegation also expanded on its views that the FMCT would not be practicably verifiable. The key point was that verification measures similar to NPT safeguards could not provide the same level of assurance when applied in the FMCT context. For example, evidence of undeclared weapons-usable nuclear material in an NPT non-nuclear-weapon state would be definitive proof of non-compliance with safeguards obligations. Exactly the same type and quantity of material found in a nuclear-weapon state under the FMCT may or may not be indicative of non-compliance.

While the US point is technically valid, ASNO does not see this as an argument against the verifiability of the FMCT *per se*, it simply means that NPT measures and approaches are not directly applicable to a treaty that has qualitatively different verification objectives. ASNO has been working on a focussed model of FMCT verification for more than a decade and firmly believes that, in order to be effective, an FMCT will need to have a sound technical basis and be verifiable.

The United States-based Arms Control Association invited Mr John Carlson to contribute an article on this topic. The Association published this article in February 2005, under the title *Can a Fissile Material Cut-Off Treaty be Effectively Verified.*[6] In this article, Mr Carlson suggested that the issue of the practicability of verification needed to be separated from the basic issue of the need for the treaty. In line with the negotiation of the NPT—where the principal treaty with its political commitments was negotiated first, and the detailed model NPT safeguards agreement (IAEA document INFCIRC/153) was developed in subsequent technical negotiations—the principal FMCT text could be negotiated first, and the specifics of the verification regime could be left to subsequent technical negotiations.

Australia is strongly committed to pursuing a non-discriminatory and internationally verifiable FMCT as an important disarmament goal. We welcome the US decision to pursue negotiation of the principal treaty text without further delay. Australia will support this effort, on the basis that the development of appropriate verification arrangements would follow.

BANNING CHEMICAL WEAPONS – PROGRESS TO DATE

After more than twenty years of negotiation and preparation, the Chemical Weapons Convention (CWC) came into force on 29 April 1997. It was, and remains, the first international treaty to require the complete and verifiable elimination of an entire category of weapons of mass destruction. As we approach its tenth anniversary, it is timely to consider how well the CWC is serving the international community—and to ask how well the international community is serving the objectives of the Convention.

Universality

At 30 June 2006 the CWC has been signed and ratified by 178 countries, representing about 95% of the world's population and landmasses and 98% of all chemical industry. This has been a fine achievement. Universality may take a little longer though. While Burma is the

6. John Carlson; *Arms Control Today*; January/February 2005; pp.25-29. Also available at www.asno.dfat.gov.au.

only country in our region to remain outside the CWC, of particular concern is the non-participation by a small number of countries alleged to have CW programs and stockpiles including the DPRK and Syria.

Compliance with CWC provisions

States Parties to the CWC are required to prohibit production and use of chemical weapons (CW), destroy CW stockpiles and dismantle related capabilities within a specified timeframe, declare CW defensive research and dual-use chemical activities, and allow independent verification by the Organization for the Prohibition of Chemical Weapons (OPCW).

CW Destruction

A small number of States Parties, principally the United States, Russia and India, still have declared CW stockpiles. By June 2006, only about 19% of declared CW stockpiles (which totalled 71,000 tonnes) and 30% of the 8.6 million declared chemical munitions and containers have been verifiably destroyed. Only India is likely to complete destruction of its CW stockpile within the 10 years specified by the CWC.

The CWC does permit extension of this deadline by five years. The United States has acknowledged, however, that even a 2012 deadline may not be met due to technical, legal and environmental issues associated with its destruction activities. Russia trails further with only 3% of its 40,000 tonnes of CW destroyed to date.[7]

National implementation

Australia is one of a number of countries that established legal and administrative arrangements allowing it to fully implement CWC obligations on the day it entered into force. Not all parties to the Convention have done the same however. For example, by February 2006, only 35% of States Parties had adopted CWC implementing legislation covering all key aspects of the Convention.[8] While those countries with legislation in place included most with significant chemical industries, much remains to be done.

In the main, these compliance deficiencies reflect lack of national resources and priority rather than efforts to circumvent the CWC. The OPCW, assisted by Australia and others, has sought to address these issues through assistance, education and other outreach activities. The CWC Article VII Implementation Action Plan began in 2003. A recent 'Follow-Up Decision' extended the Action Plan and set revised deadlines.

States Parties that do have legal and administrative measures in place have done much to implement the CWC. At 30 June 2006, the number of industrial and research facilities declared pursuant to the CWC was 6,321. Australia declared about 45 of these. However, more needs to be done. Few States Parties have instituted robust systems to regulate and monitor international trade in CWC-scheduled chemicals, which is a major cause of discrepancies between national declarations.

7. Paul Walker and Janina de Guzman (Global Green USA), "SGP Issue Brief: Implementing Chemical Weapons Destruction In Russia," Annex 1, Strengthening the Global Partnership Website, http://www.sgpproject.org/publications/SGPIssueBrief/Annex%201.PDF.
8. Note by the Director General (EC-44/DG.6 dated 1 March 2006) Report to the Executive Council at its forty-fourth session on progress in implementing the decision on follow-up to the Article VII Plan of Action as of 15 February 2006.

On-site verification

By the end of June 2006, the OPCW had conducted 2,540 on-site verification inspections worldwide. Of these, 1,483 occurred at CW production, destruction or storage facilities. An additional 1,057 inspections occurred at 761 declared industrial and research facilities, to monitor activities involving dual-use industrial chemicals, and small quantities of CW agents for research and protective purposes. A key challenge to the effectiveness of this work is that some issues regarding verification have not yet been agreed by States Parties. One example is the need for a sound site selection methodology for inspection of the thousands of industry facilities that produce organic chemicals, but that may also be capable of producing CW agents or their precursor chemicals. A second example is the need to establish a low concentration threshold for declaration and inspection of some highly toxic chemicals. While some States Parties are voluntarily subjecting relevant facilities to verification, not all such facilities are being declared.

As the OPCW mandate to conduct routine inspections is limited to declared facilities, the non-submission or late submission of declarations has also affected CWC verification. Compliant States Parties are receiving more industry inspections than would be the case if all Article VI declarations were submitted in full and on time.

A separate concern is that verification tools such as clarification procedures and challenge inspection have never yet been used. The OPCW and some States Parties have staged exercises to test readiness of the OPCW to conduct challenge inspections and for States Parties to receive them. These tools will only have value, however, if they are used. Australia does not believe they should only be measures of last resort.

Conclusion

The greatest challenge to the overall effectiveness of the CWC is insufficient engagement and compliance by States Parties including through meeting CW destruction deadlines, implementing CWC obligations and in reaching agreement on certain industry verification issues. These problems are being addressed, although more slowly than was originally envisaged.

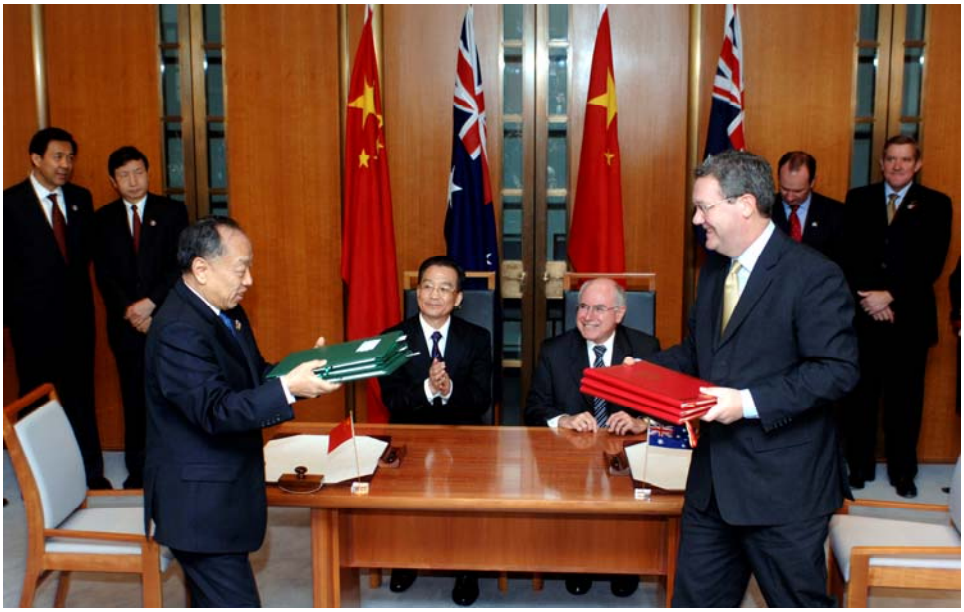
CHINA: SIGNATURE OF NUCLEAR AGREEMENTS

China is now the world's second largest consumer of energy after the United States. It continues to show strong economic growth and is the third largest export market for Australian raw materials, goods and services. Clearly it is in Australia's interests to maintain this expansion while simultaneously helping China manage greenhouse gas emissions and pollution.

At present China meets only about 2% of its electricity requirements from nuclear energy, the bulk (80%) coming from fossil fuels, principally coal. Recognising the competing challenges of economic growth, power demands and limiting greenhouse gas emissions, China has set a target of generating 40 GWe (gigawatts) of electricity by nuclear energy by 2020, roughly a four-fold increase in China's current nuclear generating capacity. To meet this goal, China will need to import uranium and, therefore, seeks long term, secure supplies of uranium to fuel its power reactors. Since Australia holds 36% of the world's low cost uranium reserves, it was only natural that China would turn to Australia to meet its future requirements. To produce 40 GWe of nuclear energy, China will require some 8,000 tonnes of uranium per annum by 2020, a quantity not far short of Australia's current annual production. International commercial practice would suggest that China might source up to about a third

of this requirement from a single supplier country. Australia can reasonably expect to supply about 2,500 tonnes a year, worth—at current spot market prices—around $250 million.

In 2004 China approached Australia requesting that we consider a nuclear safeguards agreement to allow the sale of uranium. Also at this time Australian uranium producers asked the Government to consider such an agreement. Australian and Chinese officials commenced informal discussions, and on 9 August 2005 Mr Downer announced the Government's decision to start formal negotiations with China. After this announcement, negotiations went smoothly in Canberra and Beijing, culminating in two complementary agreements, one covering transfer of nuclear material, and one covering nuclear cooperation. China had requested two agreements to reflect its internal responsibilities for treaty implementation. The agreements were signed by Mr Downer and China's Foreign Minister, Mr Li Zhaoxing, in Canberra on 3 April 2006.



The Chinese Minister of Foreign Affairs, Mr Li Zhaoxing, and the Minister for Foreign Affairs, Mr Alexander Downer, exchanging signed copies of the Australia/China nuclear agreements. Looking on are the Chinese Premier Mr Wen Jiabao and the Prime Minister, Mr John Howard (seated), the Chinese Minister of Commerce Mr Bo Xilai, and the Chairman of the Chinese National Development Reform Commission Mr Ma Kai (left), and the Deputy Prime Minister and Minister for Trade, Mr Mark Vaile, and Minister for Industry, Tourism and Resources, Mr Ian Macfarlane (right). Photo: AUSPIC

The two agreements completely meet all Australia's long-standing safeguards requirements, designed to ensure that any nuclear material, equipment or technology transferred between Australia and China will be used exclusively for peaceful, non-military purposes, and will not contribute to any military purpose. The agreements are fully consistent with Australia's other 20 safeguards agreements and consolidate Australia's position as a reliable, secure supplier of energy resources. Once both countries have completed their domestic ratification processes the agreements can enter into force, it is hoped by the end of 2006.

APPROVAL OF SECURITY FOR THE OPAL RESEARCH REACTOR

One of the more demanding tasks undertaken by ASNO this year was the assessment of the security system for ANSTO's new research reactor, OPAL. OPAL is now undergoing commissioning and is due to enter regular operation early in 2007. ASNO worked closely

with ASIO and ARPANSA on establishing acceptable standards, with ASNO approving the security system for operation on 23 June 2006.

ASNO's security approval followed consideration of all the documents provided by ANSTO, observation of system performance testing and consideration of reports provided by other agencies, principally ARPANSA and ASIO. Due consideration was given to international practice for the protection of research reactors and the risks from credible terrorist threats, including the impact of large commercial aircraft. Risks were discussed through an interdepartmental committee, taking into account national arrangements to manage critical infrastructure.

ASNO provided ARPANSA with a detailed summary of its evaluation of ANSTO's compliance with various acceptance criteria (see below). This was used by CEO ARPANSA, *inter alia*, in making his decision to grant a licence for the OPAL reactor to operate on 14 July.

Approval was granted with the security system having met the criteria set out below.

Compliance with INFCIRC/225/Rev.4 (corrected)

The IAEA document INFCIRC/225/Rev.4 (corrected) is an internationally accepted physical protection guideline for nuclear material and facilities. Pursuant to Australia's bilateral nuclear safeguards agreements Australia is required to use INFCIRC/225/Rev.4 to protect its domestic holdings of nuclear materials and facilities.

A key element arising from INFCIRC/225/Rev.4 is use of the Design Basis Threat (DBT) methodology. This offers a rigorous evaluation of realistic threats—projected over a period of some 15 years—that the security system should be designed to cope with. Using the DBT, ANSTO was able to design the OPAL reactor from the outset with security adequate to meet worst case credible threats envisaged over the next 15 years, potentially saving significant retrofitting of security in the future.

The OPAL reactor is fuelled with low enriched uranium (i.e. <20% U-235) and hence subject to INFCIRC/225/Rev.4 Category II physical protection requirements for unauthorised removal of nuclear material, along with requirements for protection against sabotage during use and storage. In assessing security plans and installed security systems ASNO was satisfied that all relevant INFCIRC/225/Rev.4 requirements were met.

Furthermore, in December 2005, as part of a routine visit to Lucas Heights to evaluate security applied to US obligated material (at the HIFAR reactor), a US delegation—comprising representatives from the Department of Energy and the Nuclear Regulatory Commission—concluded that the installed and planned security for the OPAL reactor should meet or exceed INFCIRC/225/Rev.4 and international norms for physical protection of similar facilities.

ASNO examined in detail ANSTO's plans and arrangements to meet these criteria and was satisfied with the outcome.

Consistent with fundamental principles and objectives contained in the amended Convention on the Physical Protection of Nuclear Material

The revised Convention on the Physical Protection of Nuclear Material (CPPNM) sets out Fundamental Principles of Physical Protection of Nuclear Material and Nuclear Facilities (see Appendix E of this report). ASNO is satisfied that Australia meets these principles for the protection of the OPAL reactor and its nuclear material. In particular, the level of physical protection is based on Australia's evaluation of threat (*Fundamental Principle G)*,

incorporates defence in depth (*Fundamental Principle I)* and is proportional to the sensitivity of the nuclear material to theft and sabotage (*Fundamental Principle H)*.

When announcing his decision to grant ANSTO a licence to operate the OPAL reactor on 14 July 2006, the CEO ARPANSA provided an analysis on how the physical protection at the OPAL reactor met all the Fundamental Principles.

Compliance with ASNO-ARPANSA Joint Acceptance Criteria

In November 2003, ASNO and ARPANSA established Joint Acceptance Criteria (JAC), recognising that both regulators had legislative responsibilities for protecting the public against the potential effects of sabotage of nuclear facilities. The JAC specified the objectives ANSTO's security plan and installed security system was to achieve, and required the plan to detail security measures. The objectives were grouped into the following ten broad headings covering over 30 criteria and are consistent with principles set out in INFCIRC\225\Rev.4 and the amended CPPNM mentioned above.

Joint Acceptance Criteria (JAC)	
1. Security Management; 2. Site Security and Threat Assessments; 3. System of Physical Protection and Security; 4. Access Control; 5. Personnel Security;	6. Security of Information Management Systems; 7. Performance assessment; 8. Record Keeping; 9. Reporting; 10. Review.

Using a compliance matrix with supporting documents and plans, ANSTO satisfactorily addressed the JAC.

Acceptable Risk

In accordance with sound risk management principles ASNO and ARPANSA jointly developed risk criteria including the risk acceptance level and quantitative consequences scales by which all risks would be assessed.

In considering the range of threats up to the DBT, the assessed consequences that may arise from successful malevolent actions, and the security mitigation measures in place, ASNO was satisfied that sabotage and proliferation risks were low and acceptable. Since the security system applied to the OPAL reactor, and the site as a whole, can be strengthened promptly in response to increased threat levels, low risk levels can be maintained in varying threat environments.

Ongoing compliance

In providing its approval, ASNO specified a number of required actions ANSTO would have to take to ensure ongoing compliance. The security conditions set out before licensing will continue to apply as part of ongoing permit conditions in ANSTO's permits to possess nuclear material and associated items. The operations of the reactor will be subject to regular audit and inspection, particularly during the commissioning phase and early part of its operational life in 2007.

AUSTRALIA'S URANIUM EXPORTS

Nuclear power currently provides around one sixth (or 16%) of the world's electricity, making a substantial contribution to reducing greenhouse gas emissions and providing an alternative to fossil fuels for large-scale electricity generation. At 30 June 2006, there were 441 nuclear

power reactors in operation in 30 countries (plus Taiwan, China), with a total electrical generating capacity of about 370 GWe (see Appendix A). During 2005-06, power reactors produced an electrical output of around 2,600 TWh.[9]

Australia holds 36% of the world's reasonably assured uranium resources recoverable at less than US$40/kg, or 27% of such resources recoverable at less than US$80/kg.[10] In 2005, Australia's Ranger and Olympic Dam mines were respectively the world's second largest (12% of world uranium production) and third largest (8.8% of world uranium production) uranium producers.[11] Worldwide, uranium mining currently provides only about 60% of global industry requirements, with the balance coming from down-blending of excess weapons material, stockpiles and reprocessing. As material from down-blending and stockpiles is starting to run out, uranium prices have begun to increase significantly. It is clear that new mines will be necessary to meet current, let alone increased, demand.

During 2005-06 Australia exported 10,253 tonnes of uranium ore concentrates (UOC)—U_3O_8 or U_3O_8 equivalent—corresponding to 8,694 tonnes contained uranium. These exports were valued at A$545 million. This quantity of uranium is sufficient for the annual fuel requirements of approximately 48 reactors (each of 1,000 MWe), producing around 340 TWh[12] of electricity in total—approximately 40% more than Australia's total electricity production.[13]

Overall Australia continues to be the world's second largest uranium producer after Canada, meeting about 13% of the world's annual uranium requirements. Effectively, Australian uranium supplied about 2% of total world electricity production. Countries using Australian uranium avoid carbon dioxide emissions roughly equivalent to Australia's entire annual carbon dioxide emissions from all sources[14].

While Australia appreciates the importance of its substantial uranium holding as a source of energy for other countries, Australia's nuclear export policy has always been based on strong support for the nuclear non-proliferation regime. This is a long-established and bipartisan position whereby Australia exports uranium only under stringent safeguards conditions.

A fundamental tenet of the Australian Government's uranium policy is that Australia exports uranium only to countries within its network of bilateral safeguards agreements. These agreements place obligations on the bilateral partner relating to nuclear material which is subject to the provisions of the particular bilateral agreement, known as Australian Obligated Nuclear Material (AONM). Moreover, these obligations apply to uranium as it moves through the different stages of the nuclear fuel cycle as well as to material generated through the use of that uranium.

9. Data taken from publications of Nucleonics Week.
10. From *Uranium 2005: Resources, Production and Demand*, a joint report by the OECD NEA and the IAEA.
11. Submission by Geoscience Australia to the Uranium Mining, processing and Nuclear Energy Review, August 2006.
12. Based on a comparison of TWh of electricity generated from nuclear power, and uranium required, for each country eligible to use AONM. Source: *Uranium 2005: Resources, Production and Demand*.
13. Australia's gross electricity generation in 2005-06 is estimated to be 245 TWh (not accounting for transmission losses which amount to about 20%). Source: *Australian Energy, National and State Projections to 2029-30*, ABARE eReport 05.9, October 2005.
14. Comparison made under a scenario whereby the equivalent electricity generated using Australian uranium is instead generated by coal. Comparative CO_2 emissions per TWh under a full-energy chain analysis of coal and nuclear power generation taken from *Greenhouse Gas Emissions Of Electricity Generation Chains Assessing The Difference*, IAEA Bulletin 42/2/2000.

Australia carefully selects the countries with which it will conclude a bilateral safeguards agreement. In the case of non-nuclear-weapon states (NNWS), it is a minimum requirement that IAEA safeguards apply to all existing and future nuclear activities in that country. In the case of nuclear-weapon states (NWS), there must be a treaty-level assurance that AONM will be used only for peaceful purposes and AONM must be covered by safeguards arrangements under that country's safeguards agreement with the IAEA.

Australia currently has 20[15] nuclear safeguards agreements covering 36 countries, plus Taiwan, China (see Appendix B).[16] These bilateral safeguards agreements serve as a mechanism for applying IAEA safeguards and various supplementary conditions. These requirements ensure that AONM is appropriately accounted for as it moves through the nuclear fuel cycle, is used only for peaceful purposes in accordance with the applicable agreements, and in no way enhances or contributes to any military process. In the context of Australia's bilateral safeguards agreements, military purpose means: nuclear weapons; any nuclear explosive device; military nuclear reactors; military propulsion; and depleted uranium munitions. The principal conditions for the use of AONM set out in Australia's bilateral safeguards agreements are:

- AONM will be used only for peaceful purposes and will not be diverted to military or explosive purposes, and that IAEA safeguards will apply
- Australia's prior consent must be sought for transfers to third parties, enrichment to 20% or more in the isotope ^{235}U and reprocessing[17]
- fallback safeguards or contingency arrangements will apply where NPT or IAEA safeguards cease to apply in the country concerned
- internationally agreed standards of physical security will be applied to nuclear material in the country concerned
- detailed administrative arrangements are applied between ASNO and its counterpart organisation, setting out the procedures to apply in accounting for AONM
- regular consultations on the operation of the agreement are undertaken
- provision is made for the removal of AONM in the event of a breach of the agreement.

Australia's bilateral partners holding AONM are required to maintain detailed records of transactions involving AONM. In addition, counterpart organisations in Australia's bilateral partner countries are required to submit regular reports, consent requests, transfer and receipt documentation to ASNO. ASNO accounts for AONM on the basis of information and knowledge including:

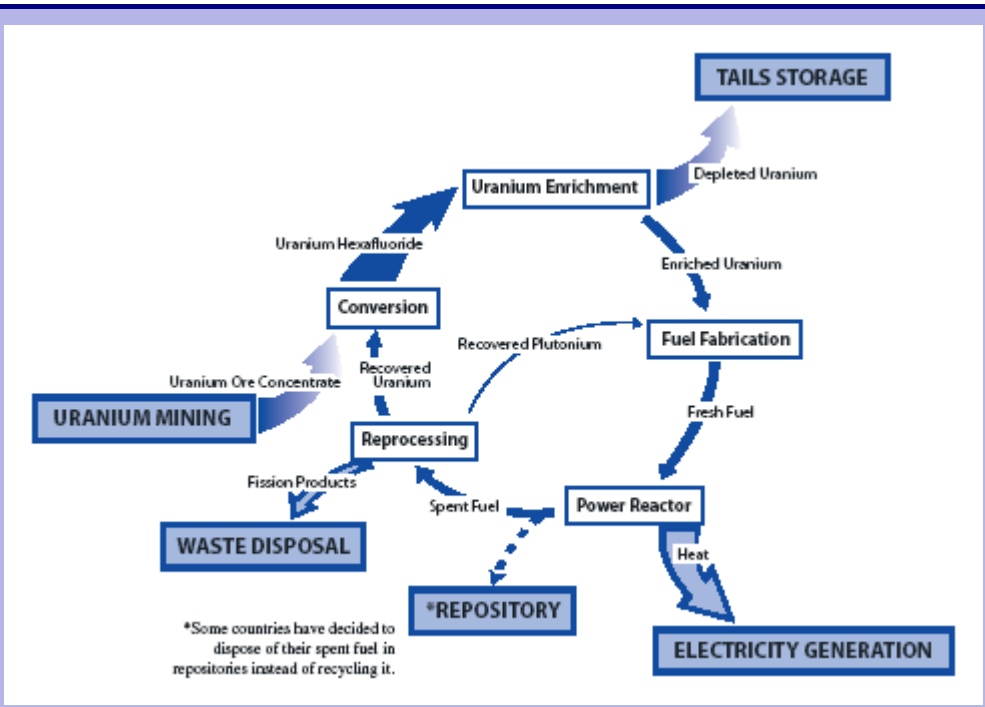
- reports from each bilateral partner
- shipping and transfer documentation
- calculations of process losses and nuclear consumption, and nuclear production
- knowledge of the fuel cycle in each country
- regular liaison with counterpart organisations and with industry
- reconciliation of any discrepancies with counterparts.

15. The 2004-05 Annual Report reports 19 nuclear safeguards agreements. For the 2005-06 Annual Report ASNO has decided to include the Silex Agreement with the US (2000) in the list of safeguards agreements–making the total 20. In contrast to the other agreements, the Silex Agreement is technology-specific, covering the transfer of Silex technology.
16. Twenty-five of the countries making up this total are European Union member states.
17. Consent has been given to reprocessing on a programmatic basis to Euratom, France and Sweden (now both covered by the Euratom consent), Japan and Switzerland.

At the NPT Review Conference in May 2005, the Minister for Foreign Affairs, Mr Downer, announced that Australia would make ratification of an Additional Protocol a condition of supply for uranium to NNWS, thus further strengthening our non-proliferation measures. It is hoped that other uranium suppliers will follow suit. A summary of the status of Additional Protocols is at Appendix C.

An outcome of note in the 2005-06 period was the signing on 3 April 2006 of two safeguards agreements with China. These were a Nuclear Transfer Agreement, which will allow for the supply of Australian uranium to China's nuclear power program, and a Nuclear Cooperation Agreement to provide for collaboration in a broad range of peaceful applications of nuclear equipment and technology (see page 22). At the time of publication of this Annual Report the agreements were being considered by the Parliamentary Joint Standing Committee on Treaties, with expected completion of the Committee's report later in 2006. It is hoped the agreements will be ratified before the end of 2006, after which the number of Australian bilateral safeguards agreements will be 22 covering 37 countries.

Figure 2: Civil Nuclear Fuel Cycle



A characteristic of the nuclear fuel cycle is the international interdependence of facility operators and power utilities. It is unusual for a country to be entirely self-contained in the processing of uranium for civil use. Even in the nuclear-weapon states, power utilities will often go to other countries seeking the most favourable terms for uranium processing and enrichment. It would not be unusual, for example, for a Japanese utility buying Australian uranium to have the uranium converted to uranium hexafluoride in Canada, enriched in France, fabricated into fuel in Japan and reprocessed in the United Kingdom.

The international flow of nuclear material means that nuclear materials are routinely mixed during processes such as conversion and enrichment and as such cannot be separated by origin thereafter. Therefore tracking of individual uranium atoms is impossible. Since nuclear material is **fungible**—that is, any given atom is the same as any other—a uranium exporter is able to ensure its exports do not contribute to military applications by applying safeguards obligations to the overall **quantity** of material it exports. This practice of tracking quantities rather than atoms has led to the establishment of universal conventions for the industry, known as the principles of **equivalence** and **proportionality**. The equivalence principle provides that where AONM loses its separate identity because of process characteristics (e.g. mixing), an equivalent quantity of that material is designated as AONM. These equivalent quantities may be derived by calculation, measurement or from operating plant parameters. The equivalence principle does not permit substitution by a lower quality material. The proportionality principle provides that where AONM is mixed with other nuclear material and is then processed or irradiated, a corresponding proportion of the resulting material will be regarded as AONM.

Overview of ASNO

GOAL

The goal of ASNO is to enhance Australian and international security through activities which contribute to effective regimes against the proliferation of weapons of mass destruction (WMD)—nuclear, chemical and biological weapons.

FUNCTIONS

The *Non-Proliferation Legislation Amendment Act 2003* enabled the offices of the national authority for safeguards, the national authority for the Chemical Weapons Convention (CWC) and the national authority for the Comprehensive Nuclear-Test-Ban Treaty (CTBT) to be formally consolidated under a common title, named the Australian Safeguards and Non-Proliferation Office (ASNO). The legislation also enabled the titles of each of the directors of the three national authorities to be combined as the Director General ASNO. These changes confirmed arrangements that had been in place informally for several years.

The principal focus of ASNO's work is on international and domestic action to prevent the proliferation of WMD. Thus, ASNO's work relates directly to international and national security. In particular, ASNO is working to strengthen the operation of relevant treaty verification regimes and their supporting technical methods. Furthermore, ASNO performs important domestic regulatory functions, ensuring that Australia is in compliance with treaty commitments and that the public is protected through application of appropriate security standards for WMD-related materials.

Nuclear Safeguards Functions

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is the centrepiece of the international nuclear non-proliferation regime. Since its entry into force (EIF) in 1970, the NPT has become almost universal, with 189 NPT Parties. Only three states—Israel, India and Pakistan—remain outside the NPT. A fourth—the Democratic People's Republic of Korea (DPRK)—announced its withdrawal from the NPT in 2003, but the validity of this withdrawal has not been determined.

Under the NPT, non-nuclear-weapon states commit not to acquire nuclear weapons, and to conclude an agreement with the International Atomic Energy Agency (IAEA) for the application of IAEA safeguards to all their nuclear material to verify their compliance with this commitment.

The *Nuclear Non-Proliferation (Safeguards) Act 1987* (Safeguards Act), which took effect on 31 March 1987, forms the legislative basis for ASNO's nuclear safeguards activities. The Safeguards Act gives effect to Australia's obligations under:

- the NPT
- Australia's safeguards agreement and Additional Protocol with the IAEA
- agreements between Australia and various countries (and Euratom) concerning transfers of nuclear items and cooperation in peaceful uses of nuclear energy
- the Convention on the Physical Protection of Nuclear Material (CPPNM).

The Safeguards Act also establishes a system for control over nuclear material and associated items in Australia through requirements for permits for their possession and transport. Communication of information contained in sensitive nuclear technology is also controlled through the grant of authorities.

Nuclear Regulation in Australia

The Australian Government has two nuclear regulatory agencies: ASNO and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

ASNO is responsible for nuclear safeguards and physical protection. ASNO ensures that **nuclear materials**—uranium, thorium and plutonium—and **nuclear items**—facilities, equipment, technology and nuclear-related materials—are used only for authorised purposes, are properly accounted for, and are protected against unauthorised use. An important part of this responsibility is ensuring that Australia's treaty commitments are met, particularly that nuclear activities are conducted for exclusively peaceful purposes. ASNO's responsibilities do not cover general radioactive materials as such.

ASNO's legislation applies to all persons or organisations in Australian jurisdiction having relevant materials, items or technology. This principally affects the Australian Nuclear Science and Technology Organisation, as Australia's only nuclear facility operator, but it also covers a diverse range of other entities including the uranium mines and associated transport and storage operations, private sector laboratories, educational institutions, and patent attorneys. ASNO's activities are based on a number of constitutional heads of power, especially external affairs (meeting treaty requirements).

ARPANSA is charged with responsibility for protecting the **health and safety** of people, and the environment, from the harmful effects of **radiation** (ionizing and non-ionizing). ARPANSA's responsibilities include:

- promoting uniformity of radiation protection and nuclear safety policy and practices across jurisdictions of the Commonwealth, the States and the Territories
- providing advice to Government and the community on radiation protection
- providing advice to Government and the community on nuclear safety—reactors and visits by nuclear powered warships
- undertaking research and providing services in relation to radiation protection, nuclear safety and medical exposures to radiation
- regulating radiation protection and nuclear safety aspects of all Commonwealth entities involved in radiation or nuclear activities or dealings, and
- approval of imports of radioactive material.

The safeguards functions of the Director General ASNO are set out in section 43 of the Safeguards Act. These include:

- ensuring the effective operation of the Australian safeguards system
- ensuring the physical protection and security of nuclear material and items in Australia
- carrying out Australia's obligations under Australia's safeguards agreement and Additional Protocol with the IAEA

- carrying out Australia's obligations under Australia's safeguards agreements with other countries and Euratom
- operating Australia's bilateral safeguards agreements and monitoring compliance with the provisions of these agreements
- undertaking, co-ordinating and facilitating research and development in relation to safeguards
- advising the Minister for Foreign Affairs on matters relating to the international nuclear non-proliferation regime and the international safeguards system.

Chemical Weapons Convention Functions

The Chemical Weapons Convention (CWC) prohibits the development, production, acquisition, stockpiling, retention or transfer of chemical weapons. Its verification regime is based on declaration by States Parties of facilities and activities dealing with particular chemicals, and on confirmation of compliance through on-site inspections.

ASNO is the focal point in Australia for liaison between domestic CWC stakeholders such as declared chemical facilities, the Organization for the Prohibition of Chemical Weapons (OPCW), and the national authorities of other States Parties.

Through a system of permits and notifications under the *Chemical Weapons (Prohibition) Act 1994* and the Customs (Prohibited Imports) Regulations, ASNO gathers information from chemical industry including traders, universities and research institutions to compile declarations that Australia must submit to the OPCW. ASNO has the right to conduct compliance inspections of relevant facilities in Australia, but such powers are exercised only in exceptional circumstances. ASNO conducts outreach activities, including site visits, to promote compliance and to check the accuracy of information provided by industry.

The OPCW conducts routine inspections of facilities listed in Australia's CWC declarations. ASNO facilitates these inspections to ensure Australia's obligations are met, and to protect the rights of facility operators.

ASNO, OPCW and site representatives during an OPCW inspection at a chemical facility in Victoria

ASNO promotes effective international implementation of the CWC, particularly in Australia's region. It works with the OPCW and other States Parties in the formulation of verification policy and by providing practical implementation assistance and advice.

Key CWC functions are:

- Australia's point of contact for liaison on CWC implementation
- identifying and gathering information on industrial chemical facilities and other activities required to be declared to the OPCW
- preparing for and facilitating OPCW inspections in Australia
- promoting awareness and effective implementation of the CWC, both domestically and internationally
- providing technical and policy advice to Government
- administering and developing related regulatory and administrative mechanisms.

Chemical Weapons (Prohibition) Act 1994

The *Chemical Weapons (Prohibition) Act 1994* (the Act) was enacted on 25 February 1994. Division 1 of Part 7 of the Act (establishing the CWCO and the position of its Director), and sections 95, 96, 97, 99, 102, 103, and 104 were proclaimed on 15 February 1995. Other provisions of the Act which expressly relied on the CWC came into effect on 29 April 1997 when the CWC entered into force. The final parts of the Act, dealing with routine compliance inspections of Other Chemical Production Facilities, came into effect on 17 August 2000.

The Act gives effect to Australia's obligations, responsibilities and rights as a State Party to the CWC. In particular, the Act:

- prohibits activities connected to the development, production or use of chemical weapons, including assisting anyone engaged in these activities, whether intentionally or recklessly—such offences are punishable by life imprisonment
- establishes permit and notification systems to provide a legal framework for the mandatory provision of data to ASNO by facilities which produce or use chemicals as specified by the Convention, so that ASNO can lodge declarations with the OPCW
- provides for routine inspections of declared facilities and challenge inspections of any facility or other place in Australia by OPCW inspectors to verify compliance with the CWC, and for inspections by ASNO to verify compliance with the Act
- provides for procedures should another State Party seek clarification concerning compliance with the Convention at any facility or other place or by any person in Australia.

Regulations under the Act prescribe procedures and details of other arrangements provided for in the Act. In particular, the Regulations define conditions that are to be met by holders of permits issued under the Act, and for granting privileges and immunities to OPCW inspectors when in Australia to carry out inspections.

The text of the CWC is reproduced in the Schedule to the Act. The manner in which any powers are exercised under the Act must be consistent with, and have regard to, Australia's obligations under the Convention.

The Act was amended on 6 April 1998. The amendments refine administration of the Act by simplifying compliance obligations for facilities requiring permits, clarifying the legislative basis for Australia to implement some of its obligations under the Convention, correcting drafting errors and improving certain procedures, including those related to secrecy. For consistency, concomitant Regulations were amended on 17 December 1998.

Comprehensive Nuclear-Test-Ban Treaty Functions

Article IV of the CTBT provides that its verification regime shall be capable of meeting the requirements of the Treaty when it enters into force. This requires a substantial program of preparation in advance of the Treaty's entry-into-force.

To make the necessary preparations, a Preparatory Commission (PrepCom) was established in 1997, made up of CTBT States Signatories and supported by a Provisional Technical Secretariat (PTS). The tasks of the PrepCom include the establishment or upgrading of 337 monitoring facilities around the world, as well as the development of detailed procedures for the operation of these facilities and for the conduct of other verification activities under the CTBT, such as On-Site Inspections.

ASNO is Australia's designated national authority for the CTBT. This role is one of liaison and facilitation to ensure that the International Monitoring System (IMS) is established efficiently and relevant domestic arrangements are in place.

ASNO makes a strong contribution on behalf of Australia to the overall work of the PrepCom to develop the CTBT verification regime.

ASNO assists DFAT with efforts to encourage ratification of the CTBT by countries that have not yet done so.

Key CTBT functions include:

- national point of contact for liaison on CTBT implementation
- establishing and maintaining legal, administrative and financial mechanisms to give effect to the CTBT in Australia
- contributing to the development of Treaty verification, through the PrepCom and its working groups
- participating in development and implementation of Australian policy relevant to the CTBT.

Comprehensive Nuclear Test-Ban Treaty Act 1998

The Act gives effect to Australia's obligations as a Party to the Comprehensive Nuclear-Test-Ban Treaty (CTBT). It prohibits the causing of any nuclear explosion at any place within Australian jurisdiction or control and establishes a penalty of life imprisonment for an offence against the provision. The Act also prohibits Australian nationals from causing a nuclear explosion in any other place.

The Act requires the Australian Government to facilitate verification of compliance with the Treaty provisions, including the obligation to arrange for the establishment and operation of Australian monitoring stations and the provision of data from these. It provides the Government with the authority to establish IMS stations and to make provision for access to them for CTBT monitoring purposes. The Act makes provision for the Minister for Foreign Affairs to enter into arrangements with the CTBT Organization to facilitate cooperation in relation to monitoring stations under Australian control.

Article IV of the Treaty obliges States Parties to allow CTBT inspectors to inspect any place within their jurisdiction or control in an on-site inspection. The Act provides comprehensive powers for inspection arrangements, including the right for inspectors to gather information, to collect and remove samples, and to undertake drilling. Access to facilities by inspectors for challenge inspections is by consent of the occupier, or by warrant issued by a magistrate.

The Act establishes an Australian national authority for the CTBT, and this role has been given to ASNO.

The Act was assented to on 2 July 1998 but was not able to enter into effect, absent the entry-into-force of the CTBT, until amended by the *Non-Proliferation Legislation Amendment Act 2003*. On 11 June 2004 sections 3 to 7, Part 2, Division 1 of Part 4, Division 1 of Part 5, sections 68 to 72, sections 74, 75 and 78, and Schedule 1 to the Act came into effect following proclamation by the Governor-General. The proclaimed provisions:

- create the offence of causing a nuclear weapons test explosion, or any other nuclear explosion
- provide a framework for the establishment and operation of IMS facilities in Australia, and a legal basis for the functioning of Australia's CTBT National Authority.

Other Functions

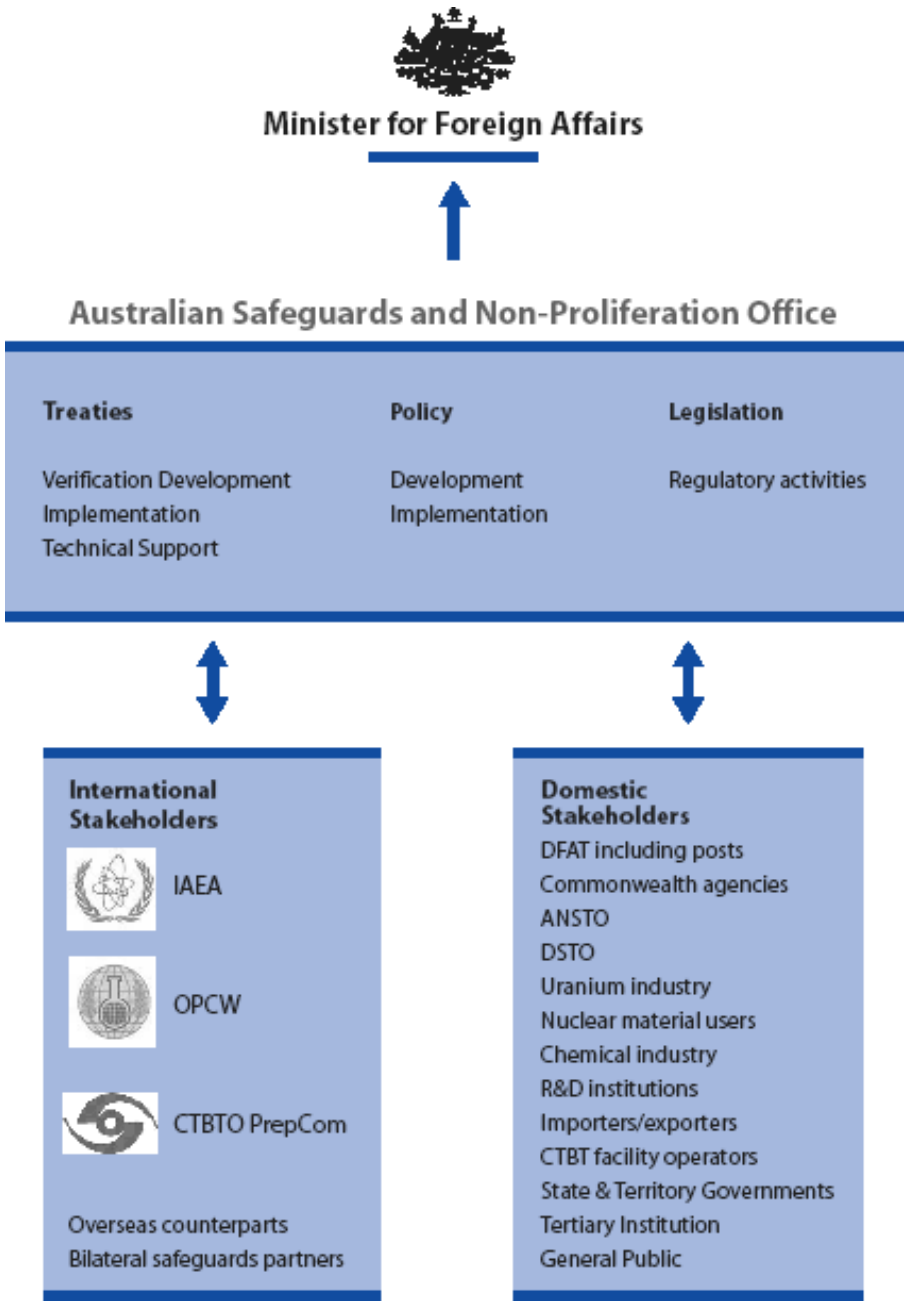
South Pacific Nuclear Free Zone Treaty

The South Pacific Nuclear Free Zone (SPNFZ) Treaty prohibits the manufacture, possession, stationing and testing of nuclear explosive devices, as well as research and development relating to manufacture or production of nuclear explosive devices, in any area for which the Signatory Parties are responsible. The SPNFZ Treaty also bans the dumping of radioactive waste at sea. Australia ratified the Treaty on 11 December 1986.

The *South Pacific Nuclear Free Zone Treaty Act 1986* (SPNFZ Act), which came into force in Australia on 11 December 1986, gives effect to Australia's obligations, responsibilities and rights under the Treaty. The SPNFZ Act also establishes the framework for SPNFZ Treaty inspections. Safeguards Inspectors appointed under the Safeguards Act are also inspectors for the purposes of the SPNFZ Act. These inspectors are to assist SPNFZ Treaty inspectors and authorised officers in carrying out Treaty inspections, and to investigate possible breaches of the SPNFZ Act.

Operating Environment

Figure 3: ASNO's Operating Environment



Outcomes and Outputs Structure

Figure 4: ASNO's Outcomes and Outputs Structure

OUTCOME 1:	Australian and international security protected and advanced through activities which contribute to effective regimes against the proliferation of nuclear, chemical and biological weapons.
OUTPUT 1.1:	Operation of Australia's national system of accounting for and control of nuclear material, items and facilities.
OUTPUT 1.2:	Protection of Australia's nuclear facilities, nuclear material and nuclear items against unauthorised access and sabotage. Internationally agreed physical protection standards applied to Australian Obligated Nuclear Material overseas.
OUTPUT 1.3:	Nuclear material and associated items exported from Australia under bilateral agreements remain in exclusively peaceful use.
OUTPUT 1.4:	Contribution to the development and effective implementation of international safeguards and the nuclear non-proliferation regime.
OUTPUT 1.5:	Regulation and reporting of Australian chemical activities in accordance with the Chemical Weapons Convention, and strengthening of international implementation of the Convention.
OUTPUT 1.6:	Development of verification systems and arrangements in support of Australia's commitments related to the Comprehensive Nuclear-Test-Ban Treaty.
OUTPUT 1.7:	Contribution to the development and strengthening of other weapons of mass destruction non-proliferation regimes.
OUTPUT 1.8:	Provision of high quality, timely, relevant and professional advice to Government.
OUTCOME 2:	Knowledge about Australia's efforts to prevent the proliferation of weapons of mass destruction enhanced through public advocacy.
OUTPUT 2.1:	Provision of public information on the development, implementation and regulation of weapons of mass destruction non-proliferation regimes, and Australia's role in these activities.

Performance

OUTPUT 1.1: NATIONAL SAFEGUARDS SYSTEM

Operation of Australia's national system of accounting for, and control of, nuclear material, items and facilities.

Performance Measures

- Australia's obligations are met under Australia's safeguards agreement with the International Atomic Energy Agency (IAEA).
- Australia's system of safeguards permits and authorities is administered in a timely and effective manner.
- Australian uranium at mines and in transit accounted for properly.

Performance Assessment

International Obligations

Reporting

ASNO met all of Australia's obligations during the reporting period as they related to the submission of declarations and notifications on nuclear materials and facilities in Australia under Australia's safeguards agreement with the IAEA.

ASNO reported Australia's nuclear material inventory to the IAEA on a monthly basis. In particular, ASNO regularly audited and reported on the inventory at the Lucas Heights site of the Australian Nuclear Science and Technology Organisation (ANSTO), the principal location in Australia of nuclear material subject to IAEA safeguards. Due to the strengthening of the IAEA safeguards system, and ASNO's desire to be as transparent as possible, the information provided to the IAEA has increased significantly since 2002.

Table 1: ASNO Reports to the IAEA, 2000-2006, by facility

Facility	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
ANSTO research laboratories	220	466	485	539	498	451
HIFAR	61	38	70	103	103	36
ANSTO vault storage	0	17	1	23	22	18
Moata reactor (defuelled)	2	0	13	0	11	83
OPAL reactor (under construction)	0	0	0	0	0	28
SSL laboratories	0	0	92	59	34	35
Other locations	6	4	2 028	2 483	2 198	2258
TOTAL	**289**	**525**	**2 689**	**3 207**	**2 866**	**2909**

Table 2: ASNO Reports to the IAEA, 2000-2006, by data type

Type of Data	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Inventory Change Report	90	191	754	813	496	407
Physical Inventory Listing	142	253	785	951	1 135	1200
Material Balance Report	57	81	127	118	139	160
Concise Note	0	0	1 023	1 325	1 096	1142
TOTAL	**289**	**525**	**2 689**	**3 207**	**2 866**	**2909**

Table 3: Nuclear Material in Australia at 30 June 2006

Category	Quantity	Intended End-use
Source Material		
UOC	546 tonnes	Exports for energy use pursuant to bilateral agreements
	3 tonnes	Storage
Natural Uranium (other than UOC)	11 379 kg	Research and shielding
Depleted Uranium	16 317 kg	Research and shielding
Thorium Ore Residues	59 tonnes	Storage/disposal
Thorium (other than Thorium Ore Residues)	1 962 kg	Research, industry
Special Fissionable Material		
^{235}U	102 876 grams	Research, radioisotope production
^{233}U	4 grams	Research
Plutonium (other than ^{238}Pu)	2 019 grams	Research, neutron sources

During the reporting period, a small amount of material unaccounted for (MUF) was recorded, with respect to low enriched uranium. This was because the Physical Inventory for ANSTO's R&D laboratories was greater than the Book Inventory by 9.20 grams of uranium element and 0.20 grams of ^{235}U isotope. This level of MUF is consistent with the measurement uncertainties and processing losses for enriched uranium in the laboratories' operations. It is also similar to the amount reported last year. The measurement of one item during a Physical Inventory Inspection revealed that it had been designated incorrectly as a batch entirely comprised of thorium, 2.98 kg in total. In fact the item comprised lead contaminated with thorium. The item was removed from the inventory of the material balance area—the consequential adjustment to the inventory was reported as 2.98 kg of thorium MUF. Very small amounts of MUF were recorded for material held at other locations (i.e. other than Lucas Heights); namely 0.19 kg depleted uranium, 0.06 kg natural uranium, 0.62 kg thorium, and 0.01 g plutonium. These MUF values were primarily due to the recalculation of weights on various items.

Nuclear Research and Development

ASNO ensured that all IAEA requirements were met during the reporting period with respect to formal reporting of nuclear R&D in Australia and ensured that any developing technology remained in exclusively peaceful use and did not contribute to any proliferation activity.

ASNO continued to monitor R&D by Silex Systems Limited (SSL) on its innovative method of separating uranium isotopes using laser techniques. On 22 May 2006, SSL announced a partnership deal with General Electric for commercialisation of its uranium enrichment technology in the US. The transaction is subject, *inter alia*, to US governmental approvals and regulatory controls on the design, construction and operation of the process. ASNO

contributed to due diligence processes to ensure associated technology was controlled appropriately.

Table 4: Associated Items in Australia at 30 June 2006

Category	Quantity	Intended End-use
Associated Material		
Deuterium and heavy water	27.4 tonnes	Research, reactors
Nuclear grade graphite	113.85 tonnes	HIFAR, Moata and storage
Associated Equipment		
HIFAR	1	Reactor
HIFAR coarse control arms	15[18]	Reactor components
HIFAR safety rods	4[19]	Reactor components
Fuel charging and discharging machines	2	Reactor components
OPAL reactor[20]	1	Reactor
OPAL control rod drives	6	Reactor components
Moata	1	Reactor[21]
Gas centrifuge components	-	Dismantled
SSL equipment	-	Enrichment R&D

Legislation and Regulation

ASNO arranged amendment of the Nuclear Non-Proliferation (Safeguards) Regulations 1987 to adjust the rate at which the Uranium Producers Charge is levied (see Uranium Producers Charge under Financial Management).

Permits and Authorities System

ASNO continued to operate Australia's State System of Accounting for and Control of Nuclear Material in accordance with Australia's safeguards agreement with the IAEA and legislation. Administration of this system of permits and authorities was carried out in a timely manner.

ASNO was active during the year in the granting of new permits, with the highest number of permits granted in a reporting year since the first tranche of permits was issued after the commencement of the Safeguards Act in 1987. The majority of grants were for industrial radiographers following the re-regulation of depleted uranium.

18. Six in reactor, nine new or partly used.
19. Two in reactor, two spare.
20. Includes, inter alia, the reactor reflector vessel and core grid. ANSTO's permit to possess associated items (PA001) was amended pursuant to the Safeguards Act on 23 June 2006 to allow the reactor be operational. The licence to operate from ARPANSA was granted on 14 July 2006.
21. The ANSTO Board decided to cease operation of Moata In February 1995. The reactor was de-fuelled in May 1995. It is now awaiting decommissioning.

Table 5: Status of Safeguards Permits and Authorities at 30 June 2006

Permit or Authority	Current Total	Granted	Varied	Revoked	Expired
Possess nuclear material	84	28	6	0	2
Possess associated items	19	0	10	3	0
Transport nuclear material	18	1	1	0	1
Transport associated items	0	0	0	0	0
Establish a facility	0	0	0	0	1
Communicate information contained in associated technology	14	0	8	3	0
TOTAL	**135**	**29**	**25**	**6**	**4**

Notice of all permit changes were published in the Commonwealth Gazette as required by the Safeguards Act (section 20 (1)).

ASNO Inspections

During the reporting period, ASNO carried out 29 domestic inspections to ensure that requirements of permits and authorities were being met. In general, permit holders were cooperative and in compliance with permit conditions. ANSTO Radiopharmaceuticals and Industrials (ARI) was found to have failed to report some transfers of radiography cameras (which contain depleted uranium shielding). As a result, multiple corrections were required to reports to the IAEA. In response to these concerns, ARI updated its procedures, and on subsequent review ASNO found these to be satisfactory. ARI's reporting performance has since improved. It must be noted that the amount and nature of the material involved was of low proliferation significance. Overall, ASNO found no indication of unauthorised access to or use of nuclear materials or nuclear items in Australia.

Figure 5: Nuclear Inspections by ASNO, 2005-06, by type of permit holder

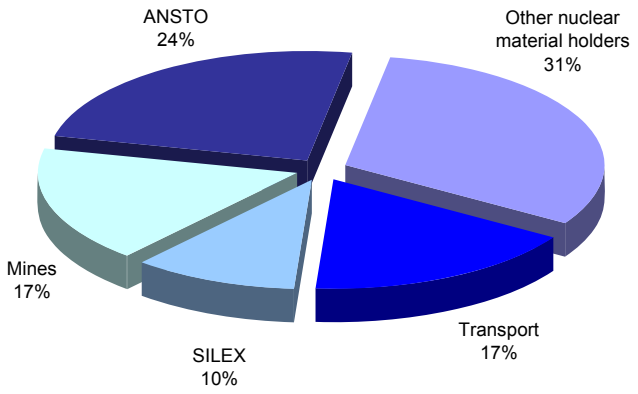
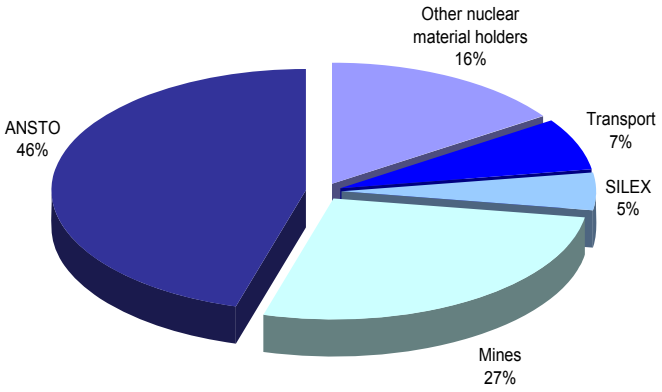


Figure 6: Nuclear Inspections by ASNO, 2005-06, by effort for each type of permit holder



The number of inspections of permit holders during the year was evenly divided between different permit holder types while the bulk of the inspection effort was directed toward ANSTO and uranium mines with an emphasis on security arrangements. Some holders of small quantities of nuclear material were inspected, largely to educate them in security, reporting and inspection requirements and to inspect initial inventories.

IAEA Inspections

ASNO met all of Australia's obligations with respect to IAEA inspections. During the reporting period, the IAEA conducted five design information verification inspections, three routine nuclear material inventory verification inspections and two short notice inspections to verify ASNO declarations. The IAEA also undertook seven complementary accesses in accordance with the Additional Protocol.

Table 6: IAEA Safeguards Inspections and Complementary Accesses, 2005-06

Date	Facility	Type
17–20 Oct 2005	HIFAR	Short Notice Inventory Verification Inspection
	SSL Laboratories ANSTO's R&D Laboratories OPAL reactor	Complementary Accesses (3)
5–7 Dec 2005	HIFAR	Short Notice Inventory Verification Inspection
	ANSTO's R&D Laboratories OPAL reactor	Complementary Accesses (2)
3–11 Apr 2006	HIFAR ANSTO's R&D Laboratories SSL Laboratories OPAL reactor	Routine Inventory Verification Inspection Design Information Verification Inspection
	MOATA reactor	Design Information Verification Inspection
	ANSTO's R&D Laboratories	Complementary Accesses (2)

The IAEA reported the outcomes of its safeguards inspections and complementary accesses in Australia, including comments on any MUF, in statements summarised in Appendix D. These statements confirm that all of Australia's IAEA safeguards obligations were discharged satisfactorily and that relevant records had been maintained in accordance with prescribed practice.

OUTPUT 1.2: PHYSICAL PROTECTION

Protection of Australia's nuclear facilities, nuclear material and nuclear items against unauthorised access and sabotage. Internationally agreed physical protection standards applied to Australian Obligated Nuclear Material overseas.

Performance Measures

- Physical protection of nuclear material and facilities meets Australia's obligations under the Convention on the Physical Protection of Nuclear Material (CPPNM), bilateral agreements and IAEA guidelines.
- Australian uranium at mines and in transit properly protected.
- Internationally agreed standards for the physical protection of nuclear material are applied to all Australian Obligated Nuclear Material (AONM).
- Proactive and professional contribution made to the development and effective international implementation of the CPPNM.

Performance Assessment

International Obligations

ASNO's inspections confirmed that current physical protection arrangements were being implemented satisfactorily in 2005-06 in accordance with Australia's obligations under the CPPNM, IAEA guidelines, relevant bilateral safeguards agreements and the *Nuclear Non-Proliferation (Safeguards) Act 1987*. ASNO also met Australia's international shipment notification obligations under the CPPNM.

In October 2005, a US delegation was shown security arrangements applied to ANSTO's reactors. The delegation was satisfied that nuclear facilities at ANSTO continue to meet or exceed the intent of the international physical protection guidelines in INFCIRC/225/Rev.4— as required by the Australia-US nuclear safeguards agreement. In a reciprocal visit, Mr Nick Doulgeris visited, in May 2006, US nuclear facilities in Nevada and the National Training Center for Safeguards and Security in Albuquerque, New Mexico as part of regular Australia/US exchange on physical protection matters.

Delegation visiting Lucas Heights to observe physical protection measures, including representatives from US DOE and US NRC, ASNO, ANSTO and ARPANSA.

On 23 June 2006 ASNO approved the security system to be applied to the OPAL reactor. A detailed account of the security approval process applied by ASNO is outlined in the article at page 23. On approving the security system, ASNO varied ANSTO's permits to possess nuclear material (PN001) and associated items (PA001) to allow the OPAL reactor to be operational (noting that ANSTO still required a licence from ARPANSA). Consequently the permit to establish a facility (EF001) lapsed.

An inspection was made of SSL's arrangements for the protection of its sensitive R&D information and a review of documents associated with Silex's due diligence negotiations to ensure information was classified appropriately. ASNO is satisfied that security requirements under the Australia-US administrative security arrangements have been met.

Exports of Australian Obligated Nuclear Material

Reporting by conversion facilities, safeguards authorities and shipping agencies confirms that all AONM transferred from Australia safely reached its destination. The physical protection measures specified for these transfers effectively contributed to this good outcome.

Protecting Australia's Uranium

ASNO inspected physical protection measures applied at, and in conjunction with, uranium mining operations. In particular ASNO was involved heavily with developing and approving security arrangements associated with transporting UOC, by rail, from Adelaide to Darwin. Following a trial Adelaide-Darwin and subsequent audit by ASNO, Freightlink was granted an ongoing permit to transport UOC in September 2005.

In March 2006, ASIO completed its reports subsequent to the security review of the production, transport and storage of uranium ore concentrates. The report endorsed ASNO's current baseline security requirements but noted issues in the application of these at particular sites. ASNO is pursuing improvements with the companies concerned. ASNO is also developing updated security requirements for uranium producers and transporters and will incorporate these in revised permits. ASNO has been given increased resources for this area, and *inter alia* will perform more regular inspections of security measures at mines and related sites.

ASNO continued to require exporters to adopt and report on specific procedures to ensure appropriate levels of physical protection for UOC shipments from Australia to the port of unloading overseas. These procedures included checking on the physical condition of the containers and verifying the container and seal numbers at each port of unloading or transhipment to detect any breaches of physical protection. At the time of export ASNO contacts its counterparts in countries through which the material will transit, alerting them to the need to protect appropriately AONM within their jurisdiction.

Strengthening the CPPNM

ASNO has contributed to efforts to amend the CPPNM over a number of years. The amendments were adopted at a diplomatic conference in July 2005, and will come into force when two-thirds of States Parties have ratified. Implementation of the amended Convention will strengthen internationally accepted standards of nuclear safety and security, in particular extending protection to nuclear facilities and nuclear material in domestic use, storage and transport.

While many of the amendments to the Convention are already captured satisfactorily under the Safeguards Act, ASNO has begun the process of amending legislation to enable permit conditions to be developed to reflect the new physical protection framework, and to bring the scope of offences under that Act into line with the new requirements.

OUTPUT 1.3: BILATERAL SAFEGUARDS

Nuclear material and associated items exported from Australia under bilateral agreements remain in exclusively peaceful use.

Performance Measures

- AONM is accounted for in accordance with the procedures and standards prescribed under relevant bilateral agreements.
- Implementation arrangements for the bilateral agreements are reviewed and revised as necessary to ensure their continuing effectiveness.

Performance Assessment

Australian Obligated Nuclear Material

On the basis of reports from bilateral treaty partners, other information and analysis, ASNO concludes that all AONM is satisfactorily accounted for. The IAEA validated through its transit matching system that, at 24 June 2006, there were no outstanding unconfirmed nuclear material shipments to or from Australia. Based on the IAEA's Safeguards Statement for 2005, and ASNO's analysis of reports and other information from counterparts on AONM located overseas, ASNO concludes that no AONM was used for non-peaceful purposes in 2005-06. A copy of the IAEA's Safeguards Statement for 2005 is at Appendix F.

Table 7: Summary of AONM by category, quantity and location at 31 December 2005[22]

Category	Location	Tonnes[23]
Depleted Uranium	European Union, Japan, Republic of Korea, United States	77,632
Natural Uranium	Canada, European Union, Japan, Republic of Korea, United States	21,059
Uranium in Enrichment Plants	European Union, Japan, United States	13,284
Low Enriched Uranium[24]	Canada, European Union, Japan, Mexico, Republic of Korea, Switzerland, United States	10,255
Irradiated Plutonium[25]	Canada, European Union, Japan, Mexico, Republic of Korea, Switzerland, United States	95
Separated Plutonium[26]	European Union, Japan	0.4
TOTAL		**122,326**

During the reporting period, Australia exported 10,253 tonnes[27] of uranium ore concentrates (UOC)—U_3O_8 or U_3O_8 equivalent—in 54 shipments from the Ranger mine, Northern Territory,

22. Figures are based on yearly reports to ASNO in accordance with Australia's bilateral agreements and other information held by ASNO. There may be minor discrepancies in the figures due to rounding.
23. All quantities are given as tonnes weight of the element uranium, plutonium or thorium. The isotope weight of ^{235}U is 0.711% of the element weight for natural uranium and from 1 to 5% for low enriched uranium.
24. An estimated 80-90% of Australian obligated low enriched uranium is in the form of spent reactor fuel.
25. Almost all Australian-obligated plutonium is *irradiated*, i.e. contained in irradiated power reactor fuel or plutonium reloaded in a power reactor following reprocessing.
26. Separated plutonium is plutonium recovered from reprocessing. The figure for separated plutonium is not accumulative, but fluctuates as plutonium is fabricated with uranium as mixed oxide (MOX) fuel and returned to reactors for further power generation. On return to reactors the plutonium returns to the 'irradiated plutonium' category. During 2005, 0.5 tonne of plutonium was fabricated into MOX fuel and transferred to reactors.

and the Olympic Dam and Beverley mines in South Australia. This corresponds to 8,694 tonnes of contained uranium.

Table 8: Supply of Australian uranium shown by end-user, 2005

Country	Tonnes UOC (U_3O_8)	% of Total
USA	3,755.95	36.47
Japan	2,272.96	22.07
France	1,131.27	10.98
ROK	945.76	9.18
UK	780.22	7.58
Sweden	660.38	6.41
Belgium	300.00	2.91
Germany	249.48	2.42
Finland	112.04	1.09
Canada	90.72	0.88
TOTAL	**10,298.78**	**100.0**

Table 9: Summary of AONM Transfers, 2005[28]

	Destination	U (tonnes)
Conversion	Canada	2,930
	European Union	2,523
	United States	3,830
Enrichment	European Union	2,846
	United States	369
Fuel Fabrication	Japan	125
	Republic of Korea	64
	United States	215
Reactor Irradiation	Japan	9
Reprocessing	European Union	<100 Kg

The shipper's weight for each UOC consignment is entered on ASNO's record of AONM. These weights, subject to amendment by measured Shipper/Receiver Differences, are the basic source data for ASNO's system of accounting for AONM in the international nuclear fuel cycle. ASNO notified each export to the safeguards authorities in the relevant countries. In every case, those safeguards authorities confirmed to ASNO receipt of each shipment. ASNO notified also the IAEA of each export to non-nuclear-weapon states pursuant to Article 35(a) of Australia's international safeguards agreement as well as to NWS under the IAEA's Voluntary Reporting Scheme. Receiving countries similarly reported receipts to the IAEA.

27. It should be noted that this figure is for the financial year 2005-06, so is different to the quantity received by end-users (see Table 9) which is for the calendar year 2005.
28. Figures are for transfers completed between jurisdictions from 1 January to 31 December 2005. Figures do not include transfers of AONM made within the fuel cycle of a state (or of Euratom), return of heels (residual UF_6 remaining in cylinders), or damaged product.

Bilateral Agreements

Reporting

Reports from ASNO's counterpart organisations were mostly received in a timely fashion and in the agreed format, which enabled analysis and reconciliation with ASNO's records. Because of the need to give priority to the security review of the OPAL reactor, ASNO had not conducted accounts reconciliation meetings with all major counterparts in time for the publication of this report, hence the figures provided in Table 8 and Table 9 are based on ASNO's analysis of all available information at the time of publication.

Transfer of Silex Technology

No new transfers of SSL's associated technology were undertaken during the year. Arrangements established by ASNO with the United States, which govern both the way in which the technology is to be protected and its use for exclusively peaceful purposes, continued to cover items and information already transferred. Messrs John Carlson and Nick Doulgeris held discussions with US counterparts on the implications of SSL obtaining new development partners in the United States.

OUTPUT 1.4: INTERNATIONAL SAFEGUARDS AND NON-PROLIFERATION

Contribution to the development and effective implementation of international safeguards and the nuclear non-proliferation regime.

Performance Measures

- Contribution to the strengthening of international safeguards in ways that advance Australia's interests.
- Contribution to policy development and diplomatic activity by the Department of Foreign Affairs and Trade.
- Contribution to the IAEA's Standing Advisory Group on Safeguards Implementation (SAGSI).
- Management of the Australian Safeguards Support Program (ASSP).
- Cooperation with counterparts in other countries on the development of international safeguards.
- Management of an international outreach program.
- Assessments of developments in nuclear technology.

Performance Assessment

Strengthening International Safeguards

ASNO took an active part in the development and effective implementation of international safeguards during the reporting period. Notable contributions included:

- Mr John Carlson's chairing of SAGSI
- ongoing management of ASSP
- provision of international and regional training on nuclear safeguards, nuclear security, the Additional Protocol and related export controls
- participation in the IAEA's Technical Working Groups on developing a nuclear security culture
- participation in the biennial joint meeting of all IAEA Member States' national safeguards support programs
- participation in the Australian delegation to the IAEA Board of Governors meetings in September 2005 and March 2006
- participation in the 2005 IAEA General Conference
- participation in the May 2006 Conference on Disarmament thematic week on the Fissile Material Cut-off Treaty
- participation in experts meetings and discussions with counterparts in other countries
- attendance at conferences
- production of publications.

During the reporting period, ASNO was proactive in maintaining and strengthening contacts with the IAEA. Extensive discussions were held with senior IAEA officials, including IAEA Director General, Dr Mohamed ElBaradei, and with both the outgoing IAEA Deputy Director General for Safeguards, Dr Pierre Goldschmidt and his successor Dr Olli Heinonen. As a result of its highly effective links with the IAEA, ASNO remained well abreast of developments and emerging problems in safeguards and was able to effectively promote Australian thinking on a range of safeguards and associated issues, contribute to the

resolution of matters of safeguards concern and ensure that ASNO's work program remained relevant to the international non-proliferation agenda.

ASNO assessed that the IAEA safeguards system effectively fulfilled its task of verifying the non-diversion of significant quantities of nuclear material subject to IAEA safeguards. However, ASNO noted that there are substantial technical and administrative challenges to the success of the system. One major technical challenge is in the timely processing of environmental samples that are collected during the IAEA inspectors' in-field activities such as inspection, complementary access and design information verification. A major administrative problem is the retention of expertise with the retirements of experienced senior safeguards inspectors and managers.

Contribution to DFAT policy development and diplomatic activity

A number of major safeguards issues arose during the year, and ASNO has been well-placed to contribute to policy development and diplomatic activities by providing analysis and advice.

ASNO has a close and supportive working relationship with the Australian Mission in Vienna, particularly with the Australian Ambassador in the role of Australian Governor on the IAEA Board of Governors. ASNO plays a major role in providing the Mission with timely and comprehensive advice on IAEA reports and briefing materials. ASNO analyses are frequently shared with the IAEA Secretariat and with likeminded governments in Vienna and other key capitals.

Issues dealt with by ASNO included:

- Iran's safeguards breaches, including analysis of nuclear developments in Iran and advice on handling in the IAEA Board of Governors
- assessment of nuclear developments in the DPRK
- 'small quantities protocols'—safeguards arrangements for countries with only small holdings of nuclear material.

An important task for ASNO is analysis of the IAEA's annual Safeguards Implementation Report (SIR), which is the principal means by which the IAEA reports to Member States on the operation of the safeguards system. The 2005 SIR included a very useful section on the new approaches to inspection planning and evaluation for states subject to integrated safeguards by use of State Level Approaches (SLA) and Annual Safeguards Implementation Plans (AIP).

IAEA Standing Advisory Group on Safeguards Implementation

During the year, SAGSI—of which Mr John Carlson has been a member since 1998 and Chair since 2001—continued to work closely with the IAEA Secretariat in the development of integrated safeguards. SAGSI has played a key role in the development of the state-level approach to safeguards, and new approaches to the evaluation of safeguards effectiveness and performance, and how to report these to Member States.

Australian Safeguards Support Program

Re-Examination of Basic Safeguards Implementation Parameters

During the 1990s the IAEA acknowledged the need, in parallel with the development of strengthened and integrated safeguards concepts, to re-examine basic safeguards implementation parameters, such as timeliness goals, significant quantities, and the categorisation of nuclear material for safeguards purposes.

ASNO is currently undertaking consultancy work for the IAEA's Division of Safeguards Concepts and Planning (SGCP) on the safeguarding of research reactors. This work is expected to take up to two years to complete.

Support for Information Review and Evaluation

Since 1997, ASNO has undertaken a number of consultancy subtasks for the IAEA supporting the implementation of strengthened safeguards. These involve:

- consultancy by Dr Annette Berriman to SGIT for periods of four to six weeks twice each year. This year the Department of Defence agreed to supply an analyst to SGIT on similar terms to those agreed for Dr Berriman. The first visit by a Defence Department consultant took place during the reporting period
- provision of open source information on developments in our region.

Design information review and evaluation for the Pebble Bed Modular Reactor (PBMR)

In September 2005 ASNO accepted a task to evaluate the methods that could be used by the IAEA to verify the design information of the South African designed PBMR. Unfortunately no progress was made on this project during the reporting period as it has not been possible to put in place arrangements to obtain the relevant design information from South Africa.

Analytical Services for Environmental Sampling

Environmental sampling is an important safeguards strengthening measure that enhances the IAEA's capability to detect undeclared nuclear activities. ANSTO has shown that mass spectrometry using a tandem accelerator can be used to analyse environmental samples with very high sensitivity.

ANSTO has demonstrated unequivocally that Accelerator Mass Spectroscopy (AMS) is the only technique capable of measuring U-236 at the low levels expected in environmental materials. The AMS at ANSTO is now a certified facility of the IAEA's Network of Analytical Laboratories for measurements of U-236 and I-129.

ANSTO is undertaking long term development work to investigate the applicability of AMS methodology for measurements of isotopes of plutonium. Significant progress on these investigations has been made.

Cooperation with other States Parties

ASNO actively strengthened contacts with other safeguards agencies and international safeguards practitioners. ASNO undertook extensive consultation with senior officials of several foreign governments and foreign industry representatives, including from Canada, China, India, Indonesia, Iran, Iraq, Japan, Korea and the United States.

ASNO staff presented papers at the July 2005 Institute of Nuclear Materials Management Annual Meeting in Arizona in the United States.

International Outreach

ASNO continued its international outreach activities to assist countries in the region with the fulfilment of their non-proliferation and physical protection obligations. All of this work was well received and led to requests for further assistance. Key contributions included:

- hosting an IAEA Regional Technical Meeting on Additional Protocol Implementation for Asian participants to discuss practical issues associated with implementing Additional Protocols
- hosting a State System of Accounting for and Control of Nuclear Material (SSAC) Training Course for Iraq. The course was conducted at the request of the IAEA as a means of assisting the Government of Iraq with its legal obligations arising from assuming responsibility for the remaining nuclear material in Iraq

- hosting an IAEA Training Course on the Security of Nuclear Research Facilities. This course was conducted with the assistance of the US Department of Energy. The course trained officials from Asian states in how to implement effective systems to ensure the physical security of nuclear facilities and materials against theft, sabotage and terrorism
- a lecture by Mr Craig Everton at a regional safeguards training course held by the Japanese Atomic Energy Agency.

Improved Nuclear Safeguards: Addressing Practical Issues in the Region

ASNO has an ongoing program of assistance to regional states in understanding the context, obligations and practical implementation of IAEA safeguards including the Additional Protocol (AP). As part of this program, from 10-14 October 2005, ASNO (using AusAID regional aid program funds) together with the IAEA conducted a Regional Technical Meeting on AP Implementation in the southern Sydney suburb of Cronulla. Thirty-two officials from China, Indonesia, Japan, the Republic of Korea, New Zealand, the Philippines, Singapore, Thailand, the United States, the IAEA and Australia participated in the meeting.

The practical issues discussed during the meeting covered non-proliferation, safeguards and the AP; obtaining information required by APs; preparation of AP declarations; complementary access; and resolving IAEA questions. Presentations were given by officials of the IAEA, Australia, New Zealand, Japan, the Republic of Korea and the United States on AP obligations, IAEA rights, export controls, reporting procedures, and experiences in implementing the AP.

Mr Nick Doulgeris (ASNO), presenting on Australia's experiences with IAEA complementary access visits.

Training Course on Security of Nuclear Research Facilities

From 20-31 March 2006, ASNO hosted a training course in Sydney on the Security of Nuclear Research Facilities. Australia, the IAEA, and the US Sandia National Laboratories jointly conducted this course. The course was funded through the regional aid program of AusAID and the IAEA's Nuclear Security Fund (to which Australia contributes). It is part of Australia's significant contribution to international efforts to establish more effective and efficient national and nuclear research facility level security systems, improve training for nuclear security personnel, and to enhance management and supervision of nuclear security activities.

This course focused on the security of research facilities and the protection of nuclear materials from theft, sabotage and terrorism. The course covered defining the threat; analysing possible consequences; defining possible terrorist targets; development of a regulatory framework; risk analysis; designing a physical protection system; detection, delay and response components; and system evaluation.

Thirty nuclear regulatory and facility officials from Bangladesh, Cambodia, China, Indonesia, Japan, Malaysia, Philippines, Thailand, Vietnam, and Australia participated in the two-week course together with lecturers from Australia (ASNO, ANSTO, ARPANSA and the Australian Federal Police), China, France, Germany, Russia, the United States and the IAEA.

Along with lectures and group discussions, the participants toured ANSTO's facilities at Lucas Heights in Sydney and undertook sub-group exercises on how to identify and deal with threats at nuclear facilities.

A subgroup compares a physical protection system's response time to the time it could take for a terrorist to blow up a hypothetical nuclear facility.

OUTPUT 1.5: CWC IMPLEMENTATION

Regulation and reporting of Australian chemical activities in accordance with the Chemical Weapons Convention, and strengthening of international implementation of the Convention.

Performance Measures

- Implementation of Australia's obligations under the Chemical Weapons Convention (CWC).
- Regulation of CWC-related activities in Australia, involving the chemical industry, research and trade.
- Formulation of Australian CWC verification and related policy.
- Cooperation with the Organization for the Prohibition of Chemical Weapons (OPCW) and other CWC States Parties.

Performance Assessments

International CWC Obligations

Each CWC State Party is required to provide accurate and timely declarations and notifications to the OPCW concerning activities with chemicals relevant to the Convention. During the year ASNO provided the following to the OPCW:

- Article VI declaration of imports and exports of CWC Scheduled Chemicals[29] and of the 45 facilities with CWC-relevant chemical production, processing or consumption activities during 2005 (provided March 2006)[30]
- Article VI declaration of 11 chemical research/industrial facilities anticipated activities during 2006 with CWC Scheduled Chemicals (provided September and October 2005)
- Article X, paragraph 4, declaration of Australia's national chemical defence program (provided April 2005)
- Article X, paragraph 7, Australia's offer of assistance and protection against the use or threat of use of chemical weapons in other States Parties (this replaces the original declaration dated April 1997)
- routine response to OPCW notifications and amendments/corrections to inspector details and deletions or additions to the OPCW inspectorate.

The accuracy of Australia's declarations was confirmed for selected facilities through short-notice routine inspections by the OPCW. In March 2006, the OPCW carried out routine inspections at two chemical facilities in Victoria where discrete organic chemicals containing phosphorus, sulphur or fluorine are produced. In fulfilment of its inspection mandates the OPCW team verified the accuracy of relevant declarations as well as the absence of any Schedule 1 chemical at the sites. ASNO facilitates OPCW inspections by liaising between OPCW inspection teams and facility operators to ensure Australia's compliance and that industry interests are protected.

29. Declared information was obtained from reports by licensed importers and exporters, industry surveys, data exchanges with trading partners and from the Australian Customs Service data.
30. Declared information was obtained mainly from industrial facilities subject to reporting obligations of the permit and notification system defined under Chemical Weapons (Prohibition) Act 1994.

Legislation and Regulation

The system of permits and notifications under the *Chemical Weapons (Prohibition) Act 1994* continued to operate well and was subject to some refinements. During the reporting period:

- activities with Schedule 1 chemicals at a research facility were moved to a new building on the same site, requiring the issue of a new permit by ASNO
- a new permit was issued, one was cancelled and four other permits were renewed authorising the processing of Schedule 2 chemicals
- 49 permits authorising the import of Schedule 2 and/or 3 chemicals were issued by ASNO, in accordance with the Customs (Prohibited Imports) Regulations 1956.

Table 10: Permits for CWC Scheduled Chemical Facilities at 30 June 2006

Chemicals	Schedule 1			Schedule 2		Schedule 3
	s19(4)	s19(5)	s19(6)	s18(1)	s18(1)	s18(1)
Facility Type	Protective	Research	Consumption	Processing	Consumption	Production
Total	**1**	**9**	**1**	**11**	**1**	**3**

To help industry understand the system of permits and notifications, and to prepare for possible OPCW inspections, ASNO visits declared industry and research facilities. During the year, ASNO representatives visited 11 such facilities. To further inform the broader chemical industry about relevant regulatory requirements, including import and export, ASNO continued to collaborate with the Plastics and Chemicals Industries Association and the Advocate for the Consumer, Cosmetic, Hygiene and Specialty Products Industry.

To raise awareness in universities about their obligations under WMD-related import/export control legislation, ASNO conducted outreach jointly with Defence Trade Control and Compliance to Australian university safety officers during a conference in Adelaide in July 2005. Constructive discussions were also held between senior government officials and the CEO of the Australian Vice-Chancellor's Committee to enhance communication channels between Government and academia. Plans for future collaboration were developed.

ASNO is assisting the Department of Defence to develop procedures for management of old chemical weapons found in Australia. This will help ASNO make timely declarations to the OPCW, facilitate possible OPCW inspections and ensure proper destruction of old chemical weapons. OPCW specialists visited Australia from 8-12 August 2005 to advise Australian officials and military explosive ordnance personnel on handling and reporting of any find of old chemical weapons.

To effectively monitor trade in CWC Scheduled chemicals ASNO has been working for some years with the Australian Customs Service (ACS) to improve the accuracy of trade statistics for particular chemicals. During the year this focused on ensuring that traders use correct tariff classification codes in Customs import documentation, and that any misclassifications are identified and corrected.

ASNO participated in a WMD commodity identification ‘train-the-trainer’ course for ACS officials conducted by a team from the United States. Dr Josy Meyer gave a presentation on ASNO’s roles and responsibilities with a focus on the importance of export controls to Australia’s participation in WMD non-proliferation treaties and export control regimes.

OPCW Officials Visit Australia to Discuss Old WWII Chemicals Weapons

In response to an invitation by ASNO, two officials from the Organization for the Prohibition of Chemical Weapons (OPCW) in The Hague visited Australia from 8-12 August 2005. The main purpose of the visit was to inform Australian officials and military explosive ordnance personnel about the options available for the appropriate handling and reporting of old chemical weapons (OCW) finds, to ensure safety, transparency and compliance with the Convention, and to prepare them for any possible future OPCW inspections of new OCW discoveries.

Australia destroyed its defensive chemical weapon capability at the end of the Second World War (WWII) but occasionally buried OCW are found during excavation work at defence sites. More recent finds of old WWII empty chemical munitions in Queensland and NSW and their destruction were previously declared to the OPCW as required under the CWC, but because of their corroded condition, the OPCW waived its right to conduct any inspections.

The OPCW officials were fully extended during the visit, travelling and presenting to largely Defence audiences as facilitated by ASNO and the Governance and Counter Proliferation Branch in Defence. Initial meetings were held at the Defence Science and Technology Organisation (DSTO) in Melbourne and at DFAT in Canberra. The visit also included tours of the Human Protection and Performance Division, DSTO, the Australian Bomb Data Centre and Australian Federal Police Forensic Laboratories. For transparency purposes, the program included a visit to the recovery site of the most recent find of WWII 250 lb OCW at a Defence facility north of Lithgow.

The Defence facility was known as a "hoax town" during WWII as it was set up to conceal Defence operations from Japanese reconnaissance. The visit was brought to life by the recollections and faded WWII photographs proudly displayed by a retired LAC Chemical Warfare Armourer RAAF officer, who at the age of 18 was responsible during the War for checking and sealing any leaking mustard canisters which were stored in old railway tunnels near Picton, Lithgow and Glenbrook, in the Blue Mountains.

The final day of the program was spent at the Orchard Hills Defence Establishment, west of Sydney, where OPCW officials gave presentations tailored for explosive ordnance army officers and other defence personnel. Copies of the OPCW Handbook (compiled by Jeff Osborne), containing extensive colour photographs of pre-1946 chemical munitions, were provided to ASNO and welcomed as a valuable resource for identifying any further discoveries of old chemical weapons both in Australia and on overseas deployments.

The visit demonstrated Australia's transparency regarding OCW finds by providing OPCW officials access to relevant sites and personnel during their stay in Australia. Roundtable discussions were particularly useful for the development of a Defence Instruction on the handling and reporting of OCW finds, which ensures Australia's international obligations are met.

Formulation of Australian CWC verification and related policy

Certain aspects of CWC declaration and verification provisions are subject to ongoing development through discussions in the OPCW. ASNO contributes to these discussions, primarily through Australia's mission in The Hague. Australia's general approach is that verification is practical and effective, based on risk-benefit considerations. Australia's input is substantial and credible because it often draws on practices that ASNO has put into place domestically. Australia continues to inform other CWC State Parties, through the industry cluster meetings, about the processes and systems for tracking chemical trade required for submission of declarations.

ASNO continued to provide input to a review of the regulation, reporting and security surrounding the storage, sale and handling of hazardous chemicals in Australia. The review was commissioned in 2002 by the Council of Australian Governments with the aim of minimising the risk of these materials being used for terrorist purposes.

ASNO assisted ACS in developing further its sniffer dog capability to detect certain chemicals that arrive in or depart from Australia.

ASNO provided advice and technical support to the International Security Division of the Department regarding enhancement of the versatility of the Australia Group website.

Cooperation with the OPCW and other States Parties

As a part of Australia's general offer of assistance under the CWC Article VII implementation Action Plan, from 13-16 December 2005 ASNO participated in an awareness raising workshop and issue focus meetings in Phnom Penh. These were hosted jointly by Cambodia and Australia (through the AusAID funded Cambodian Technical Assistance Facility) with support and participation by representatives from the OPCW and Japan. These efforts, combined with visits by two senior Cambodian official visits to DFAT, have brought progress towards full implementation by Cambodia of its CWC obligations.

Representatives from Australia, the OPCW and Japan together with participants from the CWC National Awareness Workshop in Phnom Penh 13-16 December 2005.

By way of assistance to these countries, ASNO provided technical comments on Sri Lanka's draft CWC legislation, and advised Malaysia regarding establishment of its CWC National Authority. ASNO also conducted joint outreach with DFAT to the United Arab Emirates to

advise customs officials on what Australia does with respect to its obligations under the CWC.

ASNO coordinated a program for Taiwanese representatives visiting Canberra and Sydney in May for unofficial discussions on strengthening export controls of strategic and high-tech commodities and CWC implementation issues. ASNO exchanged trade data regarding CWC Scheduled chemicals and shared its experiences in implementing CWC obligations. The visit was also useful in assisting Taiwan with its planned introduction of legislation to regulate CWC relevant chemical production. The program concluded with a tour of Customs' Container Examination Facility in Botany, Sydney.

ASNO also provided advice to Singapore regarding Australia's concentration thresholds for controlling export or import of mixtures of chemicals relevant to non-proliferation.

ASNO continued to share trade data with other States Parties prior to submission of its major declaration to help improve the accuracy and completeness of their respective declarations.

OUTPUT 1.6: CTBT IMPLEMENTATION

Development of verification systems and arrangements in support of Australia's commitments related to the Comprehensive Nuclear-Test-Ban Treaty.

Performance Measures

- Australia's obligations under the Comprehensive Nuclear-Test-Ban Treaty (CTBT) are met.
- Effective legal and administrative mechanisms which support Australia's commitments related to the CTBT.
- Effective contribution to the work of the CTBT Preparatory Commission (PrepCom) and its Working Groups.
- Contribution to Australia's CTBT international outreach efforts.

Performance Assessment

International Obligations

Australia will host 20 monitoring stations and one radionuclide laboratory as part of the CTBT International Monitoring System (IMS), the third largest number of facilities hosted by any one country. As at 30 June 2006, 17 of these facilities were operational. All are capable of operating to CTBT technical specifications and, excepting the radionuclide laboratory, have been formally certified as such. With this, all IMS facilities on the Australian mainland are in place. The four remaining Australian stations will be at remote locations, including Antarctica. Planning for these is well under way. A list of Australia's IMS facilities and their status is at Appendix G.

Specific achievements during 2005-06 in relation to Australian hosted IMS stations include:

- certification of the following stations as meeting CTBT technical requirements: the Australia/United States seismic array at Alice Springs (NT); an infrasound station at Shannon National Park (WA); and an auxiliary seismic station at Fitzroy Crossing (WA)
- advancement of planning for new radionuclide and infrasound stations on the Cocos Islands, Macquarie Island (Tas) and in Antarctica.

Legislation and Regulation

ASNO continues to fund Geoscience Australia (GA) to carry out nuclear test monitoring through that agency's network of seismic stations. This arrangement, set out in a letter of understanding between GA and DFAT, has been administered by ASNO on behalf of DFAT since 1 July 2000. GA satisfied its requirements under the letter of understanding for the reporting period. ASNO reviewed the terms of the letter of understanding during the year and found that it continued to meet Australia's requirements.

Support for the PrepCom and its Working Groups

ASNO participates in the technical working group sessions of the PrepCom, in conjunction with Australia's Mission in Vienna and with technical specialists from GA and ARPANSA. ASNO contributes to the full range of issues dealt with by the working group, with a particular focus on the development of arrangements for the conduct of an On-site Inspection (OSI). During the year ASNO has facilitated Australia's contributions to the work of the PrepCom on development of the CTBT verification regime, as well the use of IMS data for disaster alert purposes such as tsunami warning. Australia was amongst the first countries to seek access to IMS data for tsunami warning as part of a test being conducted by the PrepCom. The new

Australian Tsunami Warning System will use data from selected IMS stations as part of a capability to promptly identify seismic events with the potential for generating a tsunami.

CTBT verification includes the possibility to conduct an OSI to determine whether a nuclear explosion has taken place in a particular area. ASNO's Malcolm Coxhead, as the Task Leader for the elaboration of an Operational Manual on the conduct of OSI, continued to chair discussions at the PrepCom's technical working group. While finalisation of the manual is politically unlikely before entry into force of the CTBT, Mr Coxhead has led a particular effort in 2005-06 to settle a provisional operational manual (Test Manual) to be tested during a major inspection exercise planned for 2008 and to be used for training mock inspectors in the lead-up to the exercise.

Workshop to develop OSI Test Manual, Vienna, May 2006

During the year ASNO hosted or contributed to three Australian events on behalf of the PrepCom to facilitate the development of CTBT verification:

- ASNO hosted a workshop in Canberra in October 2005 on OSI issues. The one week workshop was attended by around 40 Australian and international experts, and focused on how to conduct the 2008 inspection exercise. The workshop was opened by the Minister for Foreign Affairs, and was co-chaired by Mr Coxhead;
- Also in October 2005, ASNO, together with Geoscience Australia, hosted an OSI equipment testing exercise at Bungonia in NSW. The exercise trialled certain geophysical imaging equipment which could be used to detect subsurface artefacts or anomalies caused by nuclear testing. Caves in the Bungonia area were used as a subject for non-destructive imaging techniques; and
- ASNO assisted GA with the planning of a PrepCom training course on analysis of IMS data. The course took place in November 2005 in Canberra, and was attended by ten trainees from regional countries.

Consistent with principles set out in the CTBT, activities associated with the development of CTBT verification are funded primarily from the contributions of Signatories. This includes training of people involved with the work of the Treaty. ASNO coordinates the involvement of Australians in this training.

Testing of geophysical imaging equipment for CTBT OSI at Bungonia, New South Wales, October 2005

International Outreach

In the period 2005-07 Australia has a specific role as the CTBT Article XIV coordinator, acting on behalf of all signatory states, which entails promoting EIF among the hold-outs. This began in September 2005 with the Minister for Foreign Affairs chairing a conference in New York on facilitating the entry into force of the CTBT. ASNO assisted DFAT's preparations for the New York conference as well as other efforts to encourage states to ratify the CTBT.

OUTPUT 1.7: OTHER NON-PROLIFERATION REGIMES

Contribution to the development and strengthening of other weapons of mass destruction non-proliferation regimes.

Performance Measures

- Proactive and professional contribution to the development and effective implementation of the Biological Weapons Convention (BWC).
- Proactive and professional contribution to the development of an effective and verifiable Fissile Material Cut-off Treaty (FMCT).
- Strengthened export controls supported through participation in the Australia Group (AG).
- Contribution to the Proliferation Security Initiative (PSI).

Performance Assessment

Biological Weapons Convention

Although ASNO lacks a formal role in regard to the BWC and, more widely, a specific role countering the proliferation of biological agents and knowledge, ASNO supports the Government's broad objectives on these issues using its technical and regulatory expertise. Since May 2006, ASNO has had to reduce its support to this specific work in order to ensure it can meet its primary responsibilities. During the year, ASNO assisted with a study commissioned by the Department of Prime Minister and Cabinet on Ethical and Philosophical Considerations of the Dual-Use Dilemma in the Biological Sciences. Arising from three years' work with the BWC meetings of experts (see ASNO's Annual Report 2004-05 page 68), ASNO has contributed strongly to developing Australia's objectives for the BWC review conference scheduled for late 2006. At the review conference, it is hoped that States Parties will formalise measures to strengthen the Convention. These may include: endorsement of national strategies to implement BWC obligations; approval of enhanced confidence building measures; and agreement on practical strategies for universalisation of the Convention.

Controlling intangible technology transfers

Working with the Department of Defence and the Department of Prime Minister and Cabinet, ASNO is conducting outreach to universities concerning intangible technology transfer. The next phase of this will be undertaken in close cooperation with the Australian Vice-Chancellors' Committee.

Fissile Material Cut-off Treaty

Throughout the year, ASNO has been active in discussions in key capitals and in specialist journals developing concepts for the negotiation and verification of such a treaty (see Current Topics). In May 2006 the United States tabled a revised draft FMCT in the Conference on Disarmament (CD). Many countries, including Australia (ASNO), sent national experts to Geneva for what turned out to be the most substantive CD debate for years. ASNO hopes there will be constructive intersessional work during the next year and plans to be involved closely.

Australia Group (AG)

ASNO continues to make a substantial contribution to the AG, intersessionally and through the annual meetings. Mr Andrew Leask was invited to again chair work on development and implementation of AG measures. This achieved a number of key outcomes in 2006. In June 2006 the AG plenary added three biological agents to the control list along with certain types of corrosion-resistant chemical manufacturing equipment. ASNO participated fully in other information exchange and enforcement meetings of the AG.

Proliferation Security Initiative

The PSI continues to be a significant activity, involving more than 70 states, for curtailing illegal trade in proliferation sensitive materials and items which, in some cases are not subject to adequate control or to any effective restraints. The PSI is an exercise in collective security: rather than simply accepting the inevitability of dangerous trade, committed states have taken the decision that they will be proactive to stop such activity. During the year, ASNO began the preparation of amendments to the Safeguards and Chemical Weapons Acts needed to implement PSI commitments, and assisted planning for a PSI exercise conducted in early 2006.

OUTPUT 1.8: ADVICE TO GOVERNMENT

Provision of high quality, timely, relevant and professional advice to Government.

Performance Measures

- Satisfaction by Ministers and other key stakeholders with policy advice, analysis and briefings.
- Contribution to the development of Australia's policies by DFAT in the area of WMD arms control and non-proliferation.
- Cooperation on technical issues of common interest with agencies such as ANSTO, ARPANSA, the Defence Intelligence Organisation and the Office of National Assessments.

Performance Assessment

ASNO staff has substantial experience in: verification methods; domestic, bilateral and international safeguards; nuclear technology and the nuclear fuel cycle; nuclear security; and CWC and CTBT verification issues. ASNO draws on this expertise and an international network of contacts in agencies and organisations to provide high quality technical and policy advice to the Government and other bodies. ASNO has furnished the Government with advice on nuclear safeguards, from both international and domestic perspectives, together with expert advice across the full range of WMD technologies.

During the year ASNO supplied advice and analysis on developments in the nuclear fuel cycle. This has included briefings for Ministers, Departments and Parliament, including the House of Representatives Standing Committee on Industry and Resources' inquiry into the development of the non-fossil fuel energy industry in Australia.

Further, ASNO provided professional advice to assist Government efforts to address the threat of chemical and biological terrorism, including:

- activities and publications to raise awareness and provide guidance to chemical companies in regard to chemical counter-terrorism measures
- extensive contribution to the national review of hazardous materials legislation being undertaken for the Council of Australian Governments (COAG).

ASNO provided special briefing materials and additional assistance to the Australian Mission to the IAEA in Vienna, and Australian missions in Washington, Geneva, London and The Hague.

ASNO has worked closely with other departments on issues covering the Global Nuclear Energy Partnership, Uranium Industry Framework and the Commonwealth Radioactive Waste Facility.

Australian Government CBRN Strategy Group

Concerns about the potential threat of CBRN related terrorist activity has led to the establishment of an Australian Government CBRN Strategy Group (the Strategy Group), as a high-level committee to provide policy oversight for civilian CBRN issues. Given its regulatory responsibilities and relevant expertise, ASNO is part of this group, where it also represents DFAT.

OUTPUT 2.1: PUBLIC INFORMATION

Provision of public information on the development, implementation and regulation of weapons of mass destruction non-proliferation regimes, and Australia's role in these activities.

Performance Measures

- Effective public education and outreach.

Performance Assessment

ASNO has worked to ensure that the nuclear debate in Australia is soundly based. During the year, Mr John Carlson gave media interviews and briefings on nuclear issues. Both Mr Carlson and Mr Andrew Leask provided several background briefings to press, industry, academic and non-governmental organisations.

ASNO made submissions to the House of Representatives Standing Committee on Industry and Resources with respect to its Inquiry into the Strategic Importance of Australia's Uranium Resources, and provided additional briefing to assist the Committee during the course of its Inquiry.

ASNO also promoted non-proliferation obligations and objectives in the science and academic community. In particular, ASNO helped raise awareness in tertiary institutions about advanced research which could be of use to weapons of mass destruction (WMD) programs. Key activities included:

- several presentations at the Science, Safeguards and Security forum hosted by Sydney University in 2005
- participation in the Uranium, Energy and Security seminar hosted by the Australian National University in 2006
- engagement with the Australian Vice-Chancellors' Committee.

The China nuclear safeguards and co-operation agreements–signed in April 2006–and the United States-India nuclear agreement announced in February 2006 drew strong and broad interest from the public. ASNO drafted responses on these two issues for 34 items of correspondence to Ministers, as well as multiple emails. In addition to written responses, the texts of the China agreements were published on the ASNO web site along with comprehensive FAQs (answers to frequently asked questions).

As the nuclear regulator responsible for safeguards and security, ASNO participated in an ARPANSA organised public forum concerning ANSTO's licence application for the OPAL reactor.

ASNO contributed to deliberations by the Ethical Investment Society explaining the scope and effectiveness of international safeguards.

At the behest of industry and in addition to its involvement in the Uranium Industry Framework, ASNO took part in discussions on industry stewardship issues. These consultations covered investment, education, fuel cycle developments and knowledge management.

Management and Accountability

CORPORATE GOVERNANCE

Portfolio Minister

Responsibility for administration of the legislation under which ASNO operates—the Nuclear Non-Proliferation (Safeguards) Act 1987, Non-Proliferation Legislation Amendment Act 2003, Chemical Weapons (Prohibition) Act 1994 and Comprehensive Nuclear-Test-Ban Treaty Act 1998—rests with the Minister for Foreign Affairs, the Hon Alexander Downer MP.

Director General ASNO

The Director General ASNO reports directly to the Minister. The position combines the statutory offices of the:

- Director of the national authority for nuclear safeguards (formerly Director of Safeguards), as established by the *Nuclear Non-Proliferation (Safeguards) Act 1987*
- Director of the national authority for the Chemical Weapons Convention, as established by the *Chemical Weapons (Prohibition) Act 1994*
- Director of the national authority for the Comprehensive Nuclear-Test-Ban Treaty, as established by the *Comprehensive Nuclear-Test-Ban Treaty Act 1998*.

Remuneration for the statutory position of Director General ASNO is determined by the Remuneration Tribunal.

Mr John Carlson has held the position of Director General ASNO since the establishment of ASNO on 31 August 1998, having previously held the position of Director of Safeguards since 1989. Mr John Carlson's current appointment is due to expire on 31 December 2006.

Assistant Secretary ASNO

The Assistant Secretary, ASNO, deputises for the Director General and is responsible for the day-to-day operations of the Office. The Assistant Secretary is Mr Andrew Leask.

ASNO Staff

ASNO has a small core of staff whose day-to-day operations are overseen by the Director General. ASNO staff (other than the Director General) are employed under the *Public Service Act 1999* as a division within the Department of Foreign Affairs and Trade (DFAT). ASNO staff are also employed under the DFAT Certified Agreement. Further details are in Table 11.

During the reporting period, Mr Nick Doulgeris, Head of the Nuclear Accountancy and Control Section, was recruited by the IAEA as a Senior Safeguards Inspector. Dr Stephan Bayer was promoted to Mr Doulgeris' position.

Training and Development

ASNO's primary training requirements are professional development of specialist skills. ASNO is proactive in managing this training, in part through a schedule of conference programs. Further details are in Table 12.

Figure 7: ASNO's Organisational Structure

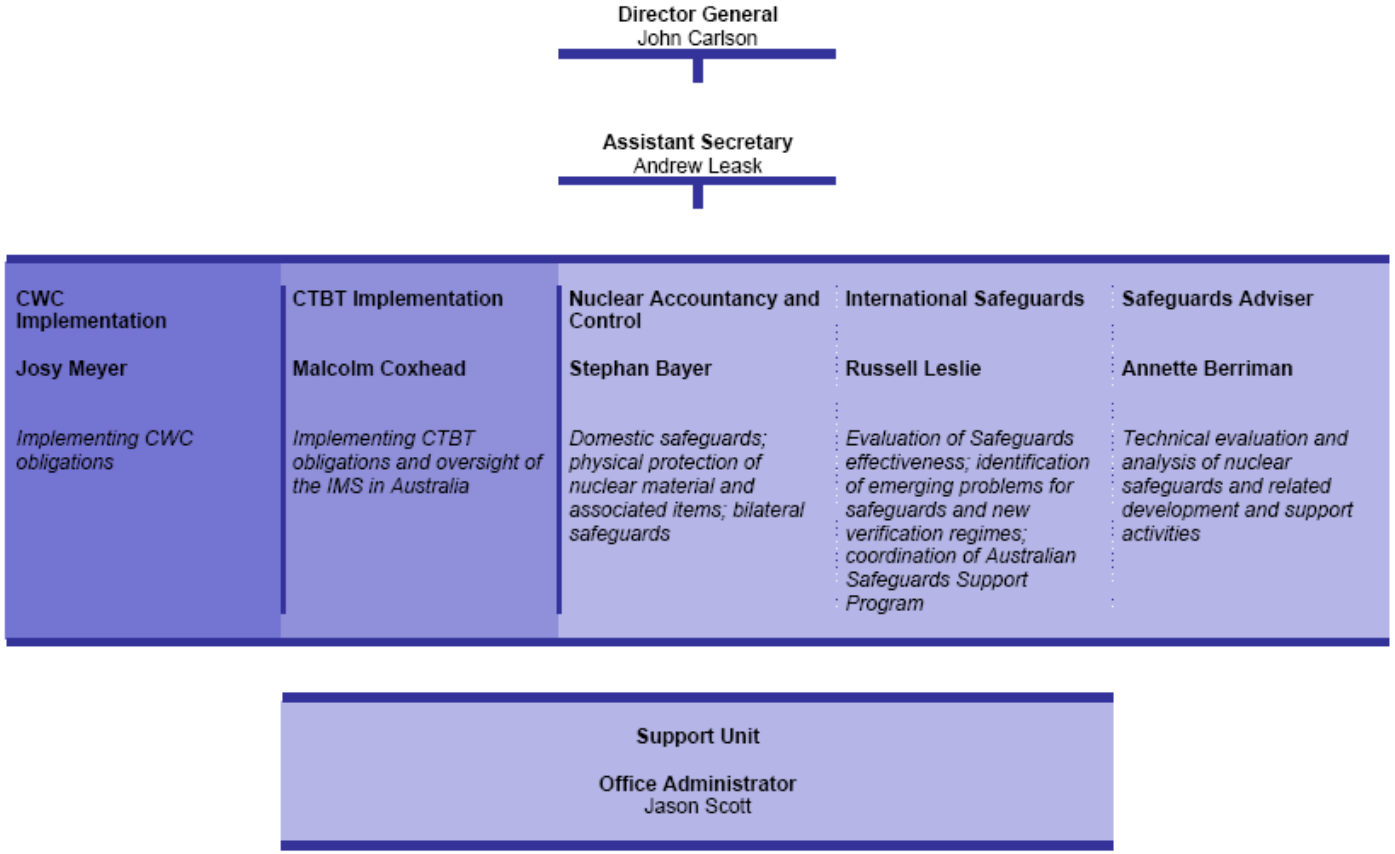


Table 11: ASNO Staff at 30 June 2006

	Male	Female	Total (Approved)
SES B2	1	0	1 (1)
SES B1	1	0	1 (1)
Executive Level 2	3	2	5 (5)
Executive Level 1	1	1	2 (3)
APS Level 6	1	1	2 (2)
APS Level 5	1	1	2 (2)
APS Level 4	0	0	0 (0)
TOTAL	**8**	**5**	**13 (14)**

Table 12: Training and Development Activities

Training and Development Activity	Person Days
Leadership/Management	6.0
Professional Development	2.5
Consular	0.0
Finance and Administration	7.5
Security	1.6
Information Technology	18.0
Other	52.3
TOTAL	**87.9**

FINANCIAL MANAGEMENT

The *Audit Act 2001* requires ASNO to submit an annual Financial Statement to the Auditor-General. As ASNO is funded as a division of DFAT, this financial statement is published in the DFAT Annual Report. Further details of ASNO activities relating to financial management and performance are also contained in the DFAT Annual Report.

Administrative Budget

Table 13: ASNO Administrative Costs[31]

		2004-05	2005-06
Salaries[32]		$1 390 015	$1 564 526
Running Costs	General	$419 469	$411 992
	Seismic monitoring[33]	$558 915	$564 071
	Security review of uranium industry	$18 100	
	Sub-Total	$996 484	$969 969
TOTAL		**$2 386 499**	**2,540,589**

31. Excludes GST.
32. Includes Long Service Leave accruals.
33. Undertaken by Geoscience Australia.

During the reporting period, actual running costs relative to 2004-05 were reduced in line with the Government's 1.25% efficiency dividend.

Uranium Producers Charge

The Uranium Producers Charge is payable on each kilogram of uranium ore concentrate production (set in 2005 to 5.1131 cents per kilogram). In 2005-06, the charge yielded $475,355 for Consolidated Revenue.

Australian Safeguards Support Program

The cost of the Australian Safeguards Support Program (ASSP) totalled about $457,146 in 2005-06. This amount included $185,511 for direct expenditure by ASNO relating to consultancy services and participation in SAGSI (including salaries). The 2005-06 ASSP budget did not include monies spent on ASSP projects by Commonwealth agencies other than ASNO, ANSTO and Defence. Further, it did not include AusAID contributions under the international outreach program.

Environmental Management System (EMS)

In accordance with the Government's decision of May 2001, ASNO, under coverage of the Department of Foreign Affairs and Trade, implemented an Environmental Management System (EMS). The EMS is aimed at reducing negative impacts on the environment, in particular through reduction in the use of energy and goods and minimisation of waste, and improvement in recycling and re-use of materials. ASNO is a key member of the DFAT's EMS committee, providing input into the development of programs and processes that allow DFAT to effectively implement its EMS. ASNO provides advice on the licensing, storage and disposal requirements for radioactive sources. In April 2006 DFAT was audited by an accredited certifying body, NCS International, against the International Standard for Environmental Management Systems, ISO 14001:2004. In June 2006 DFAT received certification to the International Standard.

Performance Indicators

ASNO has tracked its performance against specific indicators relating to core aims and organisational tasks. This information is presented below from two different perspectives. Figure 7 summarises the number of person-days of effort expended in each type of activity. Figure 8 relates to the number of events of each type in which ASNO was involved.

Figure 8: ASNO's Activities and Projects, by percentage of staff time

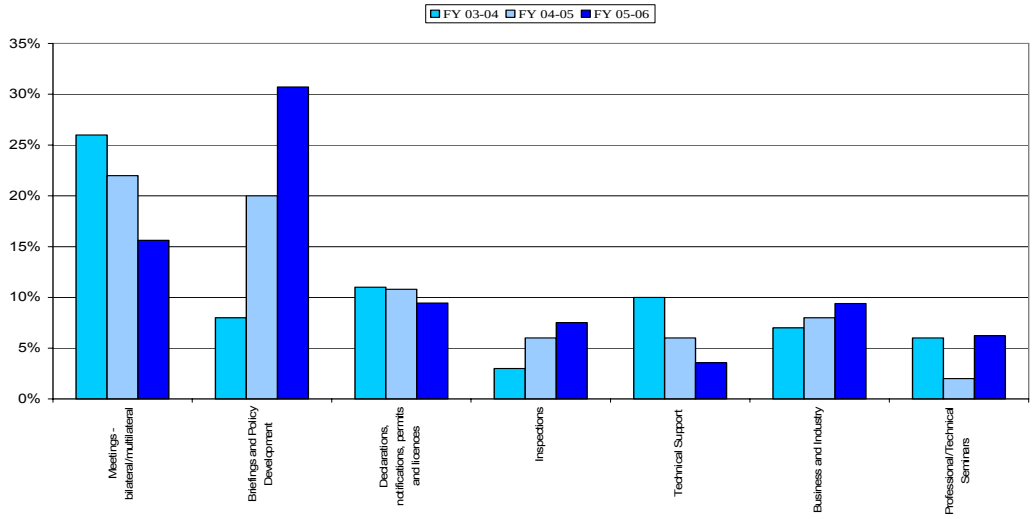
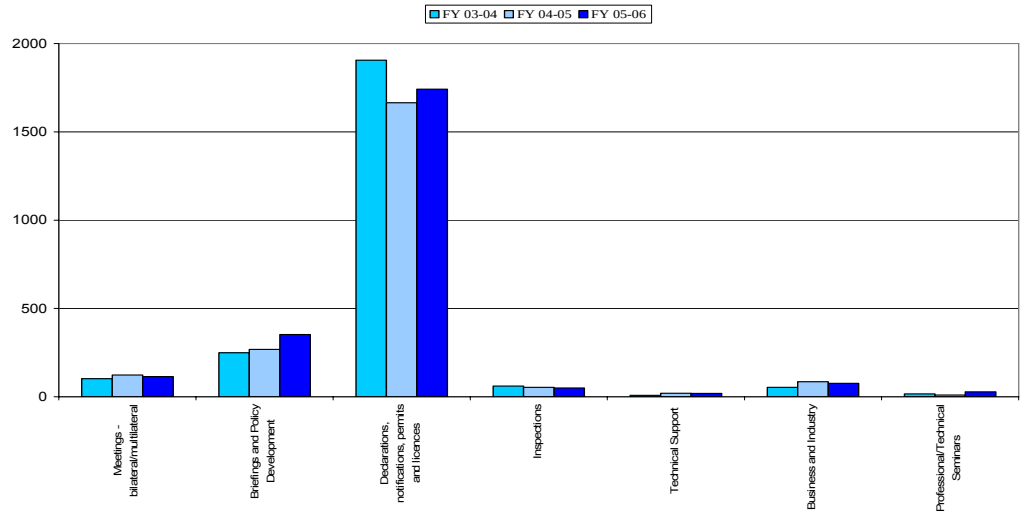


Figure 9: ASNO's Activities and Projects, by type



Appendixes

APPENDIX A WORLD NUCLEAR ENERGY, JULY 2006

World Nuclear Energy, July 2006[34]

Country	Operating Rectors		% of Total Electricity in 2005	Reactors under Construction	
	Total	Capacity (GWe)		Total	Capacity (GWe)
*United States	103	98.1	19.3		
*France	59	63.4	78.5		
*Japan	55	47.6	29.3	1	0.9
Russia	31	21.7	15.8	4	3.8
*Germany	17	20.3	31		
*Republic of Korea	20	16.8	44.7		
Ukraine	15	13.1	48.5	2	1.9
*Canada	18	12.6	14.6		
*United Kingdom	23	11.9	19.9		
*Sweden	10	8.9	44.9		
China	10	7.6	2	4	3.6
*Spain	8	7.5	19.6		
*Belgium	7	5.8	55.6		
*Taiwan[35], China	6	4.9	20	2	2.6
*Czech Republic	6	3.4	30.5		
*Switzerland	5	3.2	32.1		
India	16	3.5	2.8	7	3.1
Bulgaria	4	2.7	44.1	2	1.9
*Finland	4	2.7	32.9	1	1.6
*Slovak Republic	6	2.4	56.1		
Brazil	2	1.9	2.5		
*Hungary	4	1.8	37.2		
South Africa	2	1.8	5.5		
*Mexico	2	1.4	5		
*Lithuania	1	1.2	69.6		
*Argentina	2	0.9	6.9	1	0.7
Romania	1	0.7	8.6	1	0.7
*Slovenia	1	0.7	42.4		
*Netherlands	1	0.5	3.9		
Armenia	1	0.4	42.7		
Pakistan	2	0.4	2.8	1	0.3
Iran				1	0.9
TOTAL	**442**	**369.8**	**(est.) 16.0**	**26**	**22**

Sources: IAEA Power Reactor Information System (PRIS) (www.iaea.org/programmes/a2/)

34. Countries eligible under bilateral agreements with Australia to use AONM are marked with an asterix. These countries operate 358 power reactors, which produce around 14% of total world electricity and about 86% of world nuclear energy. In addition Australia has an agreement with Russia which covers processing on behalf of third countries.
35. Supply of AONM to Taiwan is covered by an agreement between Australia and the United States.

APPENDIX B AUSTRALIA'S BILATERAL SAFEGUARDS AGREEMENTS

Australia's Bilateral Safeguards Agreements at 30 June 2006

Country	Entry into Force
Republic of Korea	2 May 1979
United Kingdom	24 July 1979
Finland	9 February 1980
United States	16 January 1981
Canada	9 March 1981
Sweden	22 May 1981
France	12 September 1981
Euratom[36]	15 January 1982
Philippines	11 May 1982
Japan	17 August 1982
Switzerland	27 July 1988
Egypt	2 June 1989
Russia	24 December 1990
Mexico	17 July 1992
New Zealand	1 May 2000
United States (covering cooperation on Silex technology)	24 May 2000
Czech Republic	17 May 2002
United States (covering supply to Taiwan, China)	17 May 2002
Hungary	15 June 2002
Argentina	12 January 2005

Notes: Two bilateral safeguards agreements with China were signed on 3 April 2006. These have not yet entered into force.
Australia also has an Agreement with Singapore concerning cooperation on physical protection of nuclear materials, which entered into effect on 15 December 1989.

36. The Euratom agreement covers all 25 member states of the European Union.

APPENDIX C STATUS OF ADDITIONAL PROTOCOLS

At 30 June 2006, there were 71 states (plus Taiwan, China) with significant nuclear activities[37]. Of these states, 5 were nuclear-weapon states (NWS), 63 were non-nuclear-weapon states (NNWS) Party to the NPT, and 3 were non-NPT Parties.

In the following tables, states with significant nuclear activities are shown in bold.

Of the 63 NNWS NPT Parties with significant nuclear activities, 45 had an Additional Protocol in force.

Status of Additional Protocols at 30 June 2006

A. States with Additional Protocols in force at 30 June 2006

State			
Afghanistan	El Salvador	**Latvia**	**Portugal**
Armenia	**Estonia**	**Libya** (provisional)	**Republic of Korea**
Australia	**Finland**	**Lithuania**	**Romania**
Austria	**France**	**Luxembourg**	Seychelles
Azerbaijan	**Georgia**	Madagascar	**Slovakia**
Bangladesh	**Germany**	Mali	**Slovenia**
Belgium	**Ghana**	Malta	**South Africa**
Bulgaria	**Greece**	Marshall Islands	**Spain**
Burkina Faso	Haiti	Monaco	**Sweden**
Canada	Holy See	Mongolia	**Switzerland**
Chile	**Hungary**	**Netherlands**	Tajikistan
China	Iceland	New Zealand	Tanzania
Croatia	**Indonesia**	Nicaragua	**Turkey**
Cuba	**Ireland**	**Norway**	Turkmenistan
Cyprus	**Italy**	Palau	Uganda
Czech Republic	**Jamaica**	Panama	**Ukraine**
DR Congo	**Japan**	Paraguay	**United Kingdom**
Denmark	Jordan	**Peru**	**Uruguay**
Ecuador	Kuwait	**Poland**	**Uzbekistan**
TOTAL: 76 states plus Taiwan, China (including 45 NNWS with significant nuclear activities)			

37. 'Significant nuclear activities' encompasses any amount of nuclear material in a facility or "location outside a facility" (LOF), or nuclear material in excess of the exemption limits in INFCIRC/153 paragraph 37.

A further 38 states had signed an Additional Protocol or had an Additional Protocol that had been approved by the IAEA Board of Governors.

B. States with Additional Protocols signed or approved but not in force at 30 June 2006

State	State	State	State
Andorra	Comoros	Liechtenstein	**Russia**
Albania	Costa Rica	**Malaysia**	Senegal
Algeria	Fiji	Mauritania	**Serbia & Montenegro**
Belarus	FYROM	Mauritius	Singapore
Benin	Gabon	**Mexico**	**Thailand**
Botswana	Guatemala	Morocco	Togo
Cameroon	Honduras	Namibia	Tunisia
Cape Verde	**Iran**	Niger	**USA**
Central African Rep	**Kazakhstan**	Nigeria	
Colombia	Kiribati	**Philippines**	
TOTAL: 38 states (including 10 NNWS NPT Parties with significant nuclear activities)			

The remaining 8 NNWS NPT Parties with significant nuclear activities had not signed an Additional Protocol.

C. States with Significant Nuclear Activities that had not signed an Additional Protocol at 30 June 2006

State	State	State	State
Argentina[38]	**Egypt**	**Iraq**	**Venezuela**
Brazil	**India** (non-NPT)	**Pakistan** (non-NPT)	**Vietnam**
DPRK	**Israel** (non-NPT)	**Syria**	
TOTAL: 11 states (including 8 NPT Parties with significant nuclear activities)			

38. Argentina and Brazil intend to bring the Additional Protocol into effect in conjunction with their regional safeguards authority, ABACC.

APPENDIX D IAEA STATEMENTS OF CONCLUSIONS FOR AUSTRALIA 2005-06

Inventory verification inspections carried out by the IAEA at Australian nuclear facilities and locations are shown in Table 6. In addition, the Agency carries out a range of other verification activities, such as short notice inspections, complementary accesses, design verifications and increased data collection and analysis.

IAEA Conclusions of Inspections in Australia

Verification Activity	Applicable Facilities	End Date of Material Balance Period	Conclusion
Examination of records	HIFAR OPAL R&D Laboratories SSL	03/04/2006 11/04/2006 05/04/2006 07/04/2006	'The records satisfied the Agency requirements.'
Examination of Reports to the Agency	HIFAR OPAL R&D Laboratories SSL	03/04/2006 11/04/2006 05/04/2006 07/04/2006	'The reports satisfied the Agency requirements.'
Application of Containment and Surveillance Measures	HIFAR OPAL SSL	03/04/2006 11/04/2006 07/04/2006	'The application of containment and surveillance measures adequately complemented the nuclear material accountancy measures.'
Verification of Domestic and International Transfers	HIFAR OPAL R&D Laboratories SSL	03/04/2006 11/04/2006 05/04/2006 07/04/2006	'The domestic and international transfers declared by the operator were verified and the results satisfied the Agency requirements.'
Verification of Physical Inventory	HIFAR OPAL R&D Laboratories SSL	03/04/2006 11/04/2006 05/04/2006 07/04/2006	'The physical inventory declared by the operator was verified and the results satisfied the Agency requirements.'
Confirmation of the Absence of Unrecorded Production of Direct-Use Material from Material Subject to Safeguards	SSL OPAL	07/04/2006 11/04/2006	'The absence of unrecorded production of plutonium from nuclear material subject to safeguards was confirmed by the Agency in accordance with its requirements.'
Verification Activities for Timely Detection	HIFAR OPAL R&D Laboratories SSL	03/04/2006 11/04/2006 05/04/2006 07/04/2006	'The verification activities for timely detection during the material balance period satisfied the Agency requirements.'
Verification of the Quality and Functioning of the Operator's Measurement System	R&D Laboratories	05/04/2006	'The operator's measurement system satisfied the Agency requirements.'

The IAEA provides statements of conclusions of inspections under Article 91(b) of Australia's NPT Safeguards Agreement. Table summarises the latest available Article 91(b) statements arising from physical inventory inspections. The IAEA has not closed the material balance

period for locations outside Lucas Heights since 2004 and hence no Article 91(b) conclusions were made for 2005-06.

The IAEA provides statements of conclusions for states in which strengthened safeguards are in force. These statements are provided under Article 10.c. of the Additional Protocol to Australia's NPT Safeguards Agreement. The Statement for 2005 concluded as follows:

> *Access pursuant to Article 4.a.(i) did not indicate the presence of undeclared nuclear material or activities at:*
>
> *Lucas Heights Science and Technology Centre*
>
> *Silex Systems Ltd*
>
> *These conclusions are pending the results of environmental samples.*

APPENDIX E FUNDAMENTAL PRINCIPLES AND OBJECTIVES OF PHYSICAL PROTECTION

These principles were agreed by the IAEA Board and published in GOV/2001/41 dated 15 August 2001.

FUNDAMENTAL PRINCIPLE A: Responsibility of the State
The responsibility for the establishment, implementation and maintenance of a physical protection regime within a State rests entirely with that State.

FUNDAMENTAL PRINCIPLE B: Responsibilities during International Transport
The responsibility of a State for ensuring that nuclear material is adequately protected extends to the international transport thereof, until that responsibility is properly transferred to another State, as appropriate.

FUNDAMENTAL PRINCIPLE C: Legislative and Regulatory Framework
The State is responsible for establishing and maintaining a legislative and regulatory framework to govern physical protection. This framework should provide for the establishment of applicable physical protection requirements and include a system of evaluation and licensing or other procedures to grant authorization. This framework should include a system of inspection of nuclear facilities and transport to verify compliance with applicable requirements and conditions of the license or other authorizing document, and to establish a means to enforce applicable requirements and conditions, including effective sanctions.

FUNDAMENTAL PRINCIPLE D: Competent Authority
The State should establish or designate a competent authority which is responsible for the implementation of the legislative and regulatory framework, and is provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities. The State should take steps to ensure an effective independence between the functions of the State's competent authority and those of any other body in charge of the promotion or utilization of nuclear energy.

FUNDAMENTAL PRINCIPLE E: Responsibility of the License Holders
The responsibilities for implementing the various elements of physical protection within a State should be clearly identified. The State should ensure that the prime responsibility for the implementation of physical protection of nuclear material or of nuclear facilities rests with the holders of the relevant licenses or of other authorizing documents (e.g. operators or shippers).

FUNDAMENTAL PRINCIPLE F: Security Culture
All organisations involved in implementing physical protection should give due priority to the security culture, to its development and maintenance necessary to ensure its effective implementation in the entire organisation.

FUNDAMENTAL PRINCIPLE G: Threat
The State's physical protection should be based on the State's current evaluation of the threat.

FUNDAMENTAL PRINCIPLE H: Graded Approach
Physical protection requirements should be based on a graded approach, taking into account the current evaluation of the threat, the relative attractiveness, the nature of the material and

potential consequences associated with the unauthorized removal of nuclear material and with the sabotage against nuclear facilities or nuclear material.

FUNDAMENTAL PRINCIPLE I: Defence in Depth
The State's requirements for physical protection should reflect a concept of several layers and methods of protection (structural or other technical, personnel and organisational) that have to be overcome or circumvented by an adversary in order to achieve his objectives.

FUNDAMENTAL PRINCIPLE J: Quality Assurance
A quality assurance policy and quality assurance programmes should be established and implemented with a view to providing confidence that specified requirements for all activities important to physical protection are satisfied.

FUNDAMENTAL PRINCIPLE K: Contingency Plans
Contingency (emergency) plans to respond to unauthorized removal of nuclear material or sabotage of nuclear facilities or nuclear material, or attempts thereof, should be prepared and appropriately exercised by all license holders and authorities concerned.

FUNDAMENTAL PRINCIPLE L: Confidentiality
The State should establish requirements for protecting the confidentiality of information, the unauthorized disclosure of which could compromise the physical protection of nuclear material and nuclear facilities.

APPENDIX F IAEA SAFEGUARDS STATEMENT FOR 2005

The following is extracted from the IAEA's Annual Report for 2005.

In 2005, safeguards were applied for 156 States with safeguards agreements in force with the Agency. The Agency's findings and conclusions for 2005 are reported below with regard to each type of safeguards agreement. These findings and conclusions are based upon an evaluation of all the information available to the Agency in exercising its rights and fulfilling its safeguards obligations for that year.

1. Seventy States had both comprehensive safeguards agreements in force and additional protocols in force or being otherwise applied:

(a) For 24 of these States, the Agency found no indication of the diversion of declared nuclear material from peaceful nuclear activities and no indication of undeclared nuclear material or activities. On this basis, the Agency concluded that, for these States, all nuclear material remained in peaceful activities.

(b) For 46 of the States[1], the Agency found no indication of the diversion of declared nuclear material from peaceful nuclear activities. Evaluations regarding the absence of undeclared nuclear material and activities for each of these States remained ongoing. On this basis, the Agency concluded that, for these States, declared nuclear material remained in peaceful activities.

(c) Of these 46 States, the Islamic Republic of Iran (Iran) had been found to have been previously engaged in undeclared nuclear activities. In 2005, the Board of Governors found that Iran's failures and breaches of its obligations to comply with its comprehensive safeguards agreement, as detailed in GOV/2003/75, constituted non-compliance. Verification of the correctness and completeness of Iran's declarations remained ongoing.

2. Safeguards activities were implemented for 77 States with comprehensive safeguards agreements in force, but without additional protocols in force or being otherwise applied[2]. For these States, the Agency found no indication of the diversion of declared nuclear material from peaceful nuclear activities. On this basis, the Agency concluded that, for these States, declared nuclear material remained in peaceful activities.

3. As of the end of 2005, 36 non-nuclear-weapon States party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) had not yet brought comprehensive safeguards agreements with the Agency into force as required by Article III of that Treaty. For these States, the Agency could not draw any safeguards conclusions.

4. Three States had in force safeguards agreements concluded pursuant to INFCIRC/66/Rev.2, which require the application of safeguards to nuclear material, facilities and other items specified in the relevant safeguards agreement. For these States, the Agency found no indication of the diversion of nuclear material or of the misuse of the facilities or other items to which safeguards were applied. On this basis, the Agency

1. And Taiwan, China
2. The Agency was not able to perform verification activities in the Democratic People's Republic of Korea (DPRK) in 2005 and could not, therefore, draw any conclusions about the material or activities for that State.

concluded that, for these States, nuclear material, facilities or other items to which safeguards were applied remained in peaceful activities.

5. Five nuclear-weapon States had voluntary offer safeguards agreements in force. Safeguards were implemented with regard to declared nuclear material in selected facilities in four of the five States. For these four States, the Agency found no indication of the diversion of nuclear material to which safeguards were applied. On this basis, the Agency concluded that, for these States, nuclear material to which safeguards were applied in selected facilities remained in peaceful activities.

APPENDIX G STATUS OF CTBT IMS FACILITIES IN AUSTRALIA

Status of Australian CTBT IMS Stations at 30 June 2006

Facility	Status	Operator
Primary Seismic Stations		
Warramunga, NT	Certified against CTBT standards	ANU
Alice Springs, NT	Certified against CTBT standards	GA / United States
Stephens Creek, NSW	Certified against CTBT standards	GA
Mawson, Antarctica	Certified against CTBT standards	GA
Auxiliary Seismic Stations		
Charters Towers, QLD	Certified against CTBT standards	GA
Fitzroy Crossing, WA	Certified against CTBT standards	GA
Narrogin, WA	Certified against CTBT standards	GA
Infrasound Stations		
Warramunga, NT	Certified against CTBT standards	ANU
Hobart, TAS	Certified against CTBT standards	GA
Shannon, WA	Certified against CTBT standards	GA
Cocos Islands	Site survey completed	GA
Davis Base, Antarctica	Site survey underway	GA
Radionuclide Stations		
Melbourne, VIC	Certified against CTBT standards	ARPANSA
Perth, WA	Certified against CTBT standards	ARPANSA
Townsville, QLD	Certified against CTBT standards	ARPANSA
Darwin, NT	Certified against CTBT standards	ARPANSA
Cocos Islands	Certified against CTBT standards	ARPANSA
Macquarie Island, TAS	Site survey completed	ARPANSA
Mawson, Antarctica	Site survey underway	ARPANSA
Radionuclide Laboratory		
Melbourne, VIC	Testing and evaluation underway for certification against CTBT standards	ARPANSA
Hydroacoustic Stations		
Cape Leeuwin, WA	Certified against CTBT standards	GA

APPENDIX H FREEDOM OF INFORMATION STATEMENT

This statement is provided in accordance with section 8 of the *Freedom of Information Act 1982* (FOI Act) and is correct to 30 June 2006.

The FOI Act extends the right to obtain access to documents in the government's possession. Access is limited only by exemptions that, for example, protect essential public interests and the private and business affairs of people about whom departments and statutory authorities collect and hold information. ASNO received one FOI request in 2005-06.

Members of the public seeking access to documents should lodge a formal FOI request. This must be made in writing and include a contact name, address to which notifications can be sent, telephone number and fax number (if available). All enquiries should be directed to:

Director General
Australian Safeguards and Non-Proliferation Office
R G Casey Building
John McEwen Crescent
BARTON ACT 0221
Australia
Telephone: +61 (2) 6261 1920
Facsimile: +61 (2) 6261 1908
E-mail: asno@dfat.gov.au

Documents

ASNO produces a wide range of documents in administering its responsibilities including:

- submissions to the portfolio minister, Cabinet, the Director General ASNO and other government agencies
- records of parliamentary related business such as responses to parliamentary questions on notice, briefings for parliamentary delegations and parliamentarians, possible parliamentary questions, written submissions to parliamentary committees and responses to questions from parliamentary committee inquiries
- records of technical and other reports, literature, media reports and journals relevant to ASNO's responsibilities
- replies to ministerial and departmental correspondence
- papers prepared in whole or in part by ASNO officers for presentation at conferences and meetings
- texts of speeches and press statements on issues related to ASNO's responsibilities
- briefs, reports and documents on international and Australian aspects of policy relevant to ASNO's safeguards, CWC and CTBT responsibilities
- Annual Reports
- treaties, memorandums of understanding and other agreements between the Australian Government and other governments
- documents relating to program and financial management, contracts and tenders
- reviews, evaluations and audit reports on management systems, controls and the efficiency and effectiveness of development programs and activities
- minutes and working documents of the working groups, committees and organisations to which ASNO is party

- guidelines, policies and procedures relating to strategies and corporate planning, project planning and implementation, including risk assessment and fraud prevention policy and strategies
- materials relating to staff development, training, personnel management and general administration
- customer feedback surveys.

Publications

ASNO produces a range of publications to increase community awareness and understanding of ASNO responsibilities and issues for which it has expertise. They include:

- John Howell, *Chemical Control Visit to Papua New Guinea*, DFATNEWS, Vol.13(6), July 2005
- John Howell, *National Regulation and Security of Dual-Use and Hazardous Materials*, AVCC's Occupational Health and Safety Officers' Conference, Adelaide University, 8 July 2005
- Russell Leslie, Annette Berriman and John Carlson, *Minimum Inspection Frequencies Under Integrated Safeguards*, paper presented at INMM 2005 Annual Meeting, Phoenix, USA, July 2005
- Russell Leslie, Annette Berriman and John Carlson, *Are Randomized Inspections at Pu or HEU Storage Facilities Sufficiently Effective Under Integrated Safeguards?*, paper presented at INMM 2005 Annual Meeting, Phoenix, USA, July 2005
- John Carlson and Russell Leslie, *Safeguards Intensity as a Function of Safeguards Status*, paper presented at INMM 2005 Annual Meeting, Phoenix, USA, July 2005
- John Carlson and Russell Leslie, *Special Inspections Revisited*, paper presented at INMM 2005 Annual Meeting, Phoenix, USA, July 2005
- Josy Meyer, *OPCW Officials Visit Australia to Discuss Old WWII Chemicals Weapons*, DFATNEWS, Vol.15(8), September 2005
- John Carlson, *Regional Safeguards Collaboration – Some Ideas*, paper presented to the Korean Chapter of the Institute of Nuclear Materials Management, Seoul, 7 October 2005, by Martin Quinn, Counsellor, Australian Embassy, on John Carlson's behalf
- John Carlson, *Safeguards and Non-Proliferation: Current Challenges and the Implications for Australia*, paper presented at the 2005 Conference of the Australian Nuclear Association, Sydney, 10 November, 2005
- John Howell, *The Chemistry of Regional Security - Looking for a Better Return on the Chemical Weapons Convention,* paper presented at Sydney Universities' Science Safeguards and Security Workshop, held at the NSW Office of the Department of Foreign Affairs and Trade, Sydney, 16 November 2005
- John Carlson, response to supplementary question to ASNO following a public hearing on 10 October 2005 of the House of Representatives Standing Committee on Industry and Resources: Inquiry into the development of the non-fossil fuel energy industry in Australia, 18 November 2005
- Malcolm Coxhead, *Experts trial n-test search tools*, DFAT NEWS Vol.12(10), November 2005
- Andrew Leask, *A Secure Physical Protection System for the OPAL Reactor*, Sydney, December 2005
- John Howell, *Chemical Security Regulation in Australia*, the Advocate for the Consumer, Cosmetic, Hygiene and Specialty Products Industry (ACCORD) Update News, 21 December 2005

- John Carlson, response to supplementary question to ASNO following a public hearings in November 2005 of the House of Representatives Standing Committee on Industry and Resources: Inquiry into the development of the non-fossil fuel energy industry in Australia, 31 January 2006
- John Carlson, *The Role of Bilateral Nuclear Safeguards Agreements*, Trust and Verify, VERTIC, October 2005-February 2006
- John Carlson, response to supplementary question to ASNO from a committee member of the House of Representatives Standing Committee on Industry and Resources: Inquiry into the development of the non-fossil fuel energy industry in Australia, 24 February 2006
- John Carlson, *Experience and Challenges in WMD Treaty Verification: a Comparative View*, published in Verifying Treaty Compliance, Rudolf Avenhaus et al editors, Springer Berlin, Heidelberg 2006, pp 213-34
- Vanessa Masters, *OPCW Verifies Australia's Compliance with the Chemicals Weapons Convention*, DFATNEWS, Vol.13(4), April 2006
- Vanessa Masters, *Implementing CWC Obligations: an Australian Perspective*, paper distributed at the Counter-Proliferation Export Controls Seminar, Abu Dhabi, United Arab Emirates, 7 June 2006

Presentations and Lectures

- John Howell and Julia Reed, *National Regulation and Security of Dual-Use and Hazardous Materials*, presentation to AVCC's Occupational Health and Safety Officers' Conference, Adelaide University, 8 July 2005
- Andrew Leask and Russell Leslie, *Safeguards in 2015: A Regional Perspective on Challenges and Possibilities*, at the International Seminar on Nuclear and Radioactive Materials Safeguards Technology, Jakarta, 20-21 September 2005
- Nick Doulgeris, *Australia's Experience in Gathering Information*, a presentation to the Regional Technical Meeting on Additional Protocol Implementation, Sydney, 10–14 October 2005
- Nick Doulgeris, *Managed Access Issues,* a presentation to the Regional Technical Meeting on Additional Protocol Implementation, Sydney, 10–14 October 2005
- Andrew Leask, *Challenges to the Nuclear Non-Proliferation Regime and the Role of the Additional Protocol,* a presentation to the Regional Technical Meeting on Additional Protocol Implementation, Sydney, 10–14 October 2005
- John Carlson and Andrew Leask, *Is the NPT in Decline? National Security and Non-Proliferation in an Era of Uncertainty*, at the Science, Safeguards and Security Seminar, Sydney, November 2005
- Malcolm Coxhead and Andrew Leask, *Banning the Tests – The Importance of Entry Into Force of the CTBT* at the Science, Safeguards and Security Seminar, Sydney, November 2005
- Stephan Bayer, *Practical Assistance to implement Nuclear Non-Proliferation Regimes*, presentation to Pacific Island Country delegates in margins to INLEX workshop, Sydney, 28 November 2005
- Andrew Leask, presentation at the ARPANSA Public Forum, Sydney, December 2005 concerning a licence application by ANSTO for the OPAL Reactor
- Nick Doulgeris *Design Basis Threat Development*, paper presented at the Regional Training Course on the Security of Nuclear Research Facilities, Sydney, 20-31 March 2006

- Nick Doulgeris, *Risk Management Approach*, paper presented at the Regional Training Course on the Security of Nuclear Research Facilities, Sydney, 20-31 March 2006
- Stephan Bayer, *Facility Evaluation: Regulator and Operator Roles*, paper presented at the Regional Training Course on the Security of Nuclear Research Facilities, Sydney, 20-31 March 2006
- Nick Doulgeris, *Australia: National Physical Protection Approach*, paper presented at the Regional Training Course on the Security of Nuclear Research Facilities, Sydney, 20-31 March 2006
- John Carlson, Legal *Instruments Related to the Application of Safeguards*, paper presented at the State System of Accountancy and Control training course for Iraq, Canberra, 19-23 June 2006
- Russell Leslie, *Non-Destructive Assay Techniques for Nuclear Material*, paper presented at the State System of Accountancy and Control training course for Iraq, Canberra, 19-23 June 2006
- Russell Leslie, *Destructive Analysis Techniques for Nuclear Material*, paper presented at the State System of Accountancy and Control training course for Iraq, Canberra, 19-23 June 2006
- Malcolm Coxhead, *Input Documentation for on-site inspection integrated field exercise*, CTBTO OSI Workshop 11, Canberra, 10-14 October 2005
- Josy Meyer, *Regulating Chemical Weapons Agents and Their Precursors In Australia*, presentation to the WMD Commodity Identification Train-the-Trainer Course, Sydney, 28 May to 2 June 2006
- Vanessa Masters, *Implementing the Chemical Weapons Convention: an Australian Perspective*, presentation at the Counter-Proliferation Export Controls Seminar, Abu Dhabi, United Arab Emirates, 7 June 2006

FOI Request

- Richard Baker of the Age – FOI reference 63/F05

Compliance Index

This index is prepared from the checklist of annual report requirements set out in Attachment E to the *Requirements for Annual Reports for Departments, Executive Agencies and FMA Act Bodies* as approved by the Joint Committee of Public Accounts and Audit under subsections 63(2) and 70(2) of the *Public Service Act 1999* in June 2005.

Description	Requirement	Location
Letter of transmittal	Mandatory	p.iii
Table of contents	Mandatory	p.iv
Index	Mandatory	p.95
Glossary	Mandatory	p.89
Contact officer(s)	Mandatory	p.ii
Internet home page address and Internet address for report	Mandatory	p.ii
Review by Secretary		
Review by statutory office holder	Mandatory	p.1
Summary of significant issues and developments	Suggested	p.1
Overview of department's performance and financial results	Suggested	N/A
Outlook for following year	Suggested	p.6
Significant issues and developments—portfolio	Portfolio departments—suggested	p.8
Departmental Overview		
Overview description of Office	Mandatory	p.30
Role and functions	Mandatory	p.30
Organisational structure	Mandatory	p.66
Outcome and output structure	Mandatory	p.37
Where outcome and output structures differ from PBS format, details of variation and reasons for change	Mandatory	N/A
Portfolio structure	Portfolio departments—mandatory	DFAT AR
Report on Performance		
Review of performance during the year in relation to outputs and contribution to outcomes	Mandatory	p.38
Actual performance in relation to performance targets set out in PBS/ PAES	Mandatory	DFAT AR
Performance of purchaser/ provider arrangements	If applicable, mandatory	N/A
Where performance targets differ from the PBS/ PAES, + details of both former and new targets, and reasons for the change	Mandatory	N/A
Narrative discussion and analysis of performance	Mandatory	p.38
Trend information	Suggested	p.69
Factors, events or trends influencing departmental performance	Suggested	N/A
Significant changes in nature of principal functions/ services	Suggested	N/A

Performance against service charter customer service standards, complaints data, and the department's response to complaints	If applicable, mandatory	N/A
Social justice and equity impacts	Suggested	N/A
Discussion and analysis of the Office's financial performance	Mandatory	p.67
Discussion of any significant changes from the prior year or from budget.	Suggested	p.67
Summary resource tables by outcomes	Mandatory	DFAT AR
Developments since the end of the financial year that have affected or may significantly affect the department's operations or financial results in future	If applicable, mandatory	N/A
Corporate Governance and Management Accountability		
Statement of the main corporate governance practices in place	Mandatory	DFAT AR
Names of the senior executive and their responsibilities	Suggested	p.65
Senior management committees and their roles	Suggested	N/A
Corporate and operational planning and associated performance reporting and review	Suggested	DFAT AR
Approach adopted to identifying areas of significant financial or operational risk and arrangements in place to manage risks	Suggested	DFAT AR
Agency heads are required to certify that their agency comply with the Commonwealth Fraud Control Guidelines.	Mandatory	DFAT AR
Policy and practices on the establishment and maintenance of appropriate ethical standards	Suggested	DFAT AR
How nature and amount of remuneration for SES officers is determined	Suggested	p.65
External Scrutiny		
Significant developments in external scrutiny	Mandatory	DFAT AR
Judicial decisions and decisions of administrative tribunals	Mandatory	DFAT AR
Reports by the Auditor-General, a Parliamentary Committee or the Commonwealth Ombudsman	Mandatory	DFAT AR
Management of Human Resources		
Assessment of effectiveness in managing and developing human resources to achieve departmental objectives	Mandatory	DFAT AR
Workforce planning, staff turnover and retention	Suggested	p.65
Impact and features of certified agreements and AWAs	Suggested	DFAT AR
Training and development undertaken and its impact	Suggested	p.67
Occupational health and safety performance	Suggested	DFAT AR
Productivity gains	Suggested	DFAT AR
Statistics on staffing	Mandatory	p.67
Certified agreements and AWAs	Mandatory	DFAT AR
Performance pay	Mandatory	DFAT AR
Contracts exempt from Purchasing and Disposal Gazette	Mandatory	DFAT AR
Assets management		
Assessment of effectiveness of assets management	If applicable, mandatory	DFAT AR
Purchasing		
Assessment of purchasing against core policies and principles	Mandatory	DFAT AR

Consultants		
The annual report must include a summary statement detailing the number of new consultancy services contracts let during the year; the total actual expenditure on all new consultancy contracts let during the year (inclusive of GST); the number of ongoing consultancy contracts that were active in the reporting year; and the total actual expenditure in the reporting year on the ongoing consultancy contracts (inclusive of GST). (Additional information as in Attachment D to be available on the Internet or published as an appendix to the report. Information must be presented in accordance with the proforma as set out in Attachment D.)	Mandatory	DFAT AR
Competitive Tendering and Contracting		
Competitive tendering and contracting contracts let and outcomes	Mandatory	DFAT AR
Absence of contractual provisions allowing access by the Auditor-General	Mandatory	DFAT AR
Contracts exempt from the Purchasing and Disposal Gazette	Mandatory	DFAT AR
Financial Statements		
Financial Statements	Mandatory	DFAT AR
Other Information		
Occupational health and safety (section 74 of the *Occupational Health and Safety (Commonwealth Employment) Act 1991)*	Mandatory	DFAT AR
Freedom of Information (subsection 8(1) of the *Freedom of Information Act 1982)*	Mandatory	p.82
Report on performance in implementing the Commonwealth Disability Strategy	Mandatory	DFAT AR
Advertising and Market Research (section 311A of the *Commonwealth Electoral Act 1918)*	Mandatory	DFAT AR
Ecologically sustainable development and environmental performance (Section 516A of the *Environment Protection and Biodiversity Conservation Act 1999*)	Mandatory	DFAT AR
Discretionary Grants	Mandatory	DFAT AR
Correction of material errors in previous annual report	If applicable, mandatory	N/A

Glossary

Additional Protocol	An agreement designed to complement a state's Safeguards Agreement with the IAEA in order to strengthen the effectiveness and improve the efficiency of the safeguards system. The model text of the Additional Protocol is set out in IAEA document INFCIRC/540.
Agency Inspector	Person nominated by the IAEA and declared under section 57 of the Safeguards Act to undertake IAEA inspections.
AMS	Accelerator Mass Spectroscopy.
ANSTO	Australian Nuclear Science and Technology Organisation.
AONM	Australian Obligated Nuclear Material. Australian uranium and nuclear material derived therefrom which is subject to obligations pursuant to Australia's bilateral safeguards agreements.
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency.
ASIO	Australian Security and Intelligence Organisation.
ASSP	Australian Safeguards Support Program.
Australia Group	The Australian-chaired, multilateral arrangement for coordinating national export controls on materials and equipment of potential relevance to chemical and biological weapons.
BAPETEN	Indonesian Nuclear Energy Control Board.
BATAN	Indonesian National Nuclear Energy Agency.
BWC	Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction. Also known as the Biological Weapons Convention.
Challenge Inspection	(for CWC purposes) An inspection, requested by a CWC State Party, of any facility or location in the territory or in any other place under the jurisdiction or control of another State Party.
Complementary Access	The right of the IAEA pursuant the Additional Protocol for access to a site or location to carry out verification activities.
Comprehensive Safeguards Agreement	Agreement between a state and the IAEA for the application of safeguards to all of the state's current and future nuclear activities (equivalent to 'full scope' safeguards) based on INFCIRC/153.
Concise Note	Supplementary explanatory notes on formal reports from a national safeguards authority to the IAEA.
Conversion	Purification of uranium ore concentrates or recycled nuclear material and conversion to a chemical form suitable for isotopic enrichment or fuel fabrication.
CPPNM	Convention on the Physical Protection of Nuclear Material.
CTBT	Comprehensive Nuclear-Test-Ban Treaty.
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization. The Vienna-based international organisation established to give effect to the CTBT.
Customs	Australian Customs Service.

CWC	Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction. Also known as the Chemical Weapons Convention.
CWC Scheduled Chemicals	Chemicals listed in the three Schedules to the Chemical Weapons Convention. Some are chemical warfare agents and others are dual-use chemicals (that can be used in industry or in the manufacture of chemical warfare agents).
Defence	Australian Department of Defence.
Depleted Uranium (DU)	Uranium with a ^{235}U content less than that found in nature (e.g. as a result of uranium enrichment processes).
DFAT	Department of Foreign Affairs and Trade.
Direct-Use Material	Nuclear material defined for safeguards purposes as being usable for nuclear explosives without transmutation or further enrichment, e.g. plutonium, HEU and ^{233}U.
Discrete Organic Chemical	Any chemical belonging to the class of chemical compounds consisting of all compounds of carbon, except for its oxides, sulphides and metal carbonates, identifiable by chemical name, by structural formula, if known, and by Chemical Abstracts Service registry number, if assigned. Long chain polymers are not included in this definition.
DOE	United States Department of Energy.
DPRK	Democratic People's Republic of Korea.
Enrichment	A physical or chemical process for increasing the proportion of a particular isotope. Uranium enrichment involves increasing the proportion of ^{235}U from its level in natural uranium, 0.711%: for LEU fuel the proportion of ^{235}U (the enrichment level) is typically increased to between 3% and 5%.
Environmental analysis	A technique for detecting residual traces of nuclear material on building surfaces, in plants and soil, in water and in the air. A very powerful safeguards tool, the value of which was first demonstrated in Iraq.
Euratom	Atomic Energy Agency of the European Union. Euratom's safeguards office, called the Directorate General of Transport and Energy H (DG), is responsible for the application of safeguards to all nuclear material in Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, and Sweden; and to all nuclear material in civil facilities in France and the United Kingdom.
Facility	(for CWC purposes) A plant, plant site or production/processing unit. (for safeguards purposes) A reactor, critical facility, conversion plant, fabrication plant, reprocessing plant, isotope separation plant, separate storage location or any location where safeguards significant amounts of nuclear material are customarily used.
Facility Attachment	(for safeguards purposes) A document agreed between the IAEA and the relevant Member State that specifies the nuclear materials accountancy system for a specific facility and defines the format and scope of inspection activities.
Fissile	Referring to a nuclide capable of undergoing fission by neutrons of any energy, including 'thermal' neutrons (e.g. ^{233}U, ^{235}U, ^{239}Pu and ^{241}Pu).

Fission	The splitting of an atomic nucleus into roughly equal parts, often by a neutron. In a fission reaction, a neutron collides with a fissile nuclide (e.g. ^{235}U) that then splits, releasing energy and further neutrons. Some of these neutrons may go on to collide with other fissile nuclei, setting up a nuclear chain reaction.
Fissionable	Referring to a nuclide capable of undergoing fission by 'fast' neutrons (e.g. ^{233}U, ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{241}Pu and ^{242}Pu).
FMCT	Fissile Material Cut-off Treaty. A proposed international treaty to prohibit production of fissile material for nuclear weapons.
Full Scope Safeguards	The application of IAEA safeguards to all of a state's present and future nuclear activities. Now more commonly referred to as comprehensive safeguards.
G-8	Group of Eight. Comprises Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States.
GA	Geoscience Australia (formerly the Australian Geological Survey Organisation).
GW	Gigawatt (Giga = billion, 10^9).
GWe	Gigawatts of electrical power.
GWt	Gigawatts of thermal power.
Heavy Water (D_2O)	Water enriched in the 'heavy' hydrogen isotope deuterium (hydrogen 2) which consists of a proton and a neutron. D_2O occurs naturally as about one part in 6000 of ordinary water. D_2O is a very efficient moderator, enabling the use of natural uranium in a nuclear reactor.
HEU	High enriched uranium. Uranium enriched to 20% or more in ^{235}U. Weapons-grade HEU is enriched to over 90% ^{235}U.
HIFAR	High Flux Australian Reactor. The 10 MWt research reactor located at ANSTO, Lucas Heights.
Hydro-acoustic	Term referring to underwater propagation of pressure waves (sounds).
IAEA	International Atomic Energy Agency.
IDC	International Data Centre. Data gathered by monitoring stations in the CTBT IMS network is compiled, analysed and archived by the Vienna-based IDC. IDC products giving the results of analyses are made available to CTBT signatories.
IMS	International Monitoring System. A network of 337 monitoring stations and analytical laboratories established pursuant to the CTBT which, together with the IDC, gather and analyse data with the aim of detecting any explosive nuclear testing.
Indirect-Use Material	Nuclear material that cannot be used for a nuclear explosive without transmutation or further enrichment (e.g. depleted uranium, natural uranium, LEU and thorium).
INFCIRC	IAEA Information Circular. A series of documents published by the IAEA setting out, inter alia, safeguards, physical protection and export control arrangements.
INFCIRC/66 Rev.2	The model safeguards agreement used by the IAEA since 1965. Essentially this agreement is facility-specific. For NNWS party to the NPT It has been replaced by INFCIRC/153.
INFCIRC/153 (Corrected)	The model agreement used by the IAEA as a basis for safeguards agreements with non-nuclear-weapon states party to the NPT.

INFCIRC/225 Rev.4 (Corrected)	IAEA document entitled 'The Physical Protection of Nuclear Material and Nuclear Facilities'. Its recommendations reflect a consensus of views among IAEA Member States on desirable requirements for physical protection measures on nuclear material and facilities, that is, measures taken for their physical security.
INFCIRC/540	The model text of the Additional Protocol.
Infrasound	Sound in the frequency range of about 0.02 to 4 Hertz. One category of CTBT IMS stations will monitor sound at these frequencies with the aim of detecting explosive events such as a nuclear test explosion at a range up to 5000 km.
Integrated safeguards	The optimum combination of all safeguards measures under comprehensive safeguards agreements and the Additional Protocol to achieve maximum effectiveness and efficiency.
Inventory Change Report	A formal report from a national safeguards authority to the IAEA on changes to nuclear materials inventories in a given period.
Isotopes	Nuclides with the same number of protons, but different numbers of neutrons, e.g. ^{235}U (92 protons and 143 neutrons) and ^{238}U (92 protons and 146 neutrons). The number of neutrons in an atomic nucleus, while not significantly altering its chemistry, does alter its properties in nuclear reactions. As the number of protons is the same, isotopes are the same chemical element.
LEU	Low Enriched Uranium. Uranium enriched to less than 20% ^{235}U. Commonly, LEU used as fuel in light water reactors is enriched to between 3% and 5% ^{235}U.
Light water	H_2O. Standard water.
Light water reactor	A power reactor which is both moderated and cooled by ordinary (light) water. In this type of reactor, the uranium fuel must be slightly enriched (that is, LEU).
Material Balance Report	A formal report from a national safeguards authority to the IAEA comparing consolidated inventory changes in a given period with the verified inventories at the start and end of that period.
Missile Technology Control Regime, MTCR	An informal and voluntary association of countries which share the goals of non-proliferation of unmanned delivery systems capable of delivering weapons of mass destruction, and which seek to coordinate national export licensing efforts aimed at preventing their proliferation.
Moata	Small training reactor located at Lucas Heights. The ANSTO Board decided to cease operation of this reactor in February 1995. The reactor was defuelled in May 1995.
Moderator	A material used to slow fast neutrons to thermal speeds where they can readily be absorbed by ^{235}U or plutonium nuclei and initiate a fission reaction. The most commonly used moderator materials are light water, heavy water or graphite.
MOX	Mixed oxide reactor fuel, consisting of a mixture of uranium and plutonium oxides. The plutonium content of fresh MOX fuel for a LWR is typically around 5-7%.
MUF	Material Unaccounted For. A term used in nuclear materials accountancy to mean the difference between operator records and the verified physical inventory. A large MUF may indicate diversion of material or loss of control, however, a certain level of MUF is expected due to measurement processes.
MWe	Megawatts of electrical power.
MWt	Megawatts of thermal power.

Natural uranium	In nature uranium consists predominantly of the isotope ^{238}U (approx. 99.3%), with the fissile isotope ^{235}U comprising only 0.711%.
NNWS	Non-nuclear-weapon state(s). States not recognised by the NPT as having nuclear weapons at 1 January 1967 when the Treaty was negotiated
NPT	Treaty on the Non-Proliferation of Nuclear Weapons.
Nuclear material	Any source material or special fissionable material as defined in Article XX of the IAEA Statute (in practice, this means uranium, thorium and plutonium).
Nuclear Suppliers Group, NSG	A group of countries (currently 45) which seeks to contribute to the non-proliferation of nuclear weapons through the implementation of harmonised Guidelines for nuclear and nuclear-related exports.
Nuclide	Nuclear species characterised by the number of protons (atomic number) and the number of neutrons. The total number of protons and neutrons is called the mass number of the nuclide.
NWS	Nuclear-weapon state(s). States recognised by the NPT as having nuclear weapons at 1 January 1967 when the Treaty was negotiated, namely the United States, Russia, the United Kingdom, France and China.
OCW	Old chemical weapons.
OPAL	Open Pool Australian Light-Water reactor. The 20 MWt research reactor located at ANSTO, Lucas Heights, due to be operational in 2007.
OPCW	Organization for the Prohibition of Chemical Weapons.
OSI	On-Site Inspection. A short notice challenge-type inspection provided for in the CTBT as a means for investigation concerns about non-compliance with the prohibition on nuclear explosions.
Physical Inventory Listing	A formal report from a national safeguards authority to the IAEA on nuclear materials inventories at a given time (generally the end of a Material Balance Report period).
PrepCom	Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty.
Production	(for CWC purposes) The formation of a chemical through chemical reaction. Production of chemicals specified by the CWC is declarable, even if produced as intermediates and irrespective of whether or not they are isolated.
PTS	Provisional Technical Secretariat for the Comprehensive Nuclear-Test-Ban Treaty.
^{239}Pu	An isotope of plutonium with atomic mass 239 (94 protons and 235 neutrons). The fissile isotope of plutonium most suitable for nuclear weapons.
R&D	Research and Development.
Reprocessing	Processing of spent fuel to separate uranium and plutonium from highly radioactive fission products.
ROK	Republic of Korea.
Safeguards Act	Nuclear Non-Proliferation (Safeguards) Act 1987.
Safeguards Inspector	For domestic purposes, person declared under section 57 of the Safeguards Act to undertake inspections to ensure compliance with provisions of the Act and to assist IAEA Inspectors in the conduct of Agency inspections and complementary access in Australia.

SAGSI	Standing Advisory Group on Safeguards Implementation. An international group of experts appointed by and advising the IAEA Director General on safeguards implementation matters.
^{232}Th	Thorium-232.
Toxin	Compound originating from micro-organisms, animals or plants, irrespective of the method of production, whether natural or modified, that can cause death, disease or ill health to humans, animals or plants.
^{233}U	An isotope of uranium containing 233 nucleons, usually produced through neutron irradiation of ^{232}Th.
^{235}U	An isotope of uranium containing 235 nucleons (92 protons and 143 neutrons) which occurs as 0.711% of natural uranium.
^{238}U	An isotope of uranium containing 238 nucleons (92 protons and 146 neutrons) which occurs as about 99.3% of natural uranium.
UOC	Uranium Ore Concentrates. A commercial product of a uranium mill usually containing a high proportion (greater than 90%) of uranium oxide.
WMD	Weapons of mass destruction. Refers to nuclear, chemical, biological and occasionally radiological weapons.

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