AUSTRALIAN SAFEGUARDS AND NON-PROLIFERATION OFFICE

ANNUAL REPORT 2002-2003

Director of Safeguards

Director, Chemical Weapons Convention Office

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Cover:

Energy Resources of Australia's Ranger Uranium Mine, Northern Territory. *Picture courtesy of ERA.*

Australian Government

Department of Foreign Affairs and Trade

Australian Safeguards and Non-Proliferation Office

19 September 2003

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

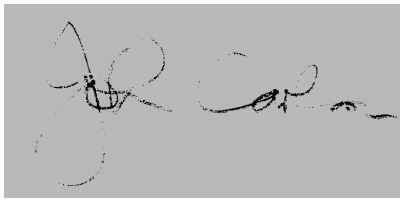
Dear Mr Downer,

Pursuant to section 51 of the *Nuclear Non-Proliferation (Safeguards) Act 1987*, and to section 96 of the *Chemical Weapons (Prohibition) Act 1994*, I submit my Annual Report covering the operations of the Australian Safeguards Office and the Chemical Weapons Convention Office for the financial year ended 30 June 2003. This Report also covers the operations of the Australian Comprehensive Test-Ban Office for the same period.

As outlined in this Report, all relevant statutory and treaty requirements were met, and ASNO found no unauthorised use of nuclear materials or nuclear items in Australia. In particular, all requirements under Australia's safeguards agreement with the International Atomic Energy Agency and under the Chemical Weapons Convention were met, and activities required in anticipation of the entry-into-force of the Comprehensive Nuclear-Test-Ban Treaty were carried out. All Australian Obligated Nuclear Material (AONM) was accounted for (as explained in the Report, the inventory of AONM under the Australia/United States agreement is based on provisional information).

During the year ASNO continued its substantial contribution to the development and strengthening of IAEA safeguards and other international regimes concerned with weapons of mass destruction (WMD). Domestically, ASNO contributed to reviews of WMD-related legislation and administration, including security arrangements for hazardous materials, and was closely involved in safeguards and security aspects of ANSTO's replacement research reactor project.

Yours sincerely,



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General enquires relating to ASNO functions, activities or responsibilities should be directed to the Director General, Australian Safeguards and Non-Proliferation Office.

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SCOPE OF THIS ANNUAL REPORT

The position of Director General, Australian Safeguards and Non-Proliferation Office (ASNO, combines the statutory office of Director of Safeguards with that of Director, Chemical Weapons Convention Office (CWCO). The Director General also performs the functions of the Director, Australian Comprehensive Test Ban Office (ACTBO) on an informal basis, as the relevant legislation has not yet come into effect.

This report covers the activities of ASNO and is prepared pursuant to the requirements of section 51 of the *Nuclear Non-Proliferation (Safeguards) Act 1987* and section 96 of the *Chemical Weapons (Prohibition) Act 1994*.

Section 71 of the *Comprehensive Nuclear Test-Ban Treaty Act 1998* also requires preparation of an annual report. That Act will take effect at entry into force of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) following ratification by the 44 states specified in the Treaty. Although the Treaty—and therefore the Act—is not yet in effect, States Signatories are co-operating, in accordance with the provisions of the Treaty, to develop CTBT verification infrastructure ahead of the Treaty's entry into force. ASNO's activities in this regard are included in this Report.

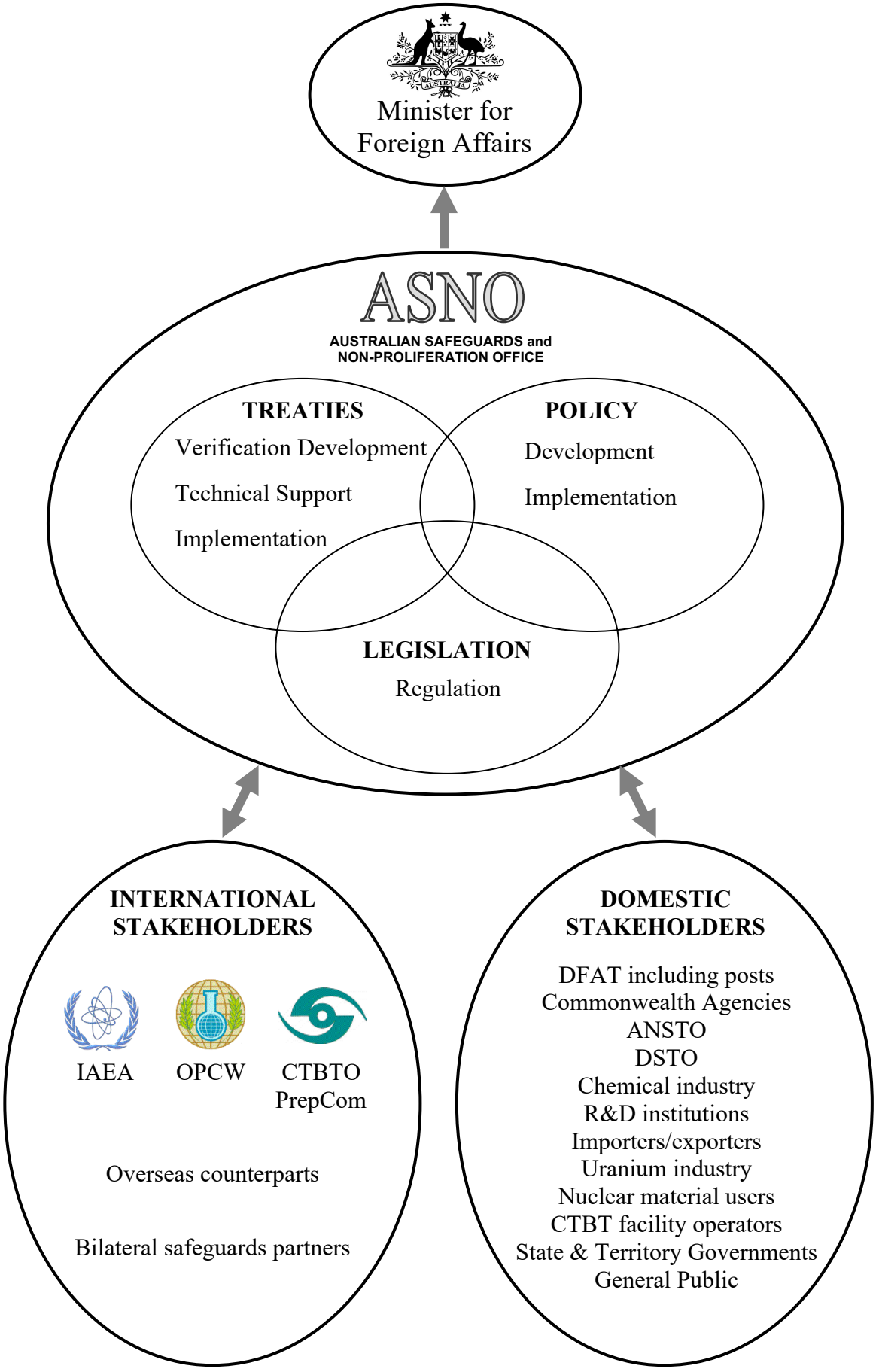


Figure 1—ASNO's operating environment

ASNO OUTCOMES AND OUTPUTS

OUTCOME 1

Australian and international security enhanced through activities which contribute to effective regimes against the proliferation of nuclear, chemical and biological weapons.

Outputs

A. Operation of Australia's national system of accounting for, and control of, nuclear material and items subject to IAEA (International Atomic Energy Agency) safeguards, including promotion and regulation, within Australia, of effective measures for the physical protection of nuclear facilities and material.

B. Development and implementation of bilateral safeguards measures that ensure nuclear material and associated items exported from Australia remain in exclusively peaceful use.

C. Contribution to the development and effective implementation of international safeguards and non-proliferation regimes, including participation in international expert groups and provision to the IAEA of consultancies, assessments, support in R&D and training; and evaluation of the effectiveness of IAEA safeguards and related regimes.

D. Operation of the national authority for implementation of the Chemical Weapons Convention (CWC), including contribution to the effective international implementation of the CWC, particularly in Australia's immediate region.

E. Operation of the national authority for implementation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), including development of CTBT verification systems and development of arrangements in support of Australia's CTBT commitments.

F. Contribution to the development of new and strengthened WMD (weapons of mass destruction) non-proliferation regimes, including the Australia Group (AG), verification and implementation arrangements in support of the Biological Weapons Convention (BWC), and verification concepts for the proposed Fissile Material Cut-off Treaty (FMCT).

G. Provision of high quality, timely and relevant professional advice to Government on non-proliferation matters.

OUTCOME 2

Knowledge about Australia's efforts to prevent the proliferation of WMD enhanced through public advocacy.

Output

H. Provision of public information on the development, implementation and regulation of WMD non-proliferation treaties, and Australia's role in these activities.

AUSTRALIAN SAFEGUARDS AND NON-PROLIFERATION OFFICE 2002-2003

MINISTER

Administration of the legislation under which ASNO operates, the *Nuclear Non-Proliferation (Safeguards) Act 1987* (the Safeguards Act), the *Chemical Weapons (Prohibition) Act 1994* and the *Comprehensive Nuclear Test-Ban Treaty Act 1998,* is the responsibility of the Minister for Foreign Affairs, the Hon. Alexander Downer MP.

DIRECTOR GENERAL, ASNO

The position of Director General, ASNO, incorporates the functions of Director of Safeguards, Director, Chemical Weapons Convention Office and Director, Australian Comprehensive Test Ban Office. Background to the establishment of ASNO, in 1998, is set out in the ASNO Annual Report 1999-2000 (page 106).

Director of Safeguards

The Australian Safeguards Office, ASNO's predecessor, was established in 1974. In 1987, in order to ensure the independence and integrity of Australia's domestic and bilateral safeguards functions, the position of Director of Safeguards was created as a statutory office, appointed by the Governor-General. The Director of Safeguards reports directly to the responsible Minister, who since 1994 has been the Minister for Foreign Affairs. The Safeguards Act requires the Director of Safeguards to prepare an Annual Report for presentation to Parliament.

Mr John Carlson was initially appointed as Director of Safeguards in 1989, and was appointed as Director General, ASNO, on 31 August 1998 when ASNO was established. Mr Carlson was re-appointed on 29 May 2003 until 31 December 2006.

Director, CWCO

The *Chemical Weapons (Prohibition) Act 1994* provides that the Minister may designate a particular office within a Department or agency for which the Minister is responsible, or a statutory office under legislation for which the Minister is responsible, as the office whose occupant is the Director, Chemical Weapons Convention Office (CWCO). On 11 March 1995 the Minister for Foreign Affairs designated the office of Director of Safeguards for this purpose.

The Director, CWCO, is required to prepare an Annual Report for presentation to Parliament, and this has been combined with the Annual Report of the Director of Safeguards.

Director, ACTBO

The Director, Australian Comprehensive Test Ban Office (ACTBO), is likewise to be designated by the Minister under the *Comprehensive Nuclear Test-Ban Treaty Act 1998*. As currently drafted, this Act will take effect when the CTBT enters into force. Accordingly, at present the Director, ACTBO cannot be formally designated, and the requirement to produce an annual report has not formally taken effect. However, as

described in this Annual Report, ASNO is already carrying out many of the tasks required of Australia's CTBT National Authority, and a report on these activities is included here.

FUNCTIONS

The functions of the Director General, ASNO, include:

- ensuring the effective operation of the *Nuclear Non-Proliferation (Safeguards) Act 1987,* and the *Chemical Weapons (Prohibition) Act 1994,* and fulfilment of Australia's obligations under the treaties these Acts implement;
- ensuring fulfilment of Australia's obligations under nuclear safeguards agreements, including the agreement with the International Atomic Energy Agency (IAEA) for the application of safeguards pursuant to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT);
- establishing bilateral nuclear safeguards agreements and monitoring compliance by Australia's treaty partners with the provisions of those agreements;
- undertaking, coordinating and facilitating research and development (R&D) in relation to nuclear safeguards;
- ensuring the timely and effective establishment of CTBT International Monitoring System (IMS) facilities in Australia, and undertaking preparations to meet the full range of Australia's obligations under the CTBT when it enters into force; and
- advising the Minister on nuclear non-proliferation and safeguards matters, and on issues related to CWC implementation and CTBT verification.

OVERVIEW OF SAFEGUARDS ROLE

On safeguards, ASNO has four main areas of responsibility:

- the application of safeguards within Australia;
- ensuring the physical protection and security of nuclear items in Australia;
- the operation of Australia's bilateral safeguards agreements; and
- contribution to the operation and development of international (IAEA) safeguards and the strengthening of the international nuclear non-proliferation regime.

IAEA safeguards are a key element in international action against the spread of nuclear weapons. Effective IAEA safeguards are of vital interest to Australia because of their contribution to global and regional peace and security. They are also important because they underpin Australia's stringent uranium export policies.

Key safeguards functions are:

- ensuring that nuclear material, associated material, equipment and technology in Australia are properly accounted for and controlled, and ensuring that requirements are met under Australia's safeguards agreement with the IAEA and bilateral agreements applying to nuclear material and items in Australia;
- pursuant to obligations under the Convention on the Physical Protection of Nuclear Material (CPPNM), and following IAEA guidelines, ensuring that appropriate security measures are applied to nuclear items in Australia;

- ensuring Australia's bilateral safeguards agreements are implemented satisfactorily, that is, to guarantee Australia's nuclear exports remain in exclusively peaceful use; ensuring that conditions which Australia places on the use of Australian Obligated Nuclear Material (AONM), additional to IAEA safeguards, are met (these conditions are outlined on page 92);
- ensuring that all AONM is subject to IAEA safeguards, and verification of non-diversion is carried out by the IAEA;
- ensuring that any nuclear items other than nuclear material (i.e. associated material, equipment and technology) transferred to other countries are properly accounted for, and that the relevant records of Australia's partners are consistent with ASNO records;
- contributing to the development and effective implementation of IAEA safeguards through activities such as participation in expert groups and international meetings on safeguards, field testing of new safeguards methods in Australia, and presentation of regional training courses on safeguards techniques;
- managing Australia's Support Program for IAEA safeguards, which embraces R&D work and includes consultancy tasks for the IAEA;
- evaluation of the effectiveness of IAEA safeguards, and evaluation of non-proliferation aspects of nuclear fuel cycle developments, as a basis for advising Government;
- contributing to the development of Australia's policies in the area of disarmament and non-proliferation by colleagues in the International Security Division (ISD) of DFAT; and
- working closely on technical issues of common interest with agencies such as the Australian Nuclear Science and Technology Organisation (ANSTO), the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the Defence Intelligence Organisation (DIO), and the Office of National Assessments (ONA).

OVERVIEW OF CWC ROLE

ASNO is the focal point in Australia for liaison between stakeholders involved with CWC implementation, such as representatives of declared facilities, the Organisation for the Prohibition of Chemical Weapons (OPCW), and the national authorities of other States Parties. ASNO's role also includes facilitation to ensure that Australia's international obligations under the CWC are met while at the same time making certain that the rights of facility operators are protected. ASNO seeks to promote effective international implementation of the CWC, particularly in Australia's immediate region, by working with the OPCW and other States Parties in the resolution of outstanding verification issues and providing practical implementation assistance, upon request.

ASNO is responsible for ensuring that the requirements of the *Chemical Weapons (Prohibition) Act 1994* are met. It has the right to conduct national compliance inspections of relevant chemical facilities in Australia. While the Act makes provision for national inspectors to obtain mandatory access to sites, it is expected such powers will be exercised only in exceptional circumstances. ASNO has an extensive on-site consultation and outreach program aimed at raising awareness of affected parties of CWC obligations, collecting information necessary for declarations and preparing sites for routine compliance inspections by the OPCW.

ASNO is responsible for ensuring that the requirements of Regulation 5J of the *Customs (Prohibited Imports) Regulations* are met by regulating the importation of CWC Scheduled

chemicals through operation of an import permit system. ASNO reports this trade to the OPCW, together with details of related chemical exports, which are regulated by the Department of Defence.

ASNO provides technical support to DFAT and other agencies in multilateral and domestic efforts to further the objectives of the Biological Weapons Convention (BWC). If a package of verification and other strengthening measures is agreed, it is envisaged that ASNO would undertake BWC responsibilities similar to those it holds under the CWC.

Figure 2—Dr Josy Meyer (left) from ASNO with OPCW inspectors and facility representatives during a routine industry inspection in Perth.

Key CWC functions are:

- identifying and gathering information on industrial chemical facilities and activities required to be declared to the OPCW;
- working with declarable facilities to prepare for the possibility of an OPCW inspection;
- facilitating OPCW inspections in Australia;
- increasing awareness of the CWC and Australia's obligations by disseminating information on the Convention and the *Chemical Weapons (Prohibition) Act 1994* to the chemical industry and other domestic entities likely to be affected, including through on-site consultations;
- administering and developing regulatory, administrative and logistical mechanisms to enable Australia to fulfill its CWC obligations;
- liaising with overseas counterpart organisations and with the Technical Secretariat of the OPCW in connection with technical and practical implementation issues;

- conducting research directed towards improving the effectiveness of the CWC's verification regime;
- assisting, upon request, other States Parties to implement the CWC, particularly in Australia's immediate region; and
- providing technical advice to support development of measures to strengthen the BWC.

OVERVIEW OF CTBT ROLE

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. 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 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.

Figure 3—The Buckland Infrasound Station was constructed during 2002-2003 at the Buckland Military Training Area in central Tasmania. *Photo courtesy of Geoscience Australia.*

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

Key CTBT functions include:

- being the 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;

- participating in development and implementation by DFAT and other agencies of Australian policy relevant to the CTBT;
- promoting understanding of CTBT verification, including by acting as an interface between technical and policy specialists; and
- contributing to the development of Treaty verification, through the PrepCom and its working groups.

ADVICE TO THE GOVERNMENT

The staff of ASNO has substantial experience in international and bilateral safeguards, nuclear technology, CWC and BWC verification issues, and CTBT processes and procedures. Drawing on this expertise and an international network of contacts in other governments and organisations, ASNO provides technical and policy advice to the Government and non-government bodies.

LEGISLATION

Nuclear Non-Proliferation (Safeguards) Act 1987

The *Nuclear Non-Proliferation (Safeguards) Act 1987* took effect on 31 March 1987. This Act establishes the statutory office of Director of Safeguards and forms the legislative basis for ASNO's nuclear safeguards activities.

The Safeguards Act gives effect to Australia's safeguards obligations under:

- the NPT;
- Australia's NPT 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; and
- the Convention on the Physical Protection of Nuclear Material (CPPNM).

Control over nuclear material and associated items in Australia is exercised under the Safeguards Act by a system of permits for their possession and transport. Communication of information contained in sensitive nuclear technology is controlled through the grant of authorities.

The Safeguards Act empowers the Minister to grant, vary or revoke permits or authorities, to make declarations or orders in relation to material, equipment or technology covered by the Act, and to appoint inspectors to assess compliance with the Act and with Australia's NPT safeguards agreement with the IAEA. The Minister has delegated most of these powers (with certain exceptions such as granting of permits to uranium mines and for nuclear activities) to the Director of Safeguards.

Regulations and declarations under this Act are listed under the *Freedom of Information Act 1982* statements on page 98 of this Report.

Nuclear Non-Proliferation (Safeguards) (Consequential Amendments) Act 1988

The *Nuclear Non-Proliferation (Safeguards) (Consequential Amendments) Act 1988* took effect on 24 May 1988. This amended the *Patents Act 1952* to allow referral from the Patent Office (now IP Australia) to the Director of Safeguards of patent applications which might constitute 'associated technology' under the Safeguards Act. The amendments give

the Director of Safeguards the power to direct that such a patent application lapse if the applicant does not hold an appropriate authority under the Safeguards Act to communicate sensitive information at the time of making the application for the patent. These amendments were consolidated into the *Patents Act 1990*.

Nuclear Safeguards (Producers of Uranium Ore Concentrates) Charge Act 1993

In conjunction with an amendment to the Safeguards Act, this legislation imposes an annual charge on uranium producers corresponding to a proportion of ASNO's operating costs. Further details are on page 26.

South Pacific Nuclear Free Zone Treaty Act 1986

The *South Pacific Nuclear Free Zone Treaty Act 1986* (the SPNFZ Act) prohibits the manufacture, production, acquisition, stationing and testing of nuclear explosive devices, and R&D relating to manufacture or production of nuclear explosive devices.

The SPNFZ Act establishes the framework for inspections in Australia by Treaty inspectors, and provides for appointment by the Minister for Foreign Affairs of authorised officers to accompany and observe international inspectors while they are in Australia. Inspectors appointed for the purposes of the Safeguards Act are also inspectors under the SPNFZ Act. These inspectors are to assist Treaty inspectors and authorised officers in carrying out Treaty inspections, and investigating possible breaches of the SPNFZ legislation in Australia.

Chemical Weapons (Prohibition) Act 1994

The *Chemical Weapons (Prohibition) Act 1994* 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.

In conjunction with other legislation (see under the following heading), 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 CWCO (i.e. 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 CWCO to verify compliance with the Act; and
- 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 an on-site inspection.

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 *Chemical Weapons (Prohibition) Act 1994* 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.

Other CWC related legislation

Other aspects of the CWC which required legislation have been, or are being, dealt with under existing legislation, in particular the:

- *Customs (Prohibited Exports) Regulations* and *Customs (Prohibited Imports) Regulations* to enforce CWC obligations in relation to export and import controls on scheduled chemicals. The *Customs (Prohibited Imports) Regulations* were amended on 15 December 1999 to extend import licensing arrangements to cover all CWC Scheduled chemicals; and
- *International Organisations (Privileges and Immunities) Act 1963*, to recognise the OPCW as an international organisation, and to grant appropriate privileges and immunities to its officers when in Australia for official purposes.

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 up to 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 Commonwealth 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 Commonwealth with the authority to establish IMS stations and to make provision for access to them for CTBT monitoring purposes. The Act also 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.

Australia is under an obligation, pursuant to Article IV of the Treaty, to allow CTBT inspectors to inspect any place in Australia or the external Territories 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 ACTBO (part of ASNO) as the Australian national authority for the CTBT. The Act grants ACTBO necessary legal capacity and provides for the power to make regulations with respect to privileges and immunities for the CTBT Organization and its officials under Australian law in accordance with the Treaty.

The Act was assented to on 2 July 1998 but, as provided for in section 2 of the Act, will not take effect until the CTBT enters into force.

Proposed legislative amendments

The *Non-Proliferation Legislation Amendment Bill 2003* was introduced into the Parliament on 26 June 2003. The purpose of this legislation is to strengthen arrangements for the protection of, and application of safeguards to, nuclear material, facilities and associated items. The legislation will also allow elements of the CTBT Act to be brought into effect ahead of entry into force of the Treaty, and will allow the amalgamation of ASO, CWCO and ACTBO into ASNO to be formalised.

THE YEAR IN REVIEW

KEY RESULTS FOR ASNO:

- **Substantial contribution to strengthening non-proliferation verification regimes and counter-terrorism initiatives:**
  - **major input to efforts to address proliferation challenges**
  - **ongoing support for IAEA safeguards development**
  - **regional outreach on IAEA safeguards, CWC (Chemical Weapons Convention) implementation and CTBT (Comprehensive Nuclear-Test-Ban Treaty) ratification**
  - **security at ANSTO site confirmed as international best practice**
  - **ongoing review, with other authorities, of security for toxic chemicals, radiation sources and biological materials.**
- **All treaty and statutory requirements met in respect of:**
  - **nuclear material and nuclear items in Australia**
  - **Australian uranium exports (Australian Obligated Nuclear Material)**
  - **chemicals and facilities covered by the CWC**
  - **establishment of CTBT monitoring stations.**

This year has seen major challenges to the nuclear non-proliferation regime, from the DPRK (Democratic People's Republic of Korea, or North Korea) and Iran—discussed below and elsewhere in this Report. In addition, Iraq's WMD programs are under intense investigation by the Coalition. Diplomatic efforts to resolve the DPRK and Iranian situations peacefully are ongoing. ASNO has been closely involved in the development of Australian and international responses to these situations.

The principal focus of ASNO's work is on international and domestic action against the proliferation of weapons of mass destruction (WMD—nuclear, chemical and biological—and also radiological weapons). In other words, ASNO's work relates directly to international and national security. In particular, ASNO is working to strengthen the operation of treaty verification regimes and their supporting technical methods. In addition, ASNO performs important regulatory functions—ensuring that Australia is in compliance with relevant treaty commitments, and that the public is protected through appropriate security standards for WMD-related materials.

Changes in the broad security environment over the last year or so have led to increasing Government attention to counter-terrorism. This has been reflected in a re-organisation within the Department of Foreign Affairs and Trade, and a shift of further responsibilities to ASNO in issues involving nuclear cooperation agreements, the Organisation for the Prohibition of Chemical Weapons (OPCW) and the Comprehensive Nuclear-Test-Ban

Treaty Organization (CTBTO) Preparatory Commission. At the same time ASNO has increased its involvement in activities such as the Australia Group.

The events of 11 September 2001, the continuing evolution of strengthened IAEA safeguards, and revitalised activity by the OPCW have led to a substantial increase in the level of effort needed for implementation of the legislation which ASNO administers (see page 25). All these developments have stretched ASNO's resources this year, a situation which is expected to continue into the foreseeable future.

The *Non-Proliferation Legislation Amendment Bill 2003* was introduced into Parliament in June. The amendments are designed to strengthen regulation of controlled items and make a number of administrative changes, including formalising the amalgamation of ASO, CWCO and ACTBO as ASNO.

On 29 May 2003, the Governor-General re-appointed Mr John Carlson as Director of Safeguards (Director General, ASNO) until the end of 2006.

International safeguards

Australia is highly regarded internationally for its major contribution to the strengthening of the IAEA safeguards system. It was the first country to sign and ratify the Additional Protocol giving effect to strengthened safeguards (in 1997), and the first country to qualify for *integrated safeguards*, the most advanced form of NPT safeguards (in 2001). Since 2001 Mr Carlson has chaired the IAEA's Standing Advisory Group on Safeguards Implementation (SAGSI), the international expert group advising the IAEA on safeguards matters. ASNO has been working with the IAEA on strengthened safeguards measures for over a decade.

As noted in the introduction, there were serious developments with the DPRK and Iran. Since disclosure of its uranium-enrichment program last October, the DPRK has taken steps to re-activate its nuclear program, expelled IAEA inspectors on 31 December 2002, and on 10 January announced its decision to withdraw from the NPT. In January, Australian Foreign Minister Alexander Downer sent a senior officials delegation, including Mr Carlson, to Pyongyang. The delegation registered firmly with DPRK officials Australia's, and the international community's, deep concern about Pyongyang's escalatory actions.

In common with regional players, Australia is deeply concerned about the DPRK nuclear issue, and is active in support of efforts to find a long term peaceful solution. The principal objective for any resolution of the nuclear issue must be complete verifiable and irreversible dismantlement of the DPRK's nuclear weapons program. ASNO involvement in this issue has included development of verification approaches in support of an eventual resolution. Prior to October 2002, ASNO provided training and explanation of safeguards matters for DPRK personnel.

Iran is proceeding with a uranium enrichment program which, though said to be peaceful, would provide the capability for a nuclear weapon program. Australia strongly believes countries in regions of tension should not pursue proliferation-sensitive technologies, such as enrichment and reprocessing. ASNO's Assistant Secretary Mr Andrew Leask participated in Arms Control talks in Teheran in August 2002. Evidence has since emerged of undeclared nuclear activities and the construction of a large-scale uranium enrichment plant. The IAEA has been investigating this since February 2003, and in June issued a report drawing attention to a number of safeguards 'failures' and lack of cooperation. The IAEA Board of Governors called on Iran to cooperate with the IAEA,

and to conclude an Additional Protocol giving the IAEA wider inspection powers. It is to be hoped that Iran will respond to the concerns of the international community.

Putting aside these specific challenges, more generally this was another year of solid achievement by the IAEA and a number of Member States—including Australia—in developing the concepts, methods and skills required for implementation of strengthened and integrated safeguards. In addition to SAGSI, ASNO contributed through projects under Australia's Safeguards Support Program, consultancies undertaken on the IAEA's behalf and involvement in IAEA working groups on key safeguards issues.

The Additional Protocol (AP) has now been ratified or signed by three-quarters of countries having *comprehensive safeguards* agreements (i.e. NPT non-nuclear-weapon states) and significant nuclear activities. The combination of a comprehensive safeguards agreement and an AP is now established as the NPT safeguards standard. Nonetheless, there are many countries that have not yet signed, including a number of countries of proliferation concern. ASNO is working with the IAEA and counterparts in other countries, particularly Japan, to increase the number of AP ratifications, to widen the application of strengthened safeguards and to isolate those whose commitment to non-proliferation is questionable.

ASNO participated in the Legal and Technical Experts Group drafting an amendment to strengthen the Convention on the Physical Protection of Nuclear Material (CPPNM). The Experts Group completed its work in March 2003. While the Group did not achieve a complete consensus text, agreement on virtually all common and significant issues was achieved. The agreed text forms a solid base for a greatly strengthened CPPNM, and is expected to be considered by a Conference of States Parties in 2004.

Although there are significant difficulties in the Conference on Disarmament, achieving a Fissile Material Cut-off Treaty (FMCT) continues to be a priority for Australia. The FMCT will complement the CTBT—together they would place a quantitative cap on the nuclear material available for weapons and a qualitative cap on nuclear weapon development. ASNO has established itself internationally as a leader in the development of proposals for verification under an FMCT regime and during the year contributed to a number of workshops on this subject.

Bilateral safeguards

During 2002-03 Australia exported 9,592 tonnes of uranium ore concentrates, earning over $425 million. Australia was the world's second largest uranium producer. This quantity of uranium was sufficient to fuel about 41 power reactors—thereby enabling the countries concerned to avoid carbon dioxide emissions equivalent to around 95% of Australia's total net carbon dioxide emissions from all sources[1]. ASNO ensured that all this uranium and derived nuclear material was accounted for in accordance with Australia's safeguards agreements and used for exclusively peaceful purposes.

ASNO negotiated Administrative Arrangements (AA) pursuant to the bilateral safeguards agreements which came into force in 2002 with Hungary, and with the United States covering uranium supply to Taiwan, China. An AA for the agreement with the Czech Republic was agreed and is awaiting signature in Prague.[2]

1. Based on data for 2000.
2. The Australia/Czech AA was signed on 2 September 2003.

Figure 4— Mr Andrew Leask from ASNO (sitting right) and Dr Ākos Pető, Head, Department of Radioactive Material, Hungarian Atomic Energy Authority (HAEA) (sitting left), signing the Administrative Arrangements to the Australia-Hungary Bilateral Safeguards Agreement, on 12 June 2003 in Budapest. Standing are Dr László Koblinger, Deputy Director General HAEA (left) and Mr Leo Cruise, Australian Ambassador to Hungary (right).

ASNO established that all AONM under Australia's bilateral agreements was satisfactorily accounted for. However, in the case of the United States this is based on provisional data. As discussed on page 40, errors in the US accounts have been under investigation by ASNO and its US counterpart. These have now been rectified, but some further adjustments to the accounts may be required during the current year. ASNO is entirely satisfied with the explanation for the errors, and that no AONM has been diverted from the coverage of the Australia/US agreement.

Domestic safeguards and nuclear security

The greater part of ASNO's inspection effort was devoted to regulating ANSTO's site at Lucas Heights. ASNO completely revised the ANSTO permits when they came due for renewal in March, moving away from a process-based to a performance-based approach, while also tightening requirements for control of nuclear materials and associated items. Although all IAEA requirements were met during the reporting period, this was not achieved easily due to inadequate performance on ANSTO's part. ASNO is continuing to assist ANSTO with improvements in this area.

Security at ANSTO, Lucas Heights, was reviewed again this year, including in conjunction with some of ASNO's overseas counterparts. This confirmed that current security arrangements are at least as good as at comparable sites overseas. A new Design Basis Threat (DBT) was issued to ensure that security at the nuclear facility remains effective over the next few years. A site security evaluation against the new DBT is being conducted by several federal agencies. ASNO also kept under review the security arrangements for the construction phase of the replacement research reactor project, supporting ARPANSA's licensing process, and has worked closely with ANSTO and other federal agencies in the development of safeguards and security aspects for the operational phase of the reactor.

ASNO continued to work carefully with Silex Systems Limited with respect to that

company's laser enrichment R&D project, to ensure effective protection of 'associated technology'. Work at Silex is continuing despite the United States Enrichment Corporation having withdrawn from the project.

Figure 5—Uranium ore container filling facility, Honeymoon uranium mine.

Regarding other permittees under the Safeguards Act, ASNO is part way through revising all permits along similar lines to ANSTO's permits. ASNO inspected the uranium mines of ERA, WMC, Heathgate Resources and Southern Cross Resources, and a number of other holders of permits under the Safeguards Act. Due to stricter IAEA requirements and the need to re-apply tracking on depleted uranium that was previously de-regulated, more effort has been necessary to inspect holders of small quantities of nuclear material. This latter activity constituted about 30% of ASNO inspections. ASNO concluded that all of these permittees were meeting their permit requirements satisfactorily. Through careful allocation of resources, ASNO has been able to increase the level of effort applied to nuclear issues by one-half of a person-year compared to the previous year.

Chemical Weapons Convention

The OPCW appears to have been rejuvenated following the appointment of a new Director General in July 2002, as evidenced by recent inspection activity. After an 18 month hiatus, in the period from January to the end of July 2003 ASNO has facilitated three routine OPCW inspections. These proceeded well, and enabled Australia to demonstrate its full

compliance with CWC treaty obligations.

One highlight of the year was the First CWC Review Conference (Revcon) at which the effectiveness of the whole Convention was reviewed by States Parties. ASNO played a key role in preparations for the Conference and during the Conference itself (see page 77). Delegates agreed that, overall, the CWC has been effective, although not without challenges during its formative years. If the OPCW Technical Secretariat and Member States act on the recommendations of the Conference, implementation of the CWC will be enhanced further over the coming years.

ASNO has been proactive within the region working with other national authorities and the OPCW, including by ensuring active Australian participation in a regional seminar on the universality of the CWC at Chiang Mai in Thailand.

Figure 6—Participants of the March 2003 CWC Regional Workshop on Universality of the CWC held in Chiang Mai, Thailand. *Photo courtesy of the Government of Thailand*.

On the domestic front, there have been discoveries of old CW munitions in eastern Australia. While the Department of Defence is responsible for the destruction of old CW munitions, ASNO has significant reporting obligations under the CWC which could lead to specific inspections by the OPCW. Also, ASNO has worked closely with peak industrial bodies, such as PACIA—the Plastics and Chemicals Industries Association—to affect outreach and improve implementation of the CWC in Australia.

As a result of expanded responsibilities, ASNO was fully involved in the Australia Group (AG), which is concerned with export controls for materials and equipment that could be used in the production of chemical and biological weapons. Mr Leask chaired the Implementation Working Group at the Australia Group's meeting of June 2003. Good outcomes included the addition to the AG biological control list of 14 human pathogens that could potentially be used in WMD programs.

Although a CWC challenge inspection in Australia is most unlikely, ASNO has facilitated the development of a detailed contingency plan for such an event.

Comprehensive Nuclear-Test-Ban Treaty

At 30 June 2003 the CTBT had been signed by 167 countries and ratified by 102. This strong level of support is indicative of the importance the international community continues to place on the Treaty as an element of the non-proliferation regime. However, the specific requirement that 44 named countries must ratify to trigger entry-into-force (EIF) remains uncomfortably distant. At 30 June 2003, 31 of those countries had ratified.

Work to establish the CTBT verification regime is continuing. However, the loss of momentum in progress toward EIF has put increasing pressure on the level of funding that many countries are prepared to support for this task, and for the funding of the pre-EIF operation of International Monitoring System (IMS) stations. Australia, along with other countries, continues to argue that the CTBT Preparatory Commission should be adequately funded for the tasks set down in its mandate. This is important not only to ensure readiness for when the CTBT does enter into force, but also to avoid a dissipation of the experience and expertise in CTBT verification that has developed over the last decade.

Australia will host a total of 21 facilities for the Treaty's IMS, the third largest number of any country. Work to establish the Australian facilities continued to make good progress. Fifteen of these facilities were operational at the end of the financial year.

ASNO has also made a strong contribution to the work of the CTBTO Preparatory Commission. Australia hosts monitoring stations employing each of the four IMS verification technologies and ASNO, together with technical experts from Geoscience Australia and ARPANSA, participates in working group meetings which provide technical guidance for work to establish CTBT verification mechanisms. ASNO also contributes actively to the development of arrangements for the conduct of an on-site inspection (OSI). Such an inspection may be requested where concerns arise about compliance with the test-ban. An Australian, Mr Richard Starr, formerly Ambassador to the UN Conference on Disarmament in Geneva, was appointed leader of a group reviewing the Commission's work on OSI (see Media Release on page 119). This review was appreciated as an important contribution to the work of the Preparatory Commission.

ASNO has also contributed to efforts promoting support for the CTBT, including through contributing a speaker and facilitator to a workshop in Nadi, Fiji, designed to encourage new ratifications of the Treaty and to assist practical implementation efforts.

ASNO management

Unlike many previous years, ASNO was fully staffed for most of the year. In addition to the activities outlined above, the need for effective domestic measures in support of BWC objectives is gaining increasing attention, and ASNO has contributed as best it can within available resources. Corporate management in ASNO remains strong, Mr Leask being recognised as a Chartered Manager by the Chartered Management Institute in the United Kingdom.

OUTLOOK: THE YEAR AHEAD

A major focus for ASNO in 2003-04 will be continuing activities to further Australia's strong support for the nuclear non-proliferation regime and other WMD regimes. ASNO will work closely with the IAEA and counterpart organisations on the continuing development of strengthened and integrated safeguards, particularly through the Australian Safeguards Support Program and substantial involvement in SAGSI.

Australia will continue to promote universal acceptance of strengthened IAEA safeguards through conclusion of Additional Protocols. ASNO's activities in this area will include further regional outreach, providing encouragement and assistance to regional countries to sign, ratify and implement the Additional Protocol. Australia will be promoting the combination of a comprehensive safeguards agreement and an Additional Protocol as the NPT safeguards standard, including as a condition for nuclear supply. ASNO will follow closely nuclear fuel cycle developments worldwide, specifically with regard to non-proliferation and safeguards implications.

A major priority will be contributing to efforts to resolve the challenges to the non-proliferation regime posed by the DPRK and Iran. In both cases, a satisfactory resolution will require their full cooperation with the IAEA safeguards system. ASNO is involved with analysis of the specific issues to be resolved, and development of effective verification approaches.

Relevant to current proliferation challenges, ASNO will be closely involved with major issues which need further analysis and reflection by governments, such as:

- Whether states can evade their non-proliferation commitments by withdrawing from the NPT. The NPT, with 188 Parties, has become almost universal: only three states, India, Israel and Pakistan, remain outside it—and the DPRK has announced withdrawal, though the validity of this has not been determined.

  The non-proliferation norm can be seen to represent customary international law—it can be argued that even the three non-Parties are obliged not to assist any proliferation efforts by other states (and as Parties, all other states are obligated not to seek such assistance). It follows that there should be **zero tolerance** of additional states attempting to develop nuclear weapons—the non-proliferation commitment of NPT Parties, even if they purport to withdraw from the Treaty, must be **inviolate**.

- The limits to the right to pursue any form of nuclear technology. The NPT refers to the 'inalienable right ... to use nuclear energy'[1]. However, this right is not absolute. It should be recognised that all 'rights' carry corresponding duties—pursuit of this right must be in conformity with the non-proliferation commitments of the Treaty, and must not prejudice the objectives of the Treaty. Australia firmly believes that proliferation-sensitive technologies—enrichment and reprocessing—should not be pursued in regions of tension, where there is the danger of 'virtual' arms races and break-out from the NPT.

On practical matters, ASNO is planning to conduct, with funding from AusAID and in conjunction with the IAEA, an Asia-Pacific Training Course on Physical Protection of nuclear material and facilities, and a regional training course on safeguards. ASNO also plans to provide safeguards inspector training to some regional countries.

ASNO will continue to work closely with ANSTO to raise the standards of its safeguards implementation, on physical protection aspects of the replacement reactor project, and with

1. NPT Article IV.1.

ARPANSA in its licensing processes.

Concerning the CWC, ASNO will continue to contribute to strengthening the verification regime, *inter alia*, by helping to resolve outstanding technical implementation issues, especially those pertaining to industry. In Australia, this will be complemented by a strong industry outreach program and revision of industry guides. The move by the Department of Defence of its CW defensive facility from Maribyrnong to Fisherman's Bend will, from a CWC implementation perspective, require careful planning to ensure all treaty obligations are satisfied.

Even though its entry-into-force is not in prospect, Australia is firmly committed to pursuing the CTBT. The Treaty reinforces the norm against testing of nuclear weapons which is a very high priority for Australia. In addition to the task of co-ordinating the establishment of International Monitoring System (IMS) stations in Australia, ASNO will continue to support efforts to encourage signature and ratification of the CTBT—especially by regional countries. Working in the CTBTO Preparatory Commission ASNO will continue its contribution to the development of the Treaty's verification regime—with a particular focus on the elaboration of procedures for the conduct of on-site inspections.

Increasingly it is recognised that proliferation is a multi-facetted problem that needs to be addressed at a number of levels. The NPT and IAEA safeguards are complemented by other multilateral mechanisms, such as nuclear-weapon-free zones and the CTBT—and Australia continues to promote the concept of a Fissile Material Cut-off Treaty. Other WMD treaties—the CWC and the BWC—are also important for the NPT, since the nuclear disarmament commitment in the NPT[1] is expressed in the context of 'general and complete disarmament under strict and effective international control'—and clearly this includes all forms of WMD. In addition to multilateral mechanisms, national actions have always been important—nuclear suppliers' guidelines are an example—and are now receiving increasing attention. Australia is a participant in the Proliferation Security Initiative, which aims to develop ways to impede the flow of WMD, their delivery systems and related materials to and from states and non-state actors of proliferation concern. ASNO is involved with relevant aspects of this work. Also, in the absence of agreement on a verification protocol for the BWC, governments are discussing advancement of BWC objectives through national actions—another area of ASNO involvement.

ASNO will also be involved in a Commonwealth-State review of security of hazardous materials, including toxic chemicals, biological agents and radiological sources.

1. NPT Article VI.

RESOURCES OVERVIEW: CORPORATE MANAGEMENT

ASNO is required, as part of a Commonwealth Agency and in accordance with section 49 of the *Financial Management and Accountability Act 1997*, to submit to the Auditor-General annual financial statements. Details relating to these financial statements are contained in the Department of Foreign Affairs and Trade (DFAT) Annual Report for 2002-03.

ASNO kept its administrative and accounting procedures under review during the reporting period. Revised and new instructions or guidelines issued by DFAT, the Department of Finance and Administration and other regulatory bodies were implemented where applicable.

Further details of ASNO activities relating to financial management and performance, occupational health and safety, industrial democracy and advertising are included in the DFAT Annual Report for 2002-03.

STAFFING

ASNO is staffed through DFAT on the basis that it is a division within the Department. The Director General, ASNO holds the statutory office of Director of Safeguards, established under the Safeguards Act, while all other staff were employed under the *Public Service Act 1999*, on a full-time basis.

Table 1—ASNO Administrative Costs - 2001-02 and 2002-03

	2001-02	*2002-03**
Salaries	$1,188,782	$1,232,548
Running Costs	$954,636**	$997,087**
Total	$2,143,418	$2,229,635

* The 2002-03 figures are ASNO's accrual budget.

** Includes funding administered by ASNO and transferred to Geoscience Australia to cover seismic monitoring in support of the CTBT ($542,256 in 2002-03).

A summary of ASNO staffing as of 30 June 2003 is given in Table 2. Following the collapse of BWC negotiations in Geneva in late 2002, one part time position was re-assigned within the Department at the end of last financial year. A stable staffing level of 100%—14 staff—was maintained for 11 months of the year, with one member departing in mid June 2003.

In view of the highly specialised nature of ASNO's work, it remains an ongoing challenge to recruit and retain suitably skilled staff. This is particularly the case for nuclear safeguards. Given the limited extent of nuclear activities in Australia, and the international orientation of safeguards, practical experience in international safeguards primarily has to be obtained overseas. Staff who retire or resign cannot be easily replaced.

In 2002-03 ASNO's level of professional staff engaged on nuclear issues was about 7¼ person-years, an increase of one-half a person-year on last year's effort. This rise was the result of re-allocating duties within ASNO from the CTBT to the nuclear section, an essential change necessary to cope with the increasing nuclear workload.

Table 2—Categories of Staff at 30 June 2003—approved and actual

	Male	*Female*	*Total*	
	[Actual]	*[Actual]*	*[Approved in brackets]*	
SES B2	1		1	(1)
SES B1	1		1	(1)
Executive level 2	4	1	5	(5)
Executive level 1	3	1	4	(4)
APS level 6	0		0	(1)
APS level 5	1		1	(1)
APS level 4	0	1	1	(1)
Total	10	3	13	(14)

TRAINING

This year ASNO made significant headway with its multi-skilling program which is designed, specifically for the purpose of national inspections, to meld the nuclear and CWC inspectors into a single inspectorate. Through this training program, the number of ASNO staff qualified as nuclear inspectors was increased by 50%, and three nuclear staff were inducted into CWC inspection duties. This program will continue in 2004 and takes into consideration the type and complexity of inspections, with the specific skills required for each.

Dr Annette Berriman undertook safeguards training at the 2002 IAEA Safeguards Workshop on Research Reactors held at the Korea Atomic Energy Research Institute (KAERI), Daejeon, Republic of Korea from 2-9 October 2002. The workshop was organised by KAERI in conjunction with the IAEA and the Nuclear Materials Control Centre, Japan.

Figure 7—Dr Annette Berriman (second from right) at the 2002 IAEA Safeguards Workshop on Research Reactors, Daejeon, ROK. *Photo courtesy of KAERI, ROK.*

Dr Stephan Bayer completed the international training course on Implementation of State Systems of Accounting and Control of Nuclear Materials held in New Mexico and Tennessee, USA during 28 April to 16 May 2003. The course was organised by the United States Department of Energy in conjunction with the IAEA.

ORGANISATION OF ASNO AT 30 JUNE 2003

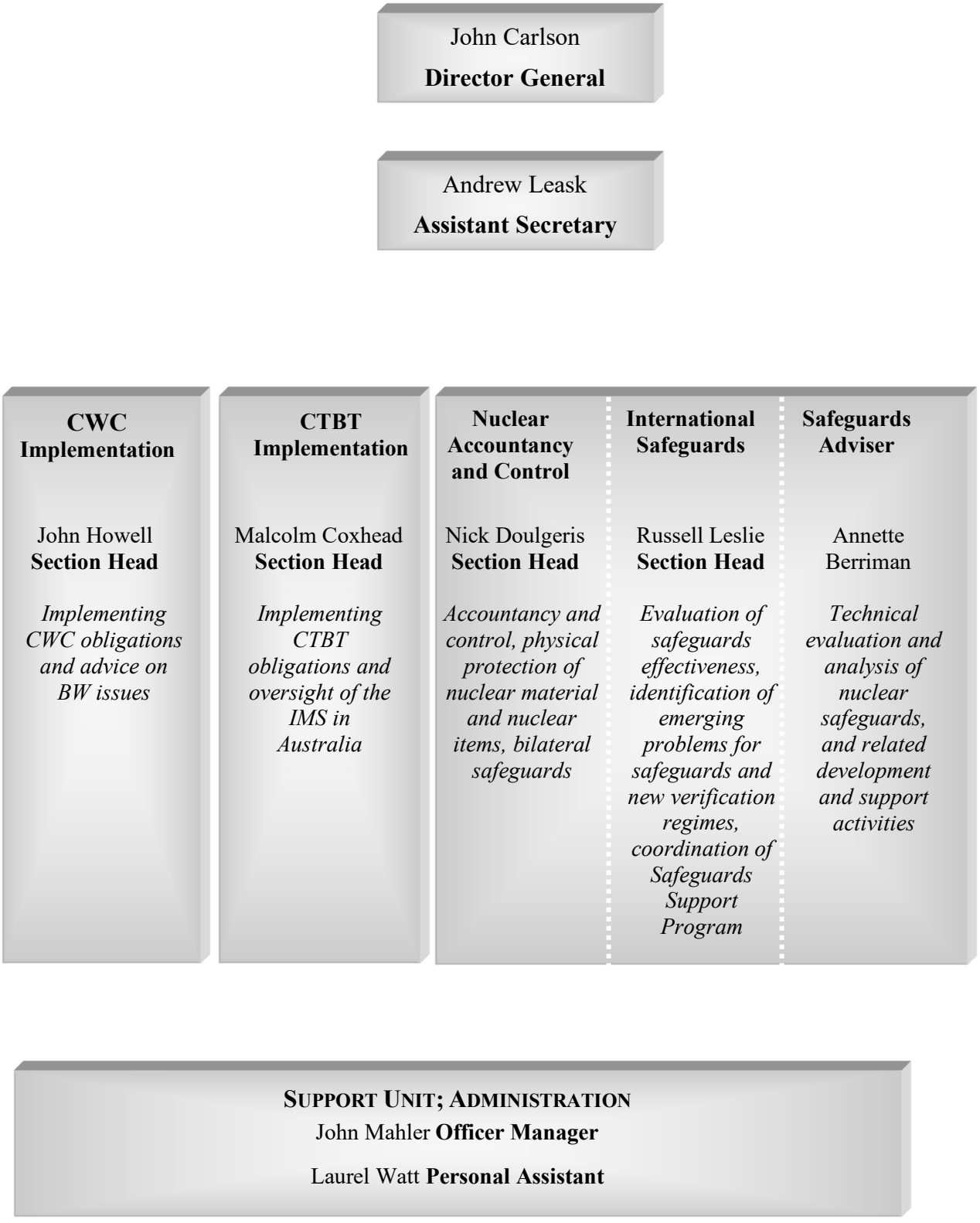


Figure 8—ASNO Organisation Chart

ASNO PERFORMANCE INDICATORS

ASNO has tracked its performance against specific indicators relating to key aims and organisational tasks. This information is presented below from two differing perspectives. The first relates to the number of events of each type in which ASNO was involved; the second to the number of person-days of effort expended in each type of activity.

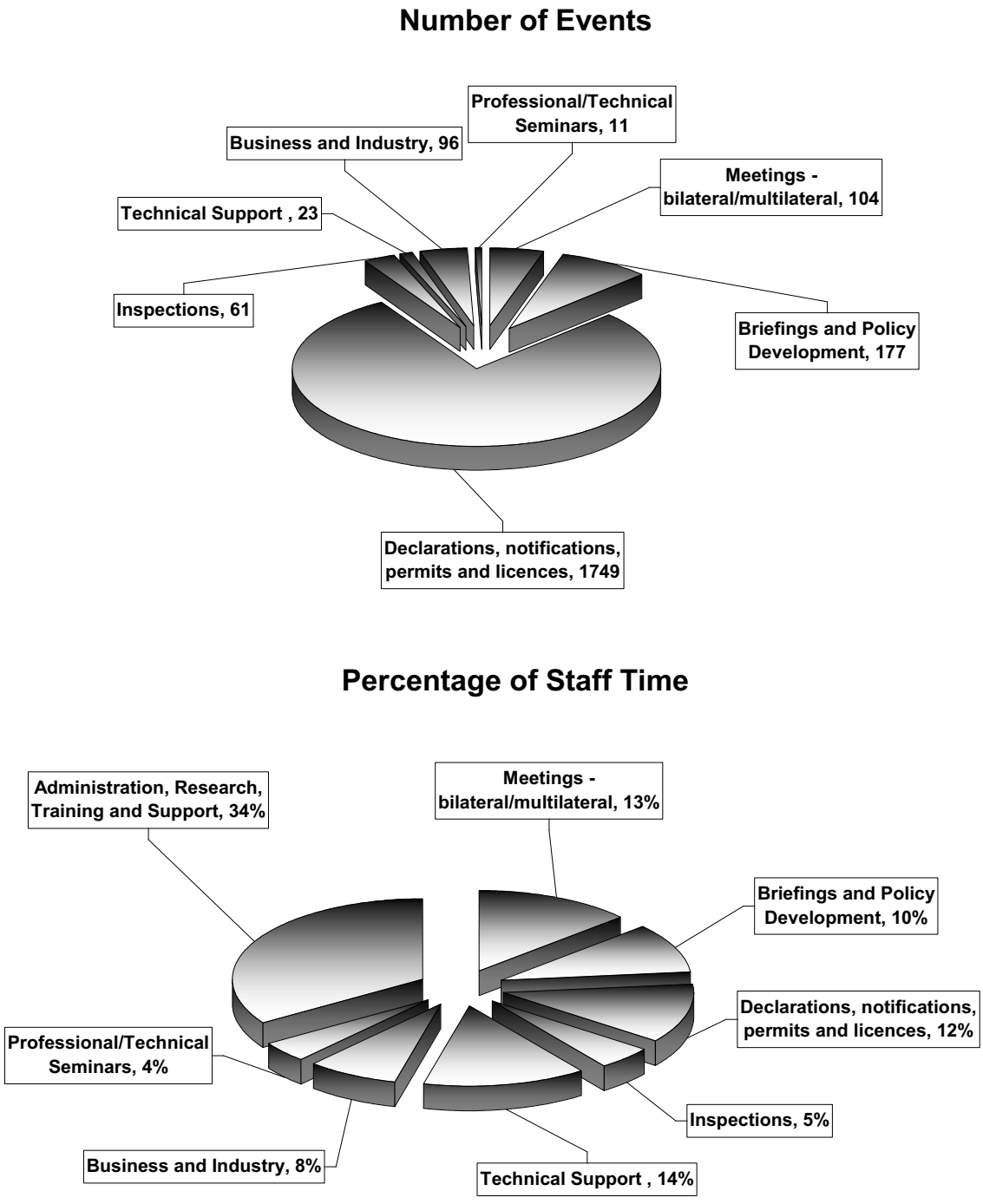


Figure 9—ASNO's performance against specific aims and organisational groupings. Note that figures for percentage of staff time include all preparation, planning, attendance and follow-up action where relevant.

URANIUM PRODUCERS CHARGE

As a number of ASNO's activities are of benefit to Australia's uranium exporters, the Government recoups about 40% of ASNO's annual costs for safeguards activities through the Uranium Producers Charge.

The current arrangements were introduced through the *Nuclear Safeguards (Producers of Uranium Ore Concentrates) Act 1993*. The Act provides for each producer to pay an annual charge, prescribed by regulation, up to a maximum of $500,000.

Following a review as part of the Government's overhaul of business regulation in June 1997, the charge on uranium producers was retained, but changed from a flat fee to a fee per kilogram of production. The new fee includes a component for future costs, that is, the ongoing costs in respect of AONM which could remain in the fuel cycle for a considerable period after a mine has ceased production.

In October 2002 the fee was set at 6.7944 cents per kilogram of contained uranium produced during 2001–2002. This yielded $469,062 for Consolidated Revenue.

Figure 10—Energy Resources Australia's Ranger Uranium Mine, Northern Territory.
Photo courtesy of ERA.

PROGRAM ACTIVITIES

Figure 11—Framework for the reactor core of ANSTO's Replacement Research Reactor.

PROGRAM ACTIVITIES

ASNO's activities in 2002-03 are described and evaluated in the following sections.

Activities are described in relation to particular tasks, and grouped according to the output to which they relate (for summary of outcomes and outputs see page 3).

OUTPUT A—OPERATION OF NATIONAL SAFEGUARDS SYSTEM

Operation of Australia's national system of accounting for, and control of, nuclear material and items subject to IAEA safeguards, including promotion and regulation, within Australia, of effective measures for the physical protection of nuclear facilities and material.

MILESTONE A1

A1.1 The provisions of the *Nuclear Non-Proliferation (Safeguards) Act 1987* administered effectively.

A1.2 The continued appropriateness of the Act's provisions reviewed and evaluated.

A1.3 Under the Permit System pursuant to the Act, nuclear items in Australia—including those subject to bilateral safeguards agreements—controlled and accounted for effectively.

A1.4 Locations holding nuclear material and associated items inspected to check compliance with permit conditions.

Activities

Permits and authorities

At the end of March 2003 most of the permits issued under the Safeguards Act were renewed. Three new permits or authorities were issued, 78 were varied, nine expired and five were revoked.

Table 3—Status of Safeguards Permits and Authorities in Australia, 30 June 2003

Permit or Authority to:	Number at End of Period	Granted	Varied *	Revoked	Expired
Possess nuclear material	33	0	30	1	1
Possess associated items	21	0	20	2	0
Transport nuclear material	17	3	12	0	8
Transport associated items	0	0	0	0	0
Communicate information contained in associated technology	17	0	16	2	0
Total	88	3	78	5	9

* Some permits had more than one variation.

Replacement Research Reactor

The Australian Nuclear Science and Technology Organisation (ANSTO) is progressing with its project to replace the ageing reactor, HIFAR. Until nuclear material is transferred to the new facility ASNO's role is related primarily to regulation of security, and ensuring appropriate security features are incorporated in the facility's design and proposed operating procedures. ASNO also has been providing information to the IAEA for safeguards purposes. As the operational stage approaches ASNO's role will increase. Planning commenced during the year for the major assessment of operational security arrangements. This assessment should take place in the next 12 months after which attention will move to the safeguards arrangements.

Figure 12—IAEA technical visit to ANSTO's Replacement Research Reactor, April 2003. ASNO's Mr Brian Ffrost (right) and ANSTO's Mr Michael Binovec (left) accompany IAEA safeguards inspectors.

Laser enrichment R&D

Silex Systems Limited, an Australian company, is developing an innovative method of separating uranium isotopes using laser techniques. This work is being carried out in laboratories leased from ANSTO at Lucas Heights. During the year the company announced a successful demonstration of the process, achieving a measurable assay change in a gram-sized sample. However, in April 2003 the project's US partner (USEC Inc) announced it was withdrawing from the project—see also under Milestone B2 (page 41). Should the technology prove to be cost effective, it is envisaged that commercialisation would occur overseas. Until the USEC withdrawal it was envisaged this would be in the United States—now this is likely to depend on a future partner.

Silex Systems Ltd holds a permit to possess 'associated technology'. ASNO monitors the progress of this research closely, with the objective of ensuring that nuclear technology remains in exclusively peaceful use and does not contribute to any proliferation activity. As SILEX technology constitutes associated technology, access to the technology is restricted to authorised persons. Under its permit, Silex Systems Ltd has been required to

put in place appropriate security measures to protect the technology against unauthorised access. ASNO ensures that all IAEA requirements are met with respect to the reporting category of nuclear-related R&D. To assist with reporting to the IAEA, a separate 'material balance area' was created this year for Silex Systems Ltd's laboratories.

Data reported pursuant to the Safeguards Act

As required by sub-section 51(2) of the Safeguards Act, details of nuclear material and associated items of Australian origin, and nuclear material and associated items within Australia, regardless of origin, are set out in Annexes to this Report as follows:

Annex A: Nuclear Material within Australia at 30 June 2003.

Annex B: Associated Items within Australia at 30 June 2003.

Annex C: Australian Obligated Nuclear Material Overseas:

(i) Locations and Quantities of AONM at 31 December 2002.

(ii) Transfers of AONM during 2002.

ASNO also provides the Australian National Audit Office with an annual statement listing nuclear items held by ANSTO.

Compliance with permit requirements

In 2002-03 ASNO carried out 51 domestic inspections to ensure that statutory and permit requirements were being met, a major increase on the 28 conducted the previous year. The growth in the number of national inspections is shown in Figure 13.

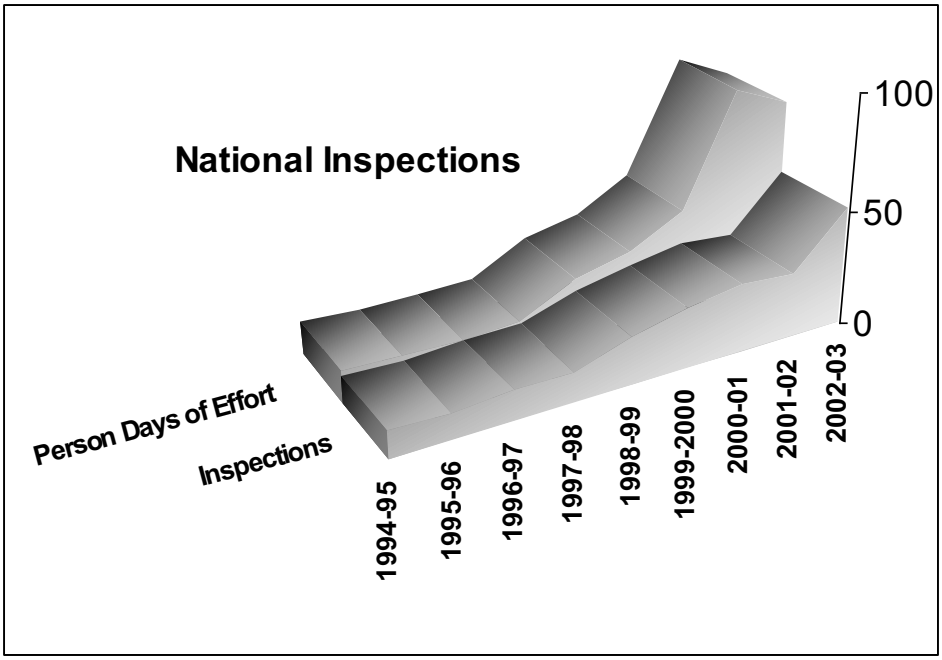


Figure 13—National inspections by number and effort

The distribution of the inspections by type of permit holder is shown in Figure 14, in terms of number of inspections and inspector days of effort.

National Inspections 2002-03

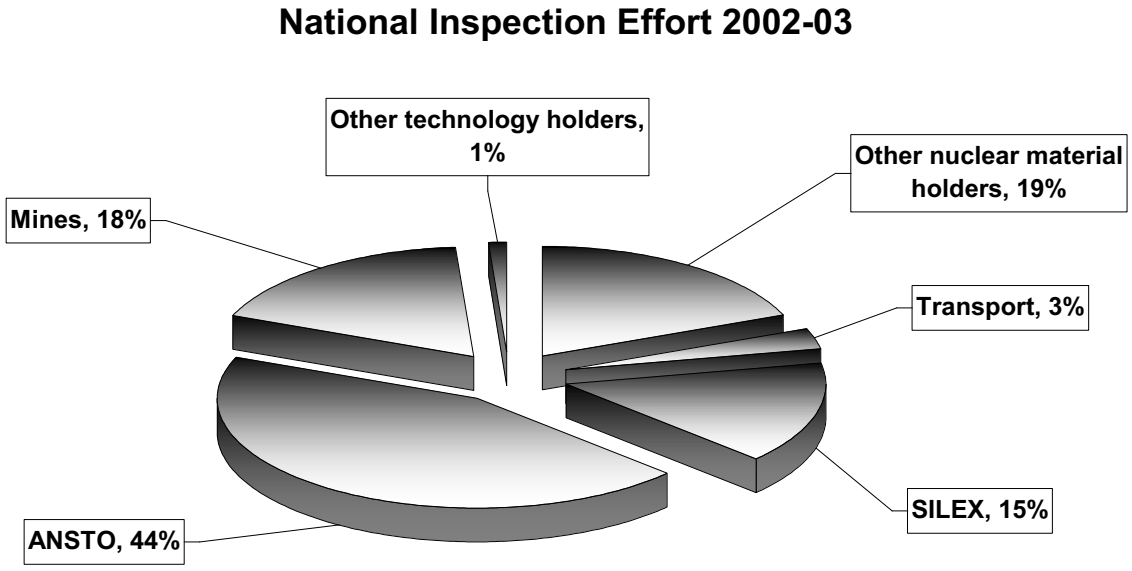


Figure 14—Distribution of the national inspections by type of permit holder as a function of number of inspections (top) and inspector days of effort (bottom).

ASNO's greatest inspection effort was at ANSTO's Lucas Heights site—to be expected since ANSTO has Australia's largest nuclear facilities (research reactors) and the nuclear material of greatest safeguards significance. The largest inspection effort at ANSTO is still devoted to nuclear materials accountancy although security involves increasing levels of effort. Since the inspection activity at Lucas Heights is closely linked to the meeting of IAEA requirements, more details are given under Milestone A2 below, on the implementation of IAEA safeguards.

During the year ASNO reviewed and significantly revised all of ANSTO's permits. One of the main aims of the revision was to modernise the management structure for the nuclear materials accountancy system. There were difficulties encountered during the year with preparing for and carrying out inspections, and it is hoped that revising the

management of the system will address these problems. ANSTO has almost completed the migration of its accountancy records to a new database and has been working to resolve discrepancies identified in the old data.

ASNO continued to work closely with Silex Systems Limited to ensure that the accountancy and control system for the SILEX laboratory effectively protects both nuclear material and, more significantly, technology. During 2002-03 Silex Systems Limited took over full management of its nuclear material accountancy system (previously shared with ANSTO). Although the scale of operation and the quantity of nuclear material held in the SILEX laboratory are small, a new material balance area, AS-G, was established in order to separate Silex's nuclear material inventory from ANSTO's. ASNO very much appreciates that Silex Systems Limited has always been highly responsive to ASNO's requirements.

All three operating mines—Ranger, Olympic Dam and Beverley—were inspected during the year, as was the planned Honeymoon mine. During ASNO's inspections of these projects, the operators were very cooperative. They met all ASNO requirements, and demonstrated a willingness to act upon ASNO advice.

The inspections of small holders of nuclear material and associated technology during the year were mostly related to familiarising them with changes to reporting and permit requirements, and in some cases the re-application of reporting requirements to their businesses. All were very cooperative and a large number of items in these small holdings have now been declared to the IAEA. ASNO also explained to small holders of nuclear material the need to prepare for the possibility of IAEA visits to their sites under the strengthened safeguards system. This proved timely—the IAEA undertook a complementary access at Wollongong University during the reporting period.

Performance Assessment

ASNO found no indication of unauthorised access to or use of nuclear materials or nuclear items in Australia. Inspections of Silex Systems Limited, the uranium mines and small holders of nuclear material and associated items have confirmed they are satisfactorily complying with permit conditions. ASNO continues to promote upgrades to ANSTO's safeguards system at Lucas Heights. Administration of the Permit System was generally carried out in a timely manner, with notice of all permit changes published in the Commonwealth Gazette as required by the Safeguards Act. There have been delays to issuing or reviewing some permits due to the large number of permits requiring renewal this financial year.

MILESTONE A2

IAEA safeguards implemented satisfactorily in Australia.

Activities

Australia's State System of Accounting for and Control of Nuclear Material (SSAC) is operated by ASNO in accordance with Australia's safeguards agreement with the IAEA. ASNO reports to the IAEA on the disposition of nuclear material in Australia and facilitates inspections carried out by the IAEA at Australian facilities and relevant locations.

Reports to IAEA on disposition of nuclear material, 2002-03

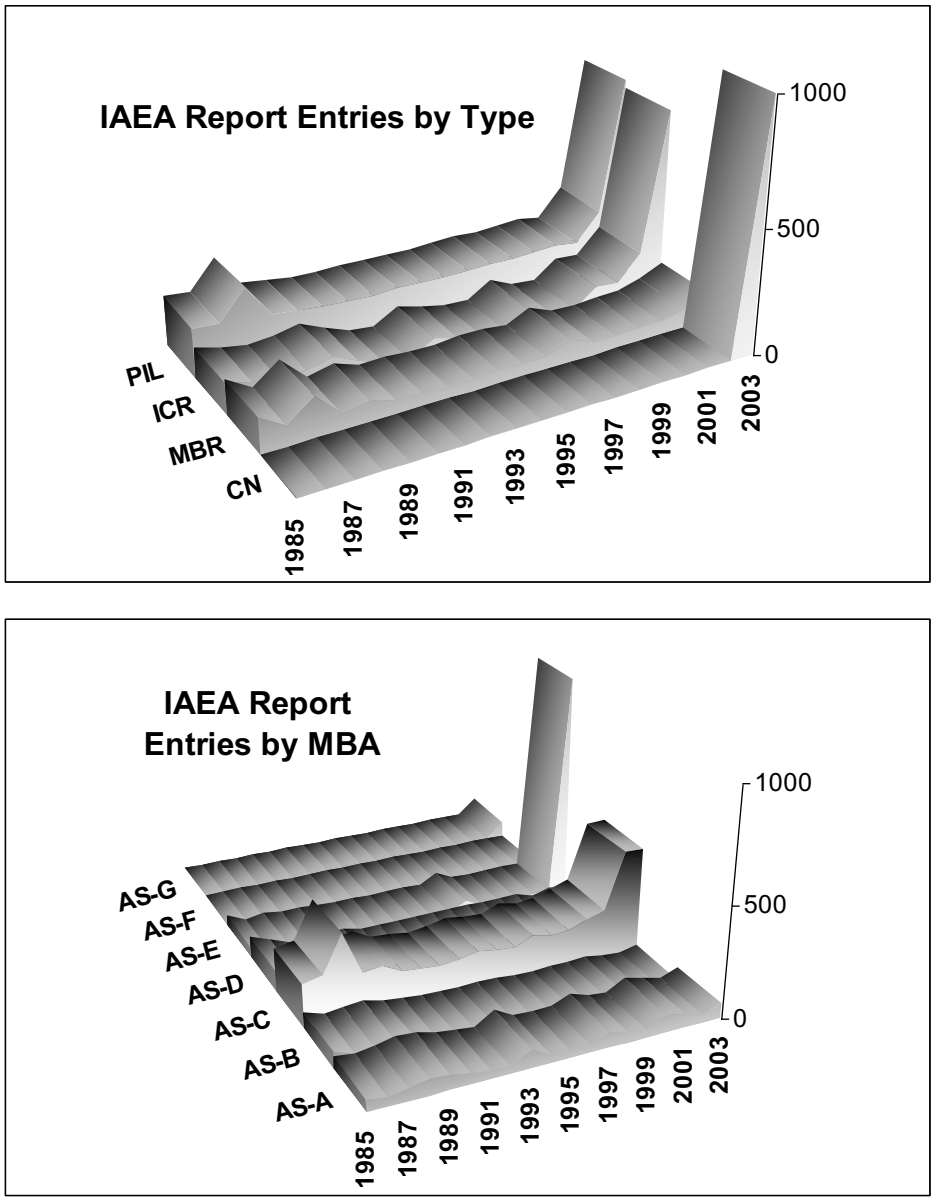


Figure 15—Reports and information submitted to the IAEA. Reports encompass Inventory Change Reports (ICRs), Physical Inventory Listings (PILs) and Material Balance Reports (MBRs). Concise Notes (CNs) are explanatory notes attached to the other reports. Material Balance Areas (MBAs) are detailed in Table 4.

As part of ASNO's inspection effort, each month an ASNO officer audits the inventory record of nuclear material at the ANSTO site at Lucas Heights (near Sydney), which is the principal location of safeguardable nuclear material in Australia. Inventory changes at Lucas Heights—on a monthly basis—as well as any changes elsewhere in Australia, are reported by ASNO to the IAEA. In 2002-03 there was a large increase in the number of batches, and hence transactions, reported for elsewhere in Australia. This did not reflect an increase in material, but rather changes to reporting policy. Due to the strengthening of the safeguards system and an effort to be as transparent as possible to the IAEA, the amount of information provided has increased dramatically in recent years (see Figure 15).

ASNO also provides the IAEA with accounting reports following Agency inspections, described below.

Details of Australian Accounting Reports to the IAEA during the year are at Annex D.

IAEA inspections in Australia

The IAEA carries out routine inspections of Australian nuclear facilities, the aim of which is to verify that nuclear material inventories are as declared by the operator and the national safeguards authority, i.e. ASNO. Each inspection deals with what is described as a 'Material Balance Area' (MBA), of which Australia currently has seven (see Table 4). It is expected that additional MBAs will be added in the future, both to account for new facilities and to enable more efficient IAEA inspection of existing facilities.

During 2002-03 IAEA inspectors carried out one scheduled inspection and one short notice inspection at Lucas Heights, both involving complementary access, and one complementary access elsewhere (see Annex D for details).

Table 4—Material Balance Areas in Australia

Location	*MBA*	*Facility*
Lucas Heights	AS-A	HIFAR reactor
Lucas Heights	AS-B	Moata reactor[1]
Lucas Heights	AS-C	Research and Development Laboratories
Lucas Heights	AS-D	Vault Storage
Elsewhere	AS-E	Other locations in Australia
Lucas Heights	AS-F	Replacement Research Reactor
Lucas Heights	AS-G	Silex Laboratories

As Australia's national safeguards authority, ASNO acts as the intermediary between the IAEA and the facility operator on all safeguards matters. An ASNO officer accompanies IAEA inspectors during inspections in Australia. This officer ensures the inspectors are able to carry out their duties so that Australia meets its obligations, and if necessary mediates on any issues arising between the IAEA and the facility operator. In particular, ASNO assists in the resolution of any inconsistencies discovered during inspections, thus simplifying the IAEA inspectors' task. During 2002-03 there were difficulties at one inspection arising from a lack of preparation by ANSTO. ASNO made a major contribution to overcoming this problem and the IAEA inspectors managed to satisfactorily conclude the inspection (albeit with additional work and some delay).

A major focus of IAEA inspection activity is the identification and evaluation of 'material unaccounted for' (MUF), that is, the difference between the records maintained by the operator (the 'ending book inventory') and the physical inventory verified by the IAEA. Since MUF is the difference between two measured quantities, it may be equal to zero, or it may be either a positive or negative value. If MUF is positive it does not necessarily indicate that material has been lost, nor does a negative figure mean that material has somehow been created. In many cases MUF can be attributed to unavoidable measurement differences, but where the size of the MUF is outside the range expected further investigation is required.

In 2002-03 there was MUF in four material categories in MBA AS-C (R&D Laboratories). For enriched uranium, the Physical Inventory was less than the Book Inventory by 3,907.33 grams of uranium element and 79.46 grams of ^{235}U isotope—it was later

1. In February 1995 the ANSTO Board decided to cease operation of Moata, and the reactor was defuelled in May 1995.

discovered that there was additional material making up this difference that had been overlooked in the inventory taking.

For natural uranium, the Physical Inventory was less than the Book Inventory by 3.37 kilograms; for depleted uranium, the Physical Inventory was less than the Book Inventory by 0.01 kilograms; while for thorium, the Physical Inventory was less than the Book Inventory by 1.01 kilograms. These MUFs in AS-C are still being investigated, but are probably related to the major transfer of waste material holdings that took place in the previous year. That transfer generated much larger discrepancies, and the smaller discrepancies this year are probably due to residual issues still being resolved.

ASNO is satisfied with ANSTO's explanation for the enriched uranium MUF, and expects the other MUFs will also be satisfactorily explained. The IAEA has confirmed that its requirements have been satisfied in respect of the nuclear material balance for the reporting period.

The IAEA reports all conclusions drawn from its routine safeguards inspections in Australia, including comments on any MUF, in the statements provided pursuant to Article 91(b) of Australia's NPT safeguards agreement. The conclusions from complementary accesses are provided in statements made pursuant to Article 10.c. of the Additional Protocol to Australia's safeguards agreement (see Annex E for details of 91(b) and 10.c. statements).

Figure 16—ASNO's Mr Nick Doulgeris (centre) and Dr Stephan Bayer (left), with IAEA inspectors and ANSTO's Mr Michael Binovec (right) during an inspection at ANSTO, April 2003. The HIFAR reactor is in the background.

Declaration of Safeguards Inspectors

Under section 57 of the Safeguards Act, the Minister may declare a person to be an inspector for the purposes of the Act. In practice, only ASNO officers have been so declared. The role of an inspector is to ensure compliance with provisions of the Safeguards Act and to assist IAEA inspectors in the conduct of Agency inspections and

complementary access in Australia. Six new national inspectors were declared in 2002-03. Most ASNO staff are now designated as inspectors. This is part of a project to establish an inspectorate across the Office providing a greater pool of inspectors for both nuclear safeguards and CWC inspections. Designation is only part of this process, training is also necessary. During 2002-03 two officers with out-of-date inspection experience were retrained to enable them to carry out inspections, four others took part in inspections as observers to gain experience.

The Minister may declare a person designated by the IAEA as an 'Agency Inspector' for the purpose of the Safeguards Act. In practice, all IAEA staff designated to Australia are declared under the Safeguards Act—there were 51 new designations during 2002-03. At 30 June 2003 there were 376 IAEA staff declared as Agency Inspectors pursuant to the Act. Some of those declared (about 33) have now left the Agency and so their designations will be revoked.

Since 1990, the Director of Safeguards has had the right to appoint inspectors and has held powers of declaration under delegation from the Minister.

Performance Assessment

All routine IAEA inspections were concluded satisfactorily. In one case this required substantial input by ASNO staff.

IAEA statements during 2002-03 confirm that all of Australia's IAEA safeguards obligations were discharged satisfactorily, and that relevant records had been maintained in accordance with prescribed practice. ASNO's reporting has satisfied IAEA requirements in full.

The IAEA has never found cause for formal adverse comment on Australia's accounting for and control of nuclear material—a fact reflected in Article 91(b) and Article 10.c. statements over the years.

MILESTONE A3

A3.1 Appropriate physical protection measures for nuclear material and associated items in Australia prescribed and reviewed.

A3.2 Sites holding nuclear material and associated items inspected to check that prescribed physical protection measures have been implemented effectively.

Activities

Physical Protection within Australia

ASNO is responsible for prescribing the levels of physical protection—in lay terms, 'security'—to be applied to nuclear items subject to the Safeguards Act. During the year, ASNO carried out inspections of the physical protection measures applied by ANSTO at its Lucas Heights site. ASNO also carried out inspections of the physical protection measures applied at, and in connection with, uranium mining operations. In addition, regular inspections were made of the arrangements put in place for the protection of sensitive information such as that relating to the SILEX laser enrichment R&D project.

Reflecting changes to the international security environment in recent years, ASNO updated the Design Basis Threat used to design and assess nuclear facility physical

protection systems. ASNO advised ANSTO of the change and the assessment process to be used to determine whether any changes to the physical protection system at Lucas Heights will be required. The revised assessment is still in progress. ASNO also commenced liaison with ANSTO in regard to security requirements for the operational phase of the replacement research reactor project—the process for assessing this is the same as for the overall site.

During the reconciliation visit program in May-June 2003 Mr Doulgeris and Dr Bayer, from ASNO's NAC Section, visited the US facility where spent fuel elements returned to the US from Australia are stored. The level of security there was found to be consistent with international guidelines and with the security afforded the elements while in Australia.

Performance Assessment

Physical protection requirements prescribed by ASNO are consistent with the most up-to-date international standards.

Through inspections, ASNO determined that all physical protection arrangements at ANSTO, the Australian uranium mines and associated operations, and Silex Systems Ltd were satisfactory and effective.

OUTPUT B—BILATERAL SAFEGUARDS

Development and implementation of bilateral safeguards measures that ensure nuclear material and items exported from Australia remain in exclusively peaceful use.

MILESTONE B1

Internationally agreed standards for physical protection of nuclear material are applied to all AONM.

Activities

ASNO continued past practice, requiring exporters to adopt and report on specific procedures to ensure appropriate levels of physical protection for shipments of uranium ore concentrates (UOC) 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.

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.

Performance Assessment

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

MILESTONE B2

AONM in countries with which Australia has concluded nuclear safeguards agreements is accounted for in accordance with procedures and standards prescribed under relevant agreements.

Activities

Exports of Uranium Ore Concentrates (UOC)

Between 1 July 2001 and 30 June 2002 there were 65 shipments of UOC from Australia. These were from the Ranger mine, Northern Territory, and the Olympic Dam and Beverley mines, South Australia. Exports totalled 9,592 tonnes of U_3O_8, or U_3O_8 equivalent, as UOC; export earnings were over $425 million. Further information on Australia's uranium exports may be found on page 90.

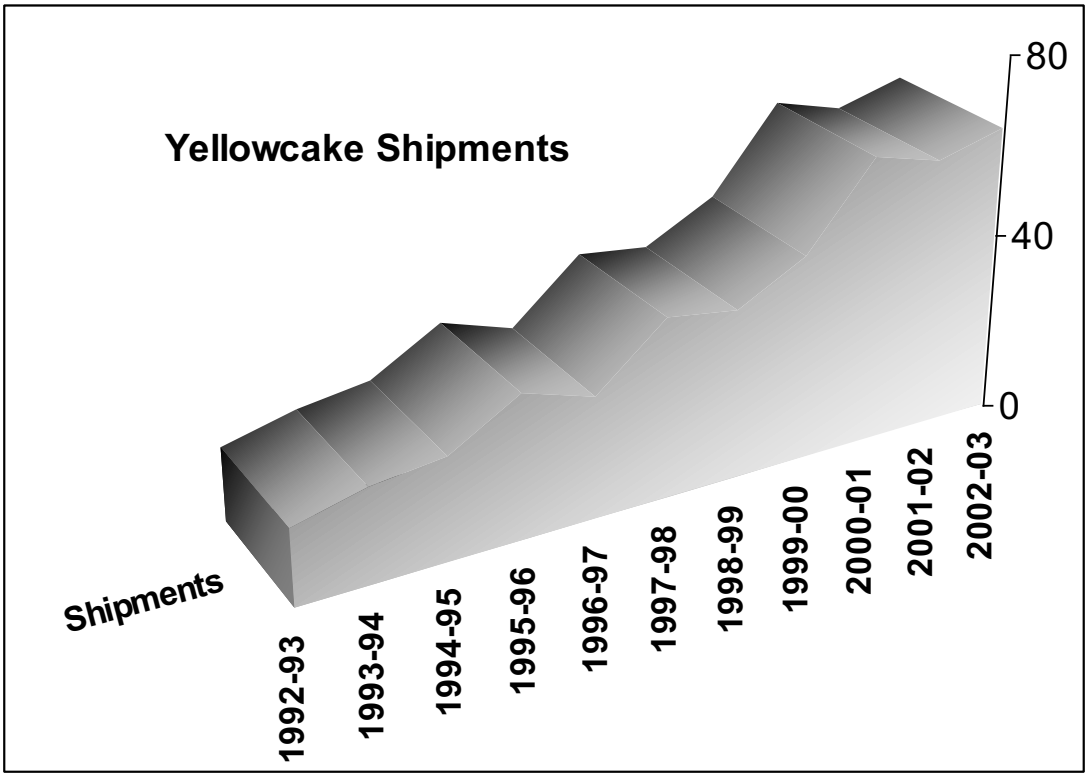


Figure 17—UOC shipments (transfers to conversion facilities)

Exporters shipped UOC to conversion facilities in the UK, the US, France and Canada. ASNO notified each export to the safeguards authorities in relevant countries. In every case, those safeguards authorities confirmed to ASNO receipt of each shipment. ASNO also notified the IAEA of each export: to non-nuclear-weapon states pursuant to Article 35(a) of Australia's NPT safeguards agreement with the IAEA; and to nuclear-weapon

states under the IAEA's Voluntary Reporting Scheme. Receiving countries similarly reported receipts to the IAEA.

The shipper's weight for each consignment was entered on ASNO's record of the relevant country's inventory 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 throughout the international nuclear fuel cycle.

The number of shipments has been increasing in recent years. This is more due to smaller, more frequent, shipments rather than an increase in production levels. However, as small shipments require the same effort in ASNO as large ones, this has created an increased workload for the Office, which has been met largely through enhanced use of IT systems.

Operation of bilateral agreements

Reports from ASNO's counterpart organisations were mostly provided in a timely fashion and in the agreed format, which enabled analysis and reconciliation with ASNO's records.

In the case of the US, ASNO has been working with its US counterpart (Department of Energy—DOE) for some time to resolve a number of problems in balancing the accounts—a reference was made to this situation in ASNO's last Annual Report. As outlined below, these problems resulted in Australia being credited with more AONM than was actually the case.

The US is the principal destination for Australian uranium exports, both as Australia's largest customer and through the supply of conversion and enrichment services to other Australian customers. Given the magnitude of the nuclear material flows through the US, accounting errors can be difficult to track down and have the potential to become fairly large. In this case, ASNO was aware there were significant problems, and to some extent could counter these through information from other bilateral partners, but it took considerable time and effort, checking many hundreds of transactions, for DOE to determine the exact causes and take corrective action.

The situation can be attributed to a number of causes, including over-reliance on computer software and 'teething problems' from the introduction of a new accounting system for US facilities. The largest single problem was failure to adjust transfers between the natural uranium and depleted uranium (DU) accounts at the US enrichment plants—as DU was transferred to the DU account, corresponding reductions were not made to the 'uranium in enrichment' account. In effect this resulted in double-counting a substantial quantity of material, and a cumulative overstatement of some 11,000 tonnes in the account for AONM in enrichment plants. A major factor in the time taken to track down the specific errors was the complex way the US reports were set out. DOE has accepted ASNO's proposals for redesigning these reports and the reports covering 2002 have been provided in this new format. The problems have now been largely resolved, though the US figures remain provisional at this stage—some further, smaller, adjustments may be made in the current year. The figures in Annex C reflect the adjustments made to date.

ASNO appreciates the substantial effort that DOE has devoted to this exercise. ASNO is satisfied with the explanations for the various inaccuracies resolved to date, and is completely satisfied that all AONM has remained in peaceful use in accordance with the Australia/US agreement.

As in previous years, ASNO officers visited all major bilateral partners to reconcile the AONM accounts. Mr Leslie met with ASNO's Japanese counterparts in July 2002. During May and June 2003 Mr Doulgeris held technical discussions with ASNO's

counterpart organisations in Mexico, US, UK, Euratom, Japan and Korea. Mr Ffrost also took part in the meetings in Japan and Korea, while Dr Bayer was involved with the US and Euratom meetings and also met with ASNO's counterparts in Canada and Switzerland. These discussions covered the reconciliation of accounting figures under the respective Agreements and a range of technical issues germane to their operation.

In addition to the consultations referred to above, during the year Messrs Carlson and Doulgeris had discussions with senior officials in the US. Mr Carlson also took the opportunity to discuss bilateral matters with a number of counterparts on the margins of SAGSI meetings (see Output C).

Laser enrichment technology

The arrangements established by ASNO with the US covering the transfer of SILEX laser enrichment technology govern both the way in which the technology is to be protected and exactly what the technology can be used for (exclusively peaceful purposes). Following USEC's withdrawal from the SILEX project, ASNO and NRC (US Nuclear Regulatory Commission) met in May 2003 to consider any implications for the protection of SILEX information exchanged between the two countries. Both sides confirmed that government-to-government arrangements for the protection of sensitive information would continue notwithstanding USEC's withdrawal from the project.

Performance Assessment

On the basis of reporting, other information and analysis, ASNO concludes that, subject to some further adjustment in the US accounts, all AONM has been accounted for satisfactorily.

ASNO's counterparts have confirmed receipt of all relevant exports in accordance with the requirements of the bilateral safeguards agreements, either formally or informally pending completion of formal processes. In addition, the IAEA provides ASNO with regular acknowledgments of ASNO's notifications of international transfers of nuclear material to and from Australia. The IAEA has confirmed that, as at 13 June 2003 there were no outstanding unconfirmed shipments to Australia (i.e. imports), other than one item, due to a minor typographical error in the batch name which has since been resolved. Receipt of all of Australia's exports up to 13 June 2003 has been confirmed through the IAEA's transit matching system.

As at 30 June 2003 ASNO had satisfactorily accounted for AONM located overseas through, *inter alia*, the annual reports (made pursuant to bilateral agreements) and other information provided by relevant bilateral treaty partners, namely Canada, Euratom, Finland, France, Japan, Mexico, New Zealand, ROK, Sweden, Switzerland, the UK and the US (in the latter case, as discussed, provisional figures were used). Australia's other bilateral partners—the Czech Republic, Egypt, Hungary, the Philippines and the Russian Federation—did not hold any AONM in 2002.

Given that AONM located overseas has been accounted for satisfactorily (subject to some further adjustment in the US accounts), is under IAEA safeguards, and drawing on the IAEA's Safeguards Statement for 2002 (see page 89), ASNO concludes that no AONM has been used for non-peaceful purposes.

OUTPUT C—INTERNATIONAL SAFEGUARDS

Contribution to the development and effective implementation of international safeguards and non-proliferation regimes, including participation in international expert groups and conferences, and provision to the IAEA of consultancies, assessments, support in R&D and training; and evaluation of the effectiveness of IAEA safeguards and related regimes.

MILESTONE C1

C1.1 A pro-active and useful contribution made to the development and effective implementation of IAEA safeguards, with national and international safeguards methods evaluated in an expert and thorough manner.

C1.2 Assessment of developments in nuclear technology.

C1.3 Contribution to IAEA technical training courses concerning nuclear material accountancy and control and other safeguards-related topics.

Activities

ASNO took an active part in the development of safeguards, through the following elements of work:

- participation in the IAEA's Standing Advisory Group on Safeguards Implementation (SAGSI), which is chaired by Mr John Carlson;
- the Australian Safeguards Support Program, comprising R&D and consultancy work in support of IAEA safeguards (see Milestone C3 on page 45);
- participation in relevant DFAT policy development activities, and support for Australia's Mission to the IAEA in Vienna and to Australian Missions in other capitals; and
- promotion of safeguards and non-proliferation concepts through experts meetings, conferences and publications, and discussions with counterparts in other countries.

SAGSI

SAGSI is a group of international experts, appointed by the IAEA Director General, to advise him on the effectiveness and cost-efficiency of implementing IAEA safeguards, and other international safeguards matters. Mr Carlson has been a member of SAGSI since 1998 and was appointed Chairman in July 2001.

SAGSI has provided much of the energy and vision for the current program to strengthen IAEA safeguards and continues to review developments. A key topic for SAGSI is the development of integrated safeguards, that is, the optimum combination of 'classical' safeguards and strengthened safeguards measures. This is a matter of high priority for the IAEA.

Topics examined by SAGSI during the year included:

- further development of integrated safeguards, including State-level approaches;
- the State evaluation process;
- unannounced and short-notice inspections;

- quality management issues;
- categorisation of nuclear material for safeguards purposes;
- transfers of spent fuel to difficult to access storage, and a range of issues relating to spent fuel verification;
- safeguards for conversion plants.

Evaluation of safeguards

In evaluating the IAEA's safeguards performance, ASNO drew on a wide range of activities and sources, such as:

- the IAEA's 'Safeguards Implementation Report' (SIR) and other detailed information made available to Australia as a member of the IAEA Board of Governors;
- appreciation of practical issues derived from participation in SAGSI and the operation of Australia's Safeguards Support Program in support of IAEA safeguards; and
- exchanges of views and information with IAEA staff, ASNO's counterparts in other countries, and relevant Australian agencies.

ASNO's assessment of IAEA data for 2002 and related information is that the safeguards system has fulfilled effectively its task of verifying the non-diversion of significant quantities of nuclear material subject to IAEA safeguards (see IAEA Safeguards Statement for 2002, page 89). However, substantial challenges are posed by the DPRK and Iran, as discussed in other parts of this Report.

Other work

ASNO has been closely involved in development of the Australian response to the DPRK and Iran nuclear situations through analysis and advice, and in the case of the DPRK through development of verification approaches that might form part of an eventual resolution.

ASNO has been developing outreach activities to assist countries in the region prepare for the introduction of strengthened safeguards. In December 2002 Mr Carlson contributed to the International Conference for Strengthening IAEA Safeguards, hosted by the Japanese Government in Tokyo. ASNO supported the IAEA and the Malaysian Government in March-April 2003, when Mr Leslie gave several presentations at an IAEA Regional Safeguards Symposium aimed at promoting the conclusion of further Additional Protocols in the ASEAN region, held in Kuala Lumpur. This work was well received and led to requests for further assistance.

Performance Assessment

Australia's participation in international work is making a significant, effective and highly regarded contribution to strengthening the IAEA safeguards system.

ASNO has worked closely with the IAEA through participation in SAGSI and other expert meetings. Under the Australian Safeguards Support Program ASNO provided cost free consultancy services to the IAEA for the further development of international safeguards (see Milestone C3 on page 45). The IAEA has expressed appreciation for and satisfaction with these services. This work has contributed to more effective international safeguards with improved use of new technologies and methods.

Developments in Nuclear Technology

Activities

For a number of reasons—including concern about climate change, uncertainty about long-term cost and security of supply for hydrocarbons, and the development of lower cost reactor designs—there are indications of increased interest in nuclear energy, including in Australia's region. Australia has a strong interest in ensuring that non-proliferation aspects are factored into new nuclear technologies at an early stage of development—ASNO is supporting international work in this area.

Performance Assessment

While Australia is not directly involved in substantial nuclear technology developments, ASNO has maintained a sound understanding of important developments and issues and is making a constructive contribution to ensure non-proliferation and safeguards aspects are fully taken into consideration.

IAEA safeguards training courses

Activities

Figure 18—Mr Nick Doulgeris from ASNO (front row, fifth from right) lectured at the international training course on implementation of State Systems of Accounting and Control (SSAC) of nuclear material, held in the USA in May 2003. *Photo courtesy of Los Alamos National Laboratory, USA.*

ASNO was invited to assist in a regional safeguards training course held in Japan by the Japan Atomic Energy Research Institute in November 2002 and in the USA by the Los Alamos National Laboratory in May 2003. Mr Doulgeris presented a series of lectures at the Japanese course, and both lectured and acted as a facilitator for the US course.

In conjunction with the IAEA Regional Safeguards Symposium held in Kuala Lumpur in April, Mr Leslie participated in a seminar on export controls jointly sponsored by ASNO, the US Department of Energy and the Malaysian Government. Delegates warmly welcomed this seminar. In August 2002, ASNO conducted an AusAID funded safeguards

training course designed to assist the DPRK to develop its national safeguards system (details on this course are given in a separate article, page 75).

ASNO is currently making preparations for an Asian-Pacific Physical Protection Training Course which is planned to be held in Australia in February 2004 and a regional safeguards training course that is due to be held in Australia in June 2004.

Performance Assessment

Through involvement in regional training activities on nuclear safeguards, ASNO has made an effective contribution to the IAEA's training programs designed to: improve the technical performance of safeguards authorities in the region; promote a fuller understanding of the IAEA Additional Protocol; and enable a better appreciation of the work of the IAEA. An important additional benefit has been strengthened relationships with counterparts in the region.

MILESTONE C2

Highly effective liaison maintained with the IAEA and with counterparts in other countries.

Activities

ASNO is pro-active in maintaining and strengthening contacts with the IAEA, other safeguards agencies and international safeguards practitioners. Relevant activities during the year include:

- The outreach program to regional countries concerning the Additional Protocol—that commenced in FY 2001-02 was continued in FY2002-03. The major activity under this program during the year was working with the IAEA, US Department of Energy and the Malaysian Government in Kuala Lumpur on an outreach program for ASEAN states.
- Extensive discussions with senior IAEA officials (including the Director General, Dr ElBaradei and the Deputy Director General for Safeguards, Dr Goldschmidt) and with counterparts in Euratom and ABACC (Argentine-Brazilian Safeguards Agency), as well as with senior officials of several governments and industry representatives, including from Canada, Indonesia, Japan, ROK and the US.

Performance Assessment

ASNO has achieved highly effective links with the IAEA and a wide range of safeguards organisations and regional counterparts. Through such links ASNO is abreast of developments and emerging problems in safeguards. ASNO has been effective in promoting Australian thinking on a range of safeguards and associated issues, contributing to resolving issues of safeguards concern, and ensuring that its work program is relevant to the international non-proliferation agenda.

ASNO has been able to give the Government sound advice on nuclear safeguards, both internationally and from a domestic perspective.

MILESTONE C3

Efficient performance and management of a technical R&D program, supporting the development and enhancement of IAEA safeguards.

Activities

The resources available to the IAEA are not sufficient to allow all necessary safeguards R&D programs to be conducted 'in-house'. Safeguards are an evolving discipline and ASSP—the Australian Safeguards Support Program—assists the IAEA develop the concepts, equipment and procedures needed to meet new challenges in a cost-effective way. The program embraces safeguards projects formally agreed directly with the IAEA. It also covers collaborative work with ASNO's counterparts and expert groups.

This program is not only an important tangible expression of Australia's support for IAEA safeguards, but it plays a major role in maintaining ASNO's technical expertise and appreciation of the practical issues confronting the safeguards system. Fifteen formal Member State Support Programs are currently in operation, with an aggregate annual budget of over US$20 million. In dollar terms, ASSP is modest—this year totalling about $400,000. A large part of this was expenditure by ANSTO in collaboration with ASNO. The total also included $70,000 for direct expenditure relating to consultancy services and participation in SAGSI, but did not include monies spent on ASSP projects by Commonwealth agencies other than ASNO and ANSTO. Further, it excluded indirect costs such as time, i.e. salaries of ASNO staff.

ASNO has a long-standing safeguards R&D Arrangement with the US Department of Energy (DOE. As foreshadowed in last year's Annual Report, three further 'Action Sheets' under this Arrangement were signed during the reporting period. The first program relates to improvement of the transparency of nuclear activities in the Asia-Pacific region—the work under this program is being conducted on ASNO's behalf by ANSTO. The second Action Sheet is the continuation of the Additional Protocol Outreach program to countries in the Asia Pacific region—the first activity here was a joint export control seminar held in Kuala Lumpur Malaysia in April 2003. The third Action Sheet concerns coordinating efforts to support the IAEA in developing the concept of 'information-driven safeguards approaches'—the first activity under this project was a workshop between ASNO and US experts in Canberra in February 2003. Three further Action Sheets relating to cooperation in training on physical protection are currently being negotiated, and ASNO and DOE are continuing to explore other collaborative projects that might be carried out under this Arrangement.

During the reporting period ASNO worked cooperatively with the Canadian Safeguards Support Program (CSSP) on the analysis of satellite images of uranium mines. The second report covering some aspects of the implementation stage of this work was presented at the INMM Annual Meeting in Phoenix, Arizona, in July 2003. This work will be ongoing for the next two years.

ASNO is continuing to explore options for collaborative projects with Indonesia's Nuclear Energy Control Board (BAPETEN) under the ASNO-BAPETEN MOU.

One major ASSP project—analysis of environmental samples—is carried out by ANSTO. ASNO is continuing to discuss with ANSTO other safeguards R&D projects which would strengthen ANSTO's non-proliferation program.

Details of ASSP projects are summarised at Annex H.

Performance Assessment

The results of several projects progressed and completed under the Australian Safeguards Assistance Program have been incorporated in the practices of the IAEA in 2002-03. The

IAEA has expressed appreciation for the valuable and vital contribution provided to the Agency's safeguards efforts under the Australian Safeguards Support Program.

MILESTONE C4

Completion of work undertaken by the Legal and Technical Experts Group established by the Director General, IAEA, to draft a 'well-defined amendment' to strengthen the Convention on the Physical Protection of Nuclear Material (CPPNM) .

Activities

Mr Leask attended three meetings of the Legal and Technical Experts Group in Vienna. By consensus the Experts Group agreed the majority of text necessary for an amendment strengthening the CPPNM. The IAEA in its role as depositary for the CPPNM issued the Experts Group report and amendment text to CPPNM Signatory States in June 2003. These States will now decide if, how and when to convene a diplomatic conference to resolve the remaining differences and agree to the amendment.

Performance Assessment

The Experts Group has drafted the major portion of an amendment necessary to strengthen the CPPNM. While outstanding issues are not insignificant, the agreement achieved by the Experts Group would result in a substantial strengthening of the CPPNM if accepted at a diplomatic conference.

OUTPUT D—CWC IMPLEMENTATION

Operation of the national authority for implementation of the CWC, including contribution to effective international implementation of the CWC, particularly in Australia's immediate region.

MILESTONE D1

Effective performance as the national focal point for liaison with the OPCW and other States Parties in relation to the fulfilment of Australia's obligations under the CWC.

Activities

Dealings with the OPCW

In accordance with Australia's obligations under the CWC, ASNO prepared and submitted annual routine declarations and notifications to the OPCW's Technical Secretariat. In September and October 2002, ASNO submitted the routine CWC Article VI declarations on activities anticipated for 2003 for a total of 10 Australian facilities working with Scheduled chemicals. In March 2003, ASNO submitted declarations for 2002 on international transfers of Scheduled chemicals and for 46 facilities with CWC-relevant chemical consumption, production or processing. These declarations were compiled using information gathered through the operation of the *Chemical Weapons (Prohibition) Act 1994*, and information on imports and exports of Scheduled chemicals obtained from Customs data, import and export-licensing records and industry surveys.

In accordance with obligations under Article X of the CWC and for the purposes of promoting transparency between States Parties, ASNO submitted to the OPCW an annual

declaration of Australia's national chemical defence program. ASNO worked closely with the Department of Defence in compiling this declaration.

In February and March 2003, some World War II chemical warfare munitions were uncovered at Tinaroo in Northern Queensland. Since the munitions originally contained sulphur mustard and were potentially still hazardous, they were destroyed by the Department of Defence using approved procedures soon after discovery. Subsequent analysis indicated that the agent had already become non-toxic through natural deterioration. ASNO notified the OPCW of the find as required by the Convention.

In addition to the submission of declarations, ASNO officers visited the OPCW in The Hague on three occasions to attend meetings and hold extensive discussions with the OPCW Technical Secretariat, facilitated by the Post. The CWC meetings included the 4th Annual Meeting of National Authorities, the 7th Conference of the States Parties, and the First CWC Review Conference (see Current Topic page 77). The visits and other contacts during the year covered a broad range of topics including: literature surveys of relevant Australian chemical industry activities; facility inspection agreements; chemical transfer declaration thresholds; industry monitoring procedures; counter-terrorism measures; OPCW staff tenure; privileges and immunities; collaboration on CWC workshops; and encrypted internet access to sensitive OPCW documents. This improved document access, largely prompted by ASNO, has been of direct benefit to States Parties in general.

Figure 19—Dr. Annette Berriman from ASNO (right) and OPCW officials check the GPS coordinates of a chemical facility during an OPCW inspection.

There were three routine OPCW facility inspections in Australia during the year. They consisted of a 'discrete organic chemical' (DOC) facility producing DOCs containing phosphorous, sulphur or fluorine (PSF-DOC) in Western Australia in January, a Schedule 2 chemical processing facility in Victoria in May, and another PSF-DOC in Sydney in June. This represented a substantial increase in inspection tempo after an 18 month hiatus. The turn-around was the result of improvements in the OPCW's financial and management position and also a greater emphasis on some types of industry inspections. All inspections proceeded smoothly and the OPCW findings were in accordance with ASNO's

declarations of the facilities. Australia continues to have very good relations with the inspectorate based on our cooperative, efficient and transparent procedures.

As a follow-on to the CWC Regional Workshop in Nadi Fiji which Australia helped the OPCW to host in June 2002, ASNO supported a similar meeting in Chiang Mai, Thailand, in March. ASNO facilitated funding from the Department of Defence and participation by a DFAT officer who gave a presentation on Australia's CWC implementation experience.

Dealings with other States Parties

ASNO has had extensive and usually proactive dealings with other State Parties, especially in the region. This included reconciliation of CWC Scheduled chemicals trade activity, discussions and visits (such as to China's CWC National Authority in Beijing) and providing these countries with advice, documentation and the administrative tools associated with Australia's implementation of CWC.

Performance Assessment

By providing accurate and timely declarations and notifications to the OPCW, ASNO has ensured that Australia has maintained a strong record of performance in meeting its CWC commitments.

ASNO's performance in supporting the Australian delegation to the CWC Revcon was also highly rated by the Australian Mission in The Hague.

The CWC Regional Workshop in Chiang Mai, Thailand (see Figure 6 on page 18), was appreciated greatly by participants, and Australia continues to be viewed as a key player in such activities. The OPCW especially thanked ASNO and Australia for the strong support that was provided, and closely engages us in the planning process as a key regional contact.

ASNO's effective facilitation of inspections and ongoing information exchanges on operational issues has also ensured a strong and good relationship with the OPCW.

MILESTONE D2

CWC-relevant activities and facilities effectively regulated and other CWC obligations implemented.

Activities

Permits and Notifications

During the year ASNO identified one additional facility which required a permit under the *Chemical Weapons (Prohibition) Act 1994* (the Act) to process Schedule 2 chemicals, while the operators of another facility notified ASNO that work with Schedule 2 chemicals had ceased, and that its permit was no longer required. Two collocated research facilities were granted permits to conduct research on Schedule 1 chemicals.

Forty-eight companies submitted valid notifications under subsection 29(1) of the Act in relation to production of discrete organic chemicals during 2002.

Table 5—Permits for CWC Scheduled Chemical Facilities held at 30 June 2003

Subsection	*19(4)*	*19(5)*	*19(6)*	*18(1)*	*18(1)*	*18(1)*
Facility	Schedule 1	Schedule 1	Schedule 1	Schedule 2	Schedule 2	Schedule 3

Type	Protective facility	Research facility	Consumption facility	Consumption facility	Processing facility	Production facility
Number	1	8	1	1	9	4

Industry Consultations

Throughout the year, ASNO continued to operate an on-site industry consultation and outreach program focussed primarily on facilities producing discrete organic chemicals. The aim of such visits included: providing facilities with updated CWC and associated legislative information; collecting information necessary for declarations; and preparing sites for possible routine compliance inspections by the OPCW.

ASNO officers also took the opportunity to speak at regulatory affairs meetings of the Plastics and Chemicals Industries Association (PACIA) and to publish articles in PACIA's newsletter.

Customs (Prohibited Imports) Regulations

During the year, ASNO issued 42 import permits covering Schedule 2 and 3 chemicals. ASNO also liaised extensively with the Australian Customs Service on improvements to facilitating, processing and monitoring chemical imports and exports. One of these improvements related to the introduction of specific CWC chemical codes allowed Australia to become the 11th country to adopt the World Customs Organization Recommendation on such codes. Further, ASNO presented a paper on this topic at the recent CWC Review Conference.

ASNO assisted the Department of Defence to develop a CD ROM, entitled 'International Chemical Trade Control' containing information for importers and exporters of chemicals. Version 1.0 of the CD was produced in January 2003 and ASNO has distributed it to all import permit holders and made it available on the ASNO website, www.dfat.gov.au/cwco. The CD is also being distributed to brokers and freight-forwarders as a means of improving the regulation of relevant chemical transfers, providing a useful operational tool for the assignment of chemicals with their correct codes.

Other Activities

As part of its contribution to Government efforts to address the threat of chemical terrorism, ASNO maintained the facility incident and security reporting procedures that it introduced in early 2002. ASNO also extensively engaged industry, Government agencies and international bodies on this issue.

ASNO worked with Department of Defence facilities and agencies to develop contingency plans to manage a CWC challenge inspection in the remote possibility of one occurring in Australia. Initially the efforts have focussed on more sensitive sites but the plan will eventually also cater for any Defence facility, and commercial facilities if necessary.

For ASNO's contribution to the work of the Australia Group, see Milestone F3 (page 56).

Performance Assessment

The system of permits and notifications operated well during the year and were subject to some refinements.

Other achievements included an increasing role in chemical counter-terrorism efforts, closer coordination with other relevant agencies in outreach and assistance to industry, and

international recognition for some of the chemical monitoring measures ASNO has introduced.

OUTPUT E—CTBT IMPLEMENTATION

Operation of the national authority for implementation of the CTBT, including development of CTBT verification systems and development of arrangements in support of Australia's CTBT commitments.

MILESTONE E1

E1.1 Operate effectively as the national point of liaison with the CTBTO and other States in relation to the fulfillment of Australia's obligations under the CTBT.

E1.2 Facilitation and enhancement of Australia's technical contributions to the work of the CTBT Preparatory Commission and its Working Groups.

Activities

To prepare for the entry into force of the CTBT the Preparatory Commission (PrepCom), made up of CTBT States Signatories and supported by a Provisional Technical Secretariat (PTS), was established in 1997. The primary task of the PrepCom is to develop and establish the Treaty's verification regime, which consists of the following components:

a) an International Monitoring System (IMS), comprising 321 seismic, radionuclide, infrasound and hydroacoustic monitoring stations and 16 radionuclide laboratories around the world;

b) arrangements for, and a capacity to conduct, an on-site inspection (OSI) to determine whether or not a nuclear explosion has taken place; and

c) arrangements through which States Parties will be able consult or seek clarification if concerns arise about Treaty compliance, and voluntary confidence building measures where States Parties would give notice of large conventional explosions.

Establishment of Australian IMS stations

Australia will host 20 IMS stations and one laboratory in the IMS (see Annex J)—the third largest number of facilities of any country. ASNO co-ordinates work to upgrade, establish and operate these in liaison with the CTBTO's Provisional Technical Secretariat (PTS), with institutions constructing and operating the stations, and with relevant Commonwealth and State and Territory agencies. This work has proceeded smoothly throughout the year, although resolving land acquisition issues has involved considerable effort.

As the CTBT is not yet in force, ASNO does not currently carry out the full range of anticipated legal functions.

CTBTO Preparatory Commission

ASNO participates in the technical working group sessions of the PrepCom, in conjunction with Australia's Mission in Vienna and with technical specialists from Geoscience Australia 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 OSI.

Figure 20—Participants in the CTBT On-Site Inspection Workshop in Hiroshima in June 2003, standing at the foot of the Cenotaph which is the central element of the memorial for victims of the atomic bomb in August 1945. *Picture courtesy of the CTBT PTS.*

The elaboration of a procedures manual for OSI is a significant ongoing task of the working group. The need to address differing views amongst States Signatories on how an OSI should be conducted makes this a difficult task. ASNO participates actively in the negotiation process for the manual. Further, ASNO participated in and contributed to OSI training and exercise activities during the year, as well as a workshop of OSI experts in Hiroshima, Japan, in June 2003.

The PrepCom's OSI development program was the subject of a major review during the year. The international team that conducted the review was led by Mr Richard Starr. Before retiring, Mr Starr held appointments as Australia's Ambassador for Disarmament in Geneva and Permanent Representative to the UN for Arms Control and Disarmament from 1994 to 1996. He was Australia's chief negotiator for the CTBT negotiations.

Regional Outreach

ASNO contributes to DFAT efforts to promote support for the CTBT, in particular its ratification by additional countries.

In June 2003, ASNO's Mr Donald Sorokowski contributed to a workshop in Nadi, Fiji with the aim of encouraging and assisting Pacific Island States to implement national arrangements required by the CTBT.

Figure 21—Workshop on CTBTO International Implementation and National Implementation of the Treaty, Nadi, Fiji, June 2003. Mr Donald Sorokowski (fourth from left) from ASNO represented Australia. *Picture courtesy of the CTBT PTS.*

Performance Assessment

Based on projections at the end of the year, the IMS should be largely complete by around 2009. At the end of 2001-02 this estimate had been 2007. In the absence of a significant near term prospect for entry-into-force of the CTBT the readiness of states to fully fund the work of the PrepCom has reduced, and this projection may need to be revised further.

Progress with the establishment of Australian IMS stations, however, has remained strong. During 2002-2003 work to establish of upgrade five Australian stations was brought to completion, and three stations were certified as meeting CTBT requirements:

- pre-existing auxiliary seismic stations at Charters Towers (QLD), Narrogin (WA) and Fitzroy Crossing (WA) were upgraded;
- an infrasound monitoring station was constructed at the Buckland Military Training Area in central Tasmania;
- a pre-existing primary seismic station at Stephens Creek (NSW) was certified;
- a pre-existing primary seismic station at Mawson Base in Antarctica was upgraded and certified; and
- a radionuclide monitoring station in Darwin (NT) was certified.

Co-ordination work was also undertaken in relation to further stations:

- construction of an infrasound station in Shannon National Park in Western Australia;
- planning for new radionuclide and infrasound stations on the Cocos Islands, at Macquarie Island, and in Antarctica.

Although progress on Australian IMS stations has so far been unaffected, the financial constraints now faced by the PrepCom may slow future work. More significantly though, pressures to reduce the cost for operating IMS stations will likely be felt by Australia more keenly than most other States Signatories, due to the large number of stations hosted.

At the CTBTO Preparatory Commission in Vienna, Australia is recognised as an important contributor on key aspects of the work of the Commission. ASNO has made a significant contribution to this in recent years through its work on IMS establishment, and on modalities for on-site inspection under the CTBT.

The leadership by Mr Richard Starr of the team conducting the external evaluation of the PrepCom's OSI programme received wide international appreciation. Mr Starr's appointment attested to the high regard for Australia's ongoing commitment to the CTBT, and the results of this work contributed further to Australia's standing in this regard (see Media Release page 119).

MILESTONE E2

Timely establishment and maintenance of legal and administrative mechanisms that will give effect to CTBT obligations in Australia.

Activities

Although the *Comprehensive Nuclear Test-Ban Treaty Act 1998* received Royal Assent on 2 July 1998, under section 2 of the Act it will not come into force before the day the CTBT enters into force. One objective of the *Non-Proliferation Legislation Amendment Bill 2003*, introduced into Parliament in June 2003, is to enable certain provisions to be proclaimed before that time.

Geoscience Australia (GA) carries out nuclear test monitoring, using its network of seismic stations, under contract to DFAT. Since 1 July 2000 ASNO has administered that contract on behalf of the Department.

Australia has concluded an arrangement with the Preparatory Commission to facilitate establishment and operation of IMS stations in Australia. The implementation of that arrangement includes access to Australia's Indirect Tax Concession Scheme. ASNO has assisted the PTS during 2002-03 to ensure claims made under that scheme are in accordance with relevant legal requirements.

Consistent with principles set out in the CTBT, activities associated with the development of the Treaty's 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. During the year three technical staff from GA, ARPANSA and Bureau of Meteorology undertook training for future responsibilities as station operators, or as inspectors to be deployed should the Treaty's on-site inspection provisions be invoked. This figure is less than in previous years, caused in part by postponements due to PTS funding difficulties in 2002 as well as a reduction in the need for training given the attendances by Australian technical staff at previous courses. In addition, ASNO's Mr Malcolm Coxhead attended the Third OSI Experimental Advanced Course held in November 2002, in Vienna.

Performance Assessment

The nuclear monitoring contract with Geoscience Australia (GA) was performed satisfactorily throughout the year. Its terms will be reviewed in the coming year to ensure they continue to be appropriate to Australia's needs.

Australia is widely regarded as an active participant in and contributor to the practical work of preparing for entry-into-force of the CTBT. Participation in training activities has presented useful opportunities to strengthen this involvement and promote Australia's interests.

OUTPUT F—OTHER NON-PROLIFERATION REGIMES

Contribution to the development of new and strengthened WMD non-proliferation regimes—including the Australia Group—and international and domestic measures in support of BWC objectives, and development of verification concepts for the proposed FMCT.

MILESTONE F1

Provision of effective technical support and advice to Australia's efforts to strengthen the BWC.

Activities

ASNO continued to provide technical support to DFAT in efforts to develop means to strengthen the BWC and to respond to its requirements. This support was more varied than previously as the international community explored new alternatives to the stalled Verification Protocol negotiations. ASNO participated in the National Consultative Group on the BWC chaired by DFAT.

ASNO provided advice to the Government on a number of issues that arose from terrorist-related ricin incidents in the UK and in Spain.

Performance Assessment

DFAT continues to value ASNO's input towards strengthening the BWC and in helping to address bioterrorism concerns. This contribution was also evident in the number of papers prepared and services provided to a broad group of agencies.

MILESTONE F2

Provision of effective technical support and advice to UNMOVIC and development of associated Australian policies.

Activities

Mr John Howell received advanced training as an UNMOVIC CW inspector in Beijing in September 2002. Due to the short period of UNMOVIC's presence in Iraq, he did not deploy to the theatre of operations. However, should UNMOVIC or an equivalent body be given a role in Iraq, ASNO would be in a good position to assist.

Figure 22—Mr John Howell (ninth from left) from ASNO at September 2002 UNMOVIC Advanced CW Course, Beijing, China. *Photo courtesy of the Government of the Peoples Republic of China*.

ASNO advised on policy development concerning UNMOVIC and Iraq, preparing reports and arranging presentations and debriefs by UNMOVIC inspectors.

Performance Assessment

ASNO received favourable comment on the timeliness and value of its activities and continues to receive requests for briefings. ASNO maintained its expertise in practical verification arrangements.

MILESTONE F3

Provision of effective technical and operational support to the Australia Group.

Activities

Mr Andrew Leask attended and chaired implementation sessions of the June 2003 meeting of the Australia Group (AG) in Paris. The AG is an informal forum of countries which harmonise their export controls to ensure that dual-use goods are prevented from reaching proliferant chemical and biological warfare programs. The meeting was highly successful and is all the more important due to greater current concerns about WMD proliferation and terrorism (see Media Release page 120). ASNO also provided comment on and input to the Australian papers presented at the meeting, which was particularly useful because of ASNO's operational perspective.

Performance Assessment

On request, ASNO has increased its level of involvement in the AG and received strong praise for its efforts. Important outcomes associated with ASNO's presence were the addition of 14 human pathogens to the control lists, and active consideration for similarly incorporating a number of relevant chemicals.

Figure 23—The Australian delegation to the June 2003 Australia Group meeting in Paris, France. ASNO's Mr Andrew Leask is fourth from the left.

MILESTONE F4

Effective contribution to national and international discussions on a possible Fissile Material Cut-off Treaty (FMCT).

Activities

Effective and cost-efficient verification will be fundamental to the FMCT regime. Therefore, an important part of preparation for FMCT negotiations is the development of verification concepts to help guide the negotiations to a successful outcome.

Since 1995 ASNO has been developing what is termed a 'focused' approach, under which verification would be concentrated on enrichment and reprocessing plants, and on separated plutonium and HEU (high enriched uranium) (see pages 73-75 of ASNO's 1999-2000 Annual Report).

ASNO has provided assistance to DFAT's International Security Division (ISD) in the formulation of advice on FMCT for the Australian Delegation to the Conference on Disarmament (CD) and Australian posts in key capitals, also taking the opportunity during bilateral consultations to promote Australian concepts for an FMCT.

Performance Assessment

ASNO's ideas on a 'focused' FMCT verification regime were presented at several international seminars and conferences where they were well received. ASNO is generally regarded by those engaged in FMCT matters to be at the forefront in the development of practical and effective verification concepts. ISD values ASNO input towards the development of verification arrangements for the FMCT.

OUTPUT G—ADVICE TO GOVERNMENT

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

MILESTONE G1

Ministers and other key stakeholders satisfied with policy advice, analysis and briefings.

Activities

ASNO provided advice to the Minister for Foreign Affairs on a range of issues, as well as contributing extensively to the development of advice provided by other Divisions in DFAT, different agencies including the Department of Industry, Tourism and Resources, the Department of Education, Science and Training, and the Department of Defence.

Significant issues affecting nuclear safeguards, the CWC, the CTBT and to a lesser extent the BWC were kept under review, and close liaison was maintained with DFAT on these and other matters of common interest.

Performance Assessment

During the reporting period ASNO submitted a total of 49 Ministerial briefs, Ministerial correspondence, Parliamentary Question briefs and press releases. ASNO also made a major contribution to DFAT policy advice, analysis and other briefings on nuclear, CWC, BWC, CTBT and other relevant issues. Ministers, Departments and agencies have indicated appreciation of the high quality, timely and relevant advice provided by ASNO.

OUTPUT H—PROVISION OF PUBLIC INFORMATION

Provision of public information on the development, management and regulation of WMD non-proliferation treaties, and Australia's role in these activities.

MILESTONE H1

Management of an effective program to inform and educate the public on nuclear safeguards and CWC issues, and promotion of an understanding of the CTBT and its verification arrangements.

Activities

As in the past, this year's ASNO Annual Report contains a considerable number of background articles and information on nuclear, CWC and CTBT issues. ASNO has also presented a series of papers at conferences and in international publications—see Annex K of this Report. ASNO's Annual Report and papers have been read and used by many parts of the community and formed the basis of public briefings.

ASNO staff have provided background briefings to the media and non-government organisations such as the Uranium Information Centre in Melbourne on a range of topics.

In conjunction with DFAT and the Department of Defence, ASNO effected outreach to universities in NSW, and industry, to address issues pertaining to the export of knowledge (intangible technology) and equipment.

Basic details of permits issued, revoked and varied under the Safeguards Act were published in the Commonwealth Government Gazette.

ASNO's web site (http://www.asno.dfat.gov.au) was modified to bring it in line with the Departmental standard and material was updated. All ASNO publications were listed, with many new documents linked to the web site.

Performance Assessment

ASNO has used a wide range of material to inform the public and officials about current nuclear, CW-related and CTBT issues. Some of these materials, such as the CD-Rom for chemical traders, have been sought after by foreign authorities with responsibilities similar to ASNO.

Industry has expressed appreciation for efforts to keep it informed about changes under IAEA safeguards, the CWC and legislation. An evaluation of ASNO's relationship with industry shows that dissemination of information has fostered an acceptance and broader understanding of relevant treaties and their verification mechanisms.

CURRENT TOPICS

Figure 24—View of the top of a chemical reaction vessel.

STRENGTHENING THE NUCLEAR NON-PROLIFERATION REGIME

This article is based on a paper prepared for the Annual Meeting of the Institute of Nuclear Materials Management, Phoenix, Arizona, 13-17 July 2003.

1. INTRODUCTION

The Nuclear Non-Proliferation Treaty (NPT) is the keystone of the international nuclear non-proliferation regime. Despite current concerns, the NPT has been an outstanding success. In the 1960s, before the NPT was negotiated, it was widely assumed that nuclear proliferation was inevitable and there would be some 25 nuclear armed states by the 1990s. This has not happened. Instead there continue to be five recognised nuclear-weapon states (US, Russia, UK, France, and China), and in addition three 'nuclear-capable' states which have remained outside the non-proliferation regime (India, Israel and Pakistan). We can count as major non-proliferation successes that South Africa, a state that developed nuclear weapons, and Ukraine, Belarus and Kazakhstan, states that had nuclear weapons in their territories after the collapse of the Soviet Union, all foreswore nuclear weapons in order to join the NPT as non-nuclear-weapon states (NNWS).

In spite of the overall success that it has enjoyed so far, however, today the non-proliferation regime has never been under greater threat. Three states have presented major challenges to the objectives of the NPT: Iraq and the DPRK have been formally found to be in non-compliance with their safeguards agreements, and the DPRK has announced its withdrawal from the NPT. Iran has committed a number of safeguards breaches, and as at 30 June 2003 (the end of the period covered by this Report), IAEA investigations were continuing. The challenge posed by Iraq has been resolved through regime change—the challenges of the DPRK and Iran are ongoing. In addition, there is a technology challenge—a common factor with all three of these states is the spread of centrifuge enrichment technology and know-how.

2. MAJOR CHALLENGES

Iraq exploited weaknesses inherent in the classical safeguards system to conceal its proliferation efforts prior to the first Gulf War. The response to this has been the development of strengthened safeguards, including the Model Additional Protocol. While the threat from Iraq has now been resolved, many of the weaknesses revealed by Iraq remain for those states that have not concluded Additional Protocols—and this includes all the states of current proliferation concern.

DPRK The DPRK has a clandestine enrichment program, has announced withdrawal from the NPT, has admitted to having nuclear weapons, and has threatened to supply fissile material to others.

Iran There is widespread concern about Iran's development of uranium enrichment and heavy water production, with plans for a large heavy water-moderated research reactor. These activities give Iran an incipient nuclear weapon capability. During the first half of 2003 the IAEA found a number of breaches of Iran's safeguards agreement, and as at 30 June investigations were ongoing. Iran's persistent refusal to conclude an Additional Protocol only reinforced suspicions about Iran's intentions.

Centrifuge enrichment All three of these states have (or in the case of Iraq, had) centrifuge enrichment programs. A number of other states are suspected of having an interest in clandestine centrifuge enrichment programs. Because of the inherent characteristics of centrifuge enrichment—including relatively small physical size, relative

absence of physical indicators—centrifuge enrichment presents major challenges: how to effectively safeguard declared facilities, how to detect undeclared facilities, and how to limit the further spread of this technology.

Dealing with proliferators The greatest single challenge currently facing the international community is how to deal with determined proliferators. In particular, how do we deal with proliferators: (a) with **undeclared** centrifuge enrichment; or (b) with declared enrichment facilities operated under safeguards, but which provide the capability for rapid break-out from non-proliferation commitments.

3. CRITICISMS OF IAEA SAFEGUARDS

These situations have led some to argue that, since the IAEA safeguards system failed to detect illicit nuclear activities in these three states, safeguards are really only effective in the case of states committed to non-proliferation, and cannot be relied on to meet contemporary proliferation challenges.

Such arguments fail to distinguish between a number of key factors:

- the IAEA's **competence**—its technical capabilities—as distinct from its **authority**—what the IAEA is permitted to do under different safeguards agreements;
- the essential role of national intelligence, relative to safeguards, in the search for undeclared nuclear activities;
- most importantly, the difference between **verification**—a technical function—and **compliance**—which is very much a political responsibility.

It should be noted these three cases—Iraq, DPRK and Iran—occurred under the safeguards system developed in the 1970s (in the case of the DPRK, essentially the IAEA was limited to monitoring under the US/DPRK Agreed Framework). Now the safeguards system has been substantially improved—rather than focusing on failings in old safeguards, it is more constructive to exert pressure on those states that have not yet accepted current, strengthened safeguards.

These arguments have emerged as part of a wider debate about the relative contribution of multilateral and national actions in countering nuclear proliferation. Actually, effective action against proliferation cannot be wholly multilateral, nor wholly national—what is needed is a collaborative relationship between the two. There is no substitute for the disciplined, ongoing and **impartial** verification activity which the IAEA safeguards system provides. However, national action is also essential—for example, addressing the motivations for proliferation, and ensuring effective coordination and application of nuclear supply policies. Ultimately, the effectiveness of measures against proliferation depends on the preparedness of governments—particularly the Permanent Members of the Security Council—to take enforcement action in support of compliance.

4. ADDRESSING THE CRITICS

The argument that IAEA safeguards serve only to confirm the commitment of non-proliferation adherents is too dismissive—the fact that the number of nuclear-armed states remains small demonstrates the value of the NPT and the safeguards system that underpins it. Even if safeguards only reinforce non-proliferation commitments, this is no mean achievement. In fact, IAEA safeguards have also been important in containing the 'uncommitted'—and a more effective alternative has yet to emerge.

In considering these issues, it is essential to have a realistic appreciation of what safeguards can, and cannot, deliver:

- A government's decision whether to proliferate will be based on complex **political** grounds—national security, strategic intentions, national prestige, and so on. The first line of support for non-proliferation objectives must be effective **incentives and sanctions** operating at the political level—promoting non-proliferation and setting an unacceptably high cost for proliferation.
- Safeguards cannot **prevent** proliferation, only **deter** proliferation through the risk of detection—and giving **warning** of proliferation, providing opportunity for intervention. Safeguards cannot be blamed for failings in the underlying political incentives and sanctions. The criticisms of the safeguards system would seem more fairly directed at the political level—the difficulty of obtaining Security Council approval for enforcement measures.
- The IAEA's **detection capability** depends on the tools—legal and technical—at its disposal. The Agency's technical capabilities have been substantially improved, but the most effective use of these capabilities depends on states concluding Additional Protocols extending the access and information available to the Agency.

  Ultimately, **national intelligence** has a vital role in the detection of **undeclared** nuclear activities. The IAEA cannot be blamed for failures of national intelligence. We must learn from past mistakes—good results will very much depend on intelligence activities being well-targeted, and working in partnership with the IAEA.

5. Strengthening the Safeguards System—The Additional Protocol

The limitations on the IAEA's inspection rights under basic NPT safeguards agreements were clear to all after the first Gulf War. Since then, considerable effort by the IAEA and Member States has gone into strengthening the safeguards system, through improved technical measures and through the development of the Additional Protocol, a legal instrument supplementary to basic safeguards agreements, which substantially increases the IAEA's rights to access and information. Australia played an active role in the negotiation of the Additional Protocol and was the first state both to sign and to ratify a Protocol.

Of course, the Additional Protocol is not a panacea, but it does represent a very substantial advance in the IAEA's capabilities—no doubt realisation of this is reflected in the fact that so far none of the states of proliferation concern has concluded a Protocol. This latter point is germane to the criticism that safeguards apply mainly to the 'committed'.

The Additional Protocol **cannot be considered optional**. NNWS Party to the NPT have accepted 'the Agency's safeguards system'. This means, the safeguards system as it exists from time to time—safeguards are not a menu, it is not acceptable for states to pick and chose to suit themselves. Now, with the signatures of **three-quarters of NNWS NPT Parties with significant nuclear activities**, the Additional Protocol is clearly established as **the contemporary NPT safeguards standard**.

That being said, the rate of acceptance of the Additional Protocol remains disappointing: as at 30 June 2003, just over a third of NNWS NPT Parties with significant nuclear activities—22 out of 63—had ratified an Additional Protocol. A further 23 such states had signed Protocols or had them approved by the IAEA Board of Governors—as just noted, when these are ratified a substantial majority of NNWS NPT Parties with significant nuclear activities will have Protocols in place. However, there remained 18 NNWS NPT Parties with significant nuclear activities that have yet to sign, let alone ratify, a Protocol—and included in these are a number of states of proliferation concern.

The greatest single step in strengthening the IAEA safeguards system will be to achieve acceptance of the Additional Protocol by all states subject to comprehensive safeguards. The figures above refer to NNWS with significant nuclear activities—looking at the totality of NNWS, 72 (out of 182) have signed, and of these 34 have ratified. While those NNWS *without* significant nuclear activities may feel their participation is not important, the existence of a number of states outside the Protocol provides cover for those who actively seek to avoid concluding a Protocol. It is a vital task for all supporters of the non-proliferation regime to encourage, persuade and if necessary pressure those without Additional Protocols to conclude these without further delay.

6. FURTHER SAFEGUARDS STRENGTHENING STEPS

Some ideas for further strengthening the safeguards regime are outlined as follows.

Enhancing the IAEA's technical capabilities

The particular challenge of detecting clandestine centrifuge enrichment operations has been mentioned already. More generally, the detection of undeclared nuclear activities presents a considerable challenge. It is important for all states in a position to do so to assist the IAEA in developing the necessary capabilities and skills.

Special inspections

While complementary access (CA) pursuant to the Additional Protocol redresses a major weakness in INFCIRC/153—the limitations on the IAEA's access rights—of course CA applies only in those states that have a Protocol in place. In respect of those states yet to conclude a Protocol, a fresh look at the special inspection mechanism is warranted.

Special inspections have been largely overlooked since the IAEA Board suggested in 1992 that they should be 'rare'—but much has happened since then. The general recognition of the need for access to resolve safeguards questions—leading to the development of the CA concept and the Additional Protocol—the unprecedented challenges now facing the non-proliferation regime, and concerns about the motives of at least some of those remaining outside the Protocol, all indicate the potential value of special inspections. While special inspections will never become 'routine', nor should they be 'rare'. It is time to remove the mystique and the accusatory overtones—special inspections are an important safeguards tool that the IAEA cannot afford to neglect.

Increased sharing of information:

National information The preparedness of states to share information with the IAEA is essential to an effective safeguards system. There are limits to what can be realistically expected of the IAEA, without the assistance of states, in the detection of undeclared nuclear activities. States need to contribute through the sharing of unclassified information and analyses, the sharing (under appropriate protection) of information from national intelligence sources, and assisting the IAEA in developing necessary information collection and analysis skills. Much has been done in these areas, but there is plenty of opportunity to do more.

Information-sharing with other verification agencies and secretariats Information-sharing can be improved, both within nuclear-related areas, such as the NSG (Nuclear Suppliers Group), the Zangger Committee, and the CTBT (Comprehensive Nuclear-Test-Ban Treaty), and also with other WMD areas, such as the CWC (Chemical Weapons Convention) and the MTCR (Missile Technology Control Regime).

The NSG is a particularly important area to look at. Patterns of acquisition of **dual-use items** would serve as a useful indicator of possible proliferation efforts. Yet currently

there is little or no sharing between NSG members of information on exports of dual-use items (apart from denial notifications), and there is no arrangement for the sharing of such information with the IAEA. In the case of items specially designed/prepared for nuclear use, the Additional Protocol requires the reporting of transfers to the IAEA—here, it might be asked whether there is scope for suppliers to voluntarily bring this into general application ahead of Additional Protocol ratifications.

As to the relevance of other WMD regimes, experience shows that a state pursuing one form of WMD is likely to be interested in others, as well as in suitable delivery systems. Often these states have used the same research institutions and front companies across different WMD areas. Thus knowledge of procurement efforts in other areas may be very useful for the IAEA, and *vice versa*.

Reviewing the IAEA's confidentiality requirements It is a long-established practice, reflecting the wishes of Member States, for information provided by states to the IAEA in the course of the Agency's verification activities to remain confidential. This practice contrasts with a more modern treaty, the CWC (concluded in 1993), under which any Party is entitled to access to national declarations submitted by other Parties.

Considering the fundamental importance of transparency to confidence-building, the question can be asked, **does confidentiality work against confidence**? States have a legitimate interest in knowing the information held by the IAEA on other states, partly as a way of building confidence in the operation of safeguards, partly to identify gaps in the IAEA's data base where they may be able to assist. Of course, there will be some information—e.g. commercial matters, physical protection arrangements, national intelligence-sourced information—that must remain confidential—but there is an extensive range of other information where there would be benefit in greater openness.

Constraints on the spread of proliferation-sensitive technology

The proliferation of nuclear weapons is in no-one's interest. Governments must be persuaded that the short-term commercial advantage of assisting nuclear programs in states of proliferation concern are more than offset by the long-term risks to themselves as well as others.

There is a need not only to ensure that NSG members' export controls are as effective as possible, but to try to secure the cooperation of states outside the NSG to apply similar controls. Iraq had been able to obtain centrifuge components and other sensitive nuclear items through illegal supply from European sources. Since then European export controls have been substantially improved, and tougher laws introduced against complicity in WMD programs. A worrying development is, according to media reports, an apparent Pakistan link in the centrifuge programs of the DPRK and Iran. Now, there must be concerns about whether Iran's enrichment technology will spread, illegally or otherwise—and the DPRK has indicated a willingness to trade in fissile material.

The conclusion of an Additional Protocol should be seen as a basic condition for nuclear supply. But this in itself is not sufficient—Australia for one urges constraint in supply **and acquisition** of sensitive technology in regions of tension. The confidence that safeguards are intended to provide will be undermined if there is concern that states, in the guise of safeguarded 'civil' programs, are developing 'virtual' nuclear weapons capabilities.

One aspect that needs to be addressed is the assertion that the NPT gives states an unlimited right to pursue any nuclear technology. It must be recognised that all 'rights' carry corresponding duties—the 'inalienable right ... to use nuclear energy' referred to in NPT Article IV.1 is not absolute. It is subject to the overriding non-proliferation

commitments of the Treaty—it does not imply the right to pursue **any** technology regardless of the implications for the objectives of the Treaty.

Given the particular problems posed by **centrifuge enrichment** technology—increasing availability, ease of concealment (including through clandestine replication of safeguarded facilities)—the time has come for a careful look at a program of action in support of non-proliferation. This could encompass not only enhanced export controls and enhanced verification/detection capabilities, but also development of political responses—such **as assurance of supply** as a means of diminishing the incentive to develop indigenous enrichment capabilities, and the establishment of multi-nation enrichment arrangements.

Flexibility in safeguards implementation—matching safeguards effort to need

The need to move away from the current **uniformity** in safeguards implementation, to flexibility based on effective use of **information** and **expert judgment**, is discussed in ASNO's paper 'Back to Basics—Re-thinking Safeguards Principles'. This is not simply an issue of efficiency, but also effectiveness—the concept of flexibility involves establishing conditions under which safeguards intensity can be adjusted upwards, as well as downwards, depending on state-specific factors.

Promotion of proliferation-resistant fuel cycle technologies

This is forward-looking—there are obvious advantages if it is possible to develop technologies that minimize opportunities for production or separation of weapons-usable materials. Such concepts have been discussed in detail elsewhere, e.g. ASNO's paper 'Towards a Proliferation-Resistant Nuclear Fuel Cycle'.

Complementary regimes

For a discussion of how other regimes—such as the CTBT, the proposed FMCT, regional and bilateral regimes, arrangements covering nuclear weapons dismantlement and irreversibility—see ASNO's paper 'Nuclear Non-Proliferation: the Role of Complementary Regimes'.

7. CONCLUSIONS

This article identifies a number of challenges to the non-proliferation regime, and discusses a number of steps that can be taken to strengthen the regime and its verification mechanism, IAEA safeguards. While some of these steps are improvements that can be made at a technical level, others require political support.

Ultimately the success of the non-proliferation regime comes down to a question of political will—the strength of states' commitment to non-proliferation objectives, and their preparedness to act in support of these objectives—including, where necessary, taking action to enforce compliance.

The spread of nuclear weapons to further states should not be tolerated. In 1992 the Security Council declared that

> 'The proliferation of all weapons of mass destruction constitutes a threat to international peace and security'. It pledged, furthermore, that
>
> 'the members of the Council will take appropriate measures in the case of any violations notified to them by the IAEA. '[1]

Without a strong political commitment by the international community there is a limit to what safeguards can achieve. It is vital that the Security Council, and especially the

1. Statement by President of the Security Council, 31 January 1992, UNSC document S/23500.

Permanent Members, are prepared to uphold this declaration and take the necessary action when cases of proliferation arise.

IRAN – NUCLEAR DEVELOPMENTS

This article outlines developments as at 30 June 2003. Developments were ongoing as the Report was being prepared.

For some years there have suspicions about Iran's nuclear ambitions and undeclared nuclear activities. During the year, there have been revelations that the scale and complexity of Iran's nuclear program and plans are far greater than previously declared. The development of proliferation-sensitive enrichment technologies by Iran within the already unstable Middle East, together with the lack of transparency of Iran's nuclear developments, is of considerable concern.

In August 2002 an Iranian dissident group revealed the existence of two undeclared nuclear-related facilities in Iran: a large underground enrichment facility under construction at Natanz, and a heavy water production plant at Arak. This was followed in September by Iran's statement to the IAEA General Conference, announcing the intention to construct six nuclear power plants with a total capacity of 6,000 MWe, together with various associated fuel cycle and waste management facilities.

In October 2002 the Director General of the IAEA sought to visit Iran to investigate the dissidents' claims and seek clarification of Iran's nuclear fuel cycle intentions. Due to delays on the Iranian side, this visit did not proceed until February 2003.

Uranium Enrichment

During this visit, Iran informed the IAEA of its uranium enrichment program and two facilities at Natanz that had not previously been declared. The first was a nearly completed pilot uranium enrichment plant containing 100 of a planned 1,000 gas centrifuges. The second was a large underground commercial-scale enrichment plant still under construction and designed to contain over 50,000 centrifuges. Iran claimed that the development of these centrifuges had been undertaken without the use of nuclear material.

The development of centrifuge uranium enrichment technology is complex and requires extensive development and testing using gaseous feed materials. While early centrifuge development may be performed using an inert gas such as argon, more advanced development involving a number of machines linked in a cascade is extremely difficult without the use of UF_6 (uranium hexafluoride gas). It is not credible that Iran would build a large pilot plant and commercial-scale production plant without having first demonstrated that the centrifuge and cascade design will actually enrich UF_6. IAEA experts consider that Iran's centrifuges could not have been developed without practical experience using nuclear material, i.e. UF_6.

As Russia has agreed to supply fuel for Iran's Bushehr power reactors currently under construction, Iran has no present need for an enrichment plant to produce such fuel. In addition, the size of the Natanz plant is not sufficient to produce enough fuel for even a few of the several large nuclear power reactors envisaged in Iran's long-term energy plan. Besides, the oversupply of enrichment services in the world means there is no commercial advantage in building another such plant.

During the February visit, the IAEA also sought information and access to the Kalaye Electric Company in Tehran, which media reports had linked to the enrichment program. Although Iran acknowledged that centrifuge components had been produced at the workshop, it stated that the workshop was not involved with enrichment using nuclear material and therefore it did not fall under Iran's NPT Safeguards Agreement. Only after

repeated requests from the IAEA to visit the site did Iran allow visits in March and May 2003. Iran repeatedly denied IAEA requests to take environmental samples at the workshop.[1]

Undeclared Import and Processing of Nuclear Material

In response to IAEA questions, Iran confirmed that it had imported 1.8 tonnes of natural uranium in 1991, mostly in the form of UF_6, but also including UF_4, and UO_2. Iran claimed that failure to report this to the IAEA was a 'mistake'. Also under IAEA questioning, Iran revealed that most of the UF_4 had been converted into uranium metal, and some of the UO_2 had been irradiated in a reactor and chemically treated. There was an obligation to report such processing to the IAEA, but again 'mistakes' had been made. Iran was found to be building a uranium metal purification and casting laboratory for which there was no apparent justification—but which is highly relevant to production of nuclear weapons components.

Proposed Heavy Water Reactor

In February, Iran confirmed to the IAEA that a heavy water plant was under construction at Arak, as had been reported in the press. Iran subsequently informed the IAEA of its intention to construct a 40 MWt heavy water research reactor, also at Arak, and a fuel fabrication plant at Esfahan. Although claimed to be needed for radioisotope production, a reactor of this type and size formed the basis of the Indian nuclear weapons program, and is also the basis of the Israeli nuclear program.

IAEA Report to Board of Governors

In his report[2] to the IAEA Board of Governors in June 2003, the IAEA Director General Dr ElBaradei stated 'Iran has failed to meet its obligations under its Safeguards Agreement with respect to the reporting of nuclear material, the subsequent processing and use of that material and the declaration of facilities where the material was stored and processed.' He also stated, 'The role of uranium metal in Iran's declared nuclear fuel cycle still needs to be fully understood, since neither its light water reactors nor its planned heavy water reactors require uranium metal for fuel.'

Lack of Transparency

Iran has been particularly secretive about its nuclear program, with official disclosures of its activities only forthcoming after media reports raised suspicions. Iran has argued that under its NPT Safeguards Agreement, it is not obliged to give access to or allow environmental sampling at facilities that have not contained nuclear material. As a consequence of Iran's unwillingness to cooperate, the IAEA has been hampered in its investigations of undeclared nuclear activities in Iran. Iran's failure to meet its safeguards obligations together with its lack of transparency and the extent of its nuclear program will continue to fuel speculation that its nuclear intentions are not completely peaceful.[3] Iran's current actions are inconsistent with reasonable expectations that Iran would want to discredit allegations and prove the peaceful nature of its nuclear program, and are also

1. Iran eventually allowed the IAEA to carry out environmental sampling at Kalaye in August 2003. At the time of writing this Report the results were not available.
2. IAEA Board of Governors document GOV/2003/40 of 6 June 2003.
3. The IAEA continues to investigate Iran's nuclear program. A further report, indicating further safeguards failures, was issued on 26 August—this was considered at the IAEA Board of Governers meeting in September 2003, and the Board adopted a resolution, *inter alia*, calling for Iran to cooperate fully with the IAEA, and to resolve outstanding questions by the end of October 2003.

inconsistent with Iran's previous offer for the IAEA to visit any location within the country to verify the absence of undeclared nuclear activities.

The IAEA, its Board of Governors and IAEA Member States—including Australia—have all encouraged Iran to sign and implement an Additional Protocol to its NPT safeguards agreement. This will give the IAEA enhanced information and access with which to provide greater assurances of the nature of Iran's nuclear program.

The Minister for Foreign Affairs Mr Downer visited Tehran from 24-26 May where he underlined the urgent need for Iran to demonstrate transparency in its nuclear program and to give assurances of peaceful intentions by concluding an Additional Protocol—and to cease the development of proliferation-sensitive technologies. Australia has good working relations with Iran, including regular officials' dialogues on arms control and disarmament issues. Australia will continue to urge the benefit to Iran of adherence to non-proliferation commitments, and of participating in the wider international community on the basis of demonstrating that it has no interest in pursuing nuclear weapons.

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA: NUCLEAR DEVELOPMENTS

This article outlines developments as at 30 June 2003. Developments were ongoing as the Report was being prepared.

The DPRK nuclear situation seriously deteriorated during the year. The DPRK expelled IAEA inspectors, announced its decision to withdraw from the NPT and restarted its nuclear facilities at Yongbyon.

The situation a year ago

The year started with efforts to develop further the IAEA/DPRK safeguards relationship, and there was hope that the DPRK would begin to normalise its safeguards arrangements with the IAEA. On 7 August 2002, a ceremony took place for the first concrete poured for the light water reactors being provided by the Korean Peninsula Energy Development Organisation (KEDO) pursuant to the 1994 US/DPRK Agreed Framework.

In September/October 2002 ASNO provided safeguards training to DPRK personnel in nuclear material accountancy and reporting. The objective was to facilitate DPRK safeguards reporting to the IAEA, and develop understanding of IAEA safeguards. Mr Russell Leslie conducted this training in Pyongyang (see Article page 75).

Uranium Enrichment?

In October 2002, during DPRK/US officials' talks in Pyongyang, the DPRK admitted to having a uranium enrichment program—confirming suspicions, based on intelligence information, that the DPRK was developing an enrichment program based on centrifuge technology. The DPRK has since claimed it made no such admission, only asserted the 'right' to such a program. Subsequently KEDO suspended heavy fuel oil (HFO) shipments. The enrichment program is a breach of the Agreed Framework and also the 1991 DPRK/ROK Joint Declaration on the Denuclearisation of the Korean Peninsula, in which the DPRK and the ROK undertook not to carry out enrichment or reprocessing.

Inspectors Expelled, Withdrawal from the NPT

In December 2002, the DPRK expelled the IAEA inspectors stationed at Yongbyon, and removed monitoring equipment and safeguards seals. In January 2003 the DPRK announced it was reactivating its withdrawal from the NPT (in 1993 the DPRK had announced but subsequently 'suspended' withdrawal from the NPT). The validity of this withdrawal has not been determined.

The DPRK claims its security is under threat by the US, and it seeks bilateral discussions with the US on a security guarantee to resolve the situation. The US and many other states maintain the DPRK's breach of NPT commitments is of concern to the international community, and needs to be resolved multilaterally, not bilaterally.

The Director General of ASNO, Mr Carlson, formed part of the Australian officials delegation which went to Pyongyang in January 2003 (see Media Release page 118) to convey Australia's concerns about the DPRK's nuclear program, and to try to find a constructive solution to the nuclear question.

In February 2003, the IAEA Board of Governors reported the DPRK's non-compliance with its safeguards agreement to the Security Council, which in April expressed concern and urged all parties to work towards a peaceful solution. In April, trilateral talks were

held between US, DPRK and China in Beijing to try to find a solution, but without tangible result.[1]

Restart of Yongbyon Nuclear Facilities

The DPRK restarted its 5 MWe reactor at Yongbyon in February 2003—this reactor would take at least one year of operation at full power to produce sufficient plutonium for one weapon. Of greater concern is the spent fuel from previous operation of this reactor, 8,000 fuel rods, which may contain sufficient plutonium for up to six weapons—in theory this could be reprocessed in as little as two months at the Yongbyon reprocessing plant, though in practice it is more likely to take several months. Even this longer timeframe, however, could give the DPRK separated plutonium for up to six weapons by the end of 2003. At the time of writing this Report, there was no clear evidence that the DPRK has undertaken reprocessing of the spent fuel at Yongbyon.

Conclusion

At various times the DPRK has said that it already has nuclear weapons, has reprocessed the spent fuel at Yongbyon, proposes to develop further nuclear weapons, and that it may supply fissile material to others. At the same time, the DPRK implies that if its security concerns were resolved by the US it would not proceed with a nuclear weapons program.

The US, in common with other countries, wants to see the DPRK nuclear program irreversibly and verifiably terminated, and then will look at security assurances and other issues.

In any resolution, it can be expected that a rigorous and intrusive verification mechanism will be an essential element. ASNO has been active in developing verification approaches in support of an eventual resolution.

1. A further round of talks, between the US, China, Russia, Japan, ROK and DPRK, were held in Beijing in August 2003.

DPRK – NUCLEAR ACCOUNTANCY TRAINING COURSE

ASNO conducted a nuclear accountancy training course, for safeguards personnel from the Democratic People's Republic of Korea (DPRK), in Pyongyang from 30 September to 4 October 2002. The course was part of Australia's overall outreach efforts to the DPRK, with funding provided by AusAID.

Figure 25—The participants and lecturers at the DPRK nuclear accountancy training course conducted by ASNO's Mr Russell Leslie (front row fourth from right). *Photo courtesy of the General Department of Atomic Energy, DPRK.*

The course was held in a lecture theatre at the *Grand Study Hall of the People*, a showpiece, multi-purpose library and lecture facility in Pyongyang. The lectures and other training took-place in a science lecture room. The support supplied by the Korean hosts was enthusiastic and effective.

The course involved four solid days of work with 24 participants, often with 10 participants trying to work at the same time on the two PCs that were available. Six of the course participants had a good working capacity for English, 12 required assistance with their English and the remainder had a working grasp of Russian. The format for course involved training those with the greatest English fluency first and then proceeding with those students with the most fluent English helping the rest.

The fortuitous provision of seven copies of the new IAEA Safeguards Glossary by the IAEA was integral to the success of the course. In order to keep occupied those students not directly involved in computer training, a list of topics was prepared that the students had to explain to the class in Korean. Each afternoon a list of topics to discuss for the next day was displayed on the screens. The students worked on the project of producing explanations with great enthusiasm.

The explanations provided varied from a brief, five-minute explanation of the term 'batch' to a full one-hour dissertation on the NPT involving three speakers and a quite animated discussion.

The aim of this course was to introduce students to the topic of nuclear materials accountancy and then give them hands-on experience of working with a nuclear materials accountancy program on a real dataset. The training effectively introduced all of the participants to nuclear materials accountancy and its attendant concepts. The students with the best English appeared to derive the greatest benefit from the course, but the format adopted by the Korean hosts ensured that all participants benefited from the training.

Figure 26—Participants undertake an exercise under the supervision of Mr Russell Leslie (right) from ASNO, Pyongyang. *Photo courtesy of the General Department of Atomic Energy, DPRK.*

CHEMICAL WEAPONS CONVENTION: FIRST REVIEW CONFERENCE

Article 22 of the Chemical Weapons Convention (CWC) provides for conferences to be held every five years to review the operation of the Convention. The Convention entered into force in 1997, and the First Review Conference (Revcon) was held in The Hague from 28 April to 9 May 2003. The Convention is designed to eliminate chemical weapons worldwide, in a verifiable way. The Conference reviewed the effectiveness of the Convention's implementation with a view to proposing future improvements. The Australian Delegation was led by Australia's Ambassador to The Hague, Mr Peter Hussin, and included other representation from the Australian Mission and participants from ISD, ASNO, Defence and Australian academia.

The review was broad-ranging and included input and papers from the 110 States Parties which attended, the OPCW Technical Secretariat, and also interested NGOs. Australia provided a conference paper on tracking international trade in chemicals and made a national statement in support of the Convention, which included areas for improved implementation.

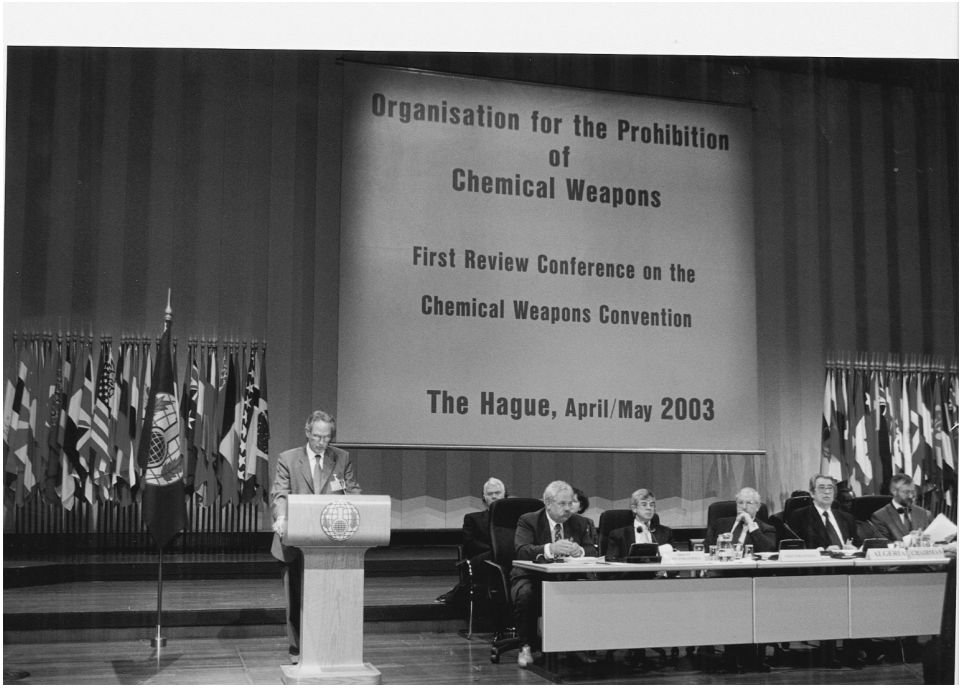


Figure 27—Australian Ambassador to The Hague, Mr Peter Hussin, delivers the Australian National Statement. *Photo courtesy of the OPCW.*

The main outcomes of the Revcon were a unanimous Declaration of commitment to the Convention by attending States Parties, and agreement on a document outlining a range of actions on improving the verification mechanism of the Convention. Areas highlighted for additional work included greater universality, increased national implementation measures and more comprehensive compliance with the Convention. These proposals will be given further consideration prior to adoption and implementation, with Australia involved in this process. Details of the Revcon and its outcomes are provided under the Convention's website: www.opcw.org/cwcrevcon.

The achievements of the Convention so far have been impressive. As of May 2003, there were 151 States Parties, with membership of the world's newest State, East Timor, pending. However, a number of countries of concern, especially in the Middle East, are not participants. Implementation of the Convention so far has involved over 880 inspections at 160 CW sites, 550 visits to 445 industrial facilities, and the destruction of over 10% of the global declared CW agents and 25% of declared CW munitions.

Even during the Revcon itself, inspections of declared relevant facilities in States Parties continued. On the first day of the Revcon, an inspection team arrived in Australia for a routine visit to a commercial chemical facility in Melbourne. The team found that activities were consistent with the corresponding declaration and complimented Australia on the accuracy of its declarations, cooperative attitude and transparency of its operations.

Australia will continue to be a strong advocate of the CWC, including by being at the cutting edge of its implementation and a source of assistance for other States Parties and prospective participants in our region.

OPCW Routine Inspections of Australian Chemical Facilities

As a State Party to the Chemical Weapons Convention, Australia is required to submit annual declarations about relevant dual-use chemical facilities to the Organisation for the Prohibition of Chemical Weapons (OPCW) and facilitate routine OPCW inspections of verifiable sites. There are currently 36 inspectable facilities of a range of types in Australia, out of a worldwide total of approximately 4,500. The OPCW conducts inspections to verify the information contained in related national declarations and the absence of CWC prohibited activities, in particular in relation to Schedule 1 chemicals.

Australia usually receives on average about two inspections a year. Each inspection occurs over three to four days. However, this tempo of activity was broken during 2001 and 2002 when the OPCW ran into funding and management problems. Although it was able to continue with other core activities such as monitoring CW facilities and CW destruction worldwide, routine industry visits dropped off dramatically both internationally and in Australia. There was only one inspection during this period, during July 2001 in Western Australia.

Figure 28—Dr Josy Meyer (right) and Mr Malcolm Coxhead (far left) from ASNO with OPCW inspectors and facility staff during a routine industry inspection.

Following resolution of these administrative problems in 2002, in early 2003 Australia and other countries were faced with an unprecedented number of inspections. This was also partly due to a shift of inspection emphasis to higher priority facilities, a decision which Australia had supported in The Hague. In January, May and June, ASNO facilitated routine OPCW inspections of facilities in Perth, Melbourne and Sydney, respectively. As usual, only several days notice was provided and on each occasion ASNO staff resources were stretched due to other commitments or leave.

Although this has been a hectic period for ASNO, the resumption of OPCW inspection activity was most welcome especially since these were accompanied by improved

procedures. The outcomes of the CWC Review Conference (page 77) will strengthen this process further.

The OPCW routine inspections confirmed that all was in order and the burden on the facility was low. ASNO obtained some valuable lessons from the inspections, as well as receiving complimentary OPCW feedback on the management of the inspections and cooperation by the facilities concerned. *Inter alia*, ASNO has developed new management tools, introduced intra-ASNO cross-disciplinary escort support, and is redesigning its programs of industry outreach and information collection, to even better manage and prepare for future inspections.

Although the OPCW faces continuing challenges, such as the retention of inspection expertise and a greater CW destruction monitoring burden, it is expected that the new OPCW inspection tempo will be maintained. This may mean that the rate of routine inspections in Australia will be kept at 3 or 4 visits a year. ASNO would welcome this prospect and continues to work closely with the OPCW to help improve the Organisation's performance and our own efforts in support of this.

Figure 29—Mr John Howell (left) from ASNO with OPCW inspectors and facility representatives during a routine industry inspection in Perth.

RADIONUCLIDE MONITORING IN THE CTBT'S INTERNATIONAL MONITORING SYSTEM

Of the four technologies employed in the CTBT's International Monitoring System (IMS), three are essentially **acoustic** in character, i.e. they listen for the acoustic waves generated by an explosion—whether nuclear or conventional in origin. The radionuclide monitoring component however has been described as 'smelling', specifically for signs of a nuclear explosion, and is the only technology that can unequivocally identify an event as being nuclear in origin.

When completed, the IMS radionuclide system will be a network of 80 stations located in areas that are well coupled to atmospheric air currents, and can thus sample particulates and gases that may have been released several thousand kilometres distant. Each of the stations carries out high volume air sampling (more than 500 cubic centimetres per hour) onto a filter. The radiation from particulates that have collected on the filter is subsequently counted using a high efficiency germanium detector, and the resulting spectrum is analysed for the presence of radionuclides that would indicate a recent nuclear explosion. Half of the 80 stations will also be fitted with equipment for detecting the presence of noble gases that would also be indicative of a nuclear explosion.

Spectra from each of the radionuclide stations are transmitted to the International Data Centre operated by the CTBT Organization in Vienna, where analysis identifies nuclides included on a list of those which could be indicative of a nuclear explosion. Events of interest for Treaty verification would normally include those where two or more listed nuclides were indicated by a spectrum.

Of the 80 radionuclide monitoring stations proposed for the IMS network, Australia will be responsible for establishing and operating seven. Five stations, installed on the Australian mainland and on the Cocos Islands, are currently transmitting data to Vienna on a continuous basis. Two further stations are to be installed in the Polar Regions in the near future. Australia will also host one of 16 laboratories that will support the radionuclide stations by carrying out additional analysis of samples where needed. Action to establish this laboratory is well under way.

Figure 30—Components of a radionuclide monitoring station: (left) particulates are sampled from the air onto a filter; (centre) the filter is analysed with a high sensitivity detector; and (right) data on radionuclides measured are forwarded to Vienna where they are compiled and released to CTBT signatories. *Photos courtesy of ARPANSA.*

REGULATION OF DEPLETED URANIUM

Section 9 (c) of the Safeguards Act provides that regulations may specify nuclear materials to which Part II of the Act does not apply. In 1990 most depleted uranium in non-nuclear use was deregulated, as it was determined that the costs of controlling this material, which is of low safeguards significance, outweighed the benefits. However, as part of the strengthening of the international safeguards system, the IAEA has tightened its requirements for reporting on depleted uranium.

ASNO is pursuing with the IAEA the need to rationalise these reporting requirements, with respect to depleted uranium and also to small quantities of nuclear material (the issue of *de minimus* quantities). Pending any change in these requirements, on 31 October 2002 the exemption from the Safeguards Act for possession of depleted uranium for non-nuclear uses was removed by Amendment Regulations, the *Nuclear Non-Proliferation (Safeguards) Amendment Regulations 2002 (No. 2)*.

Following the amendment regulations, it is a requirement to hold a permit under the Safeguards Act to possess all forms of depleted uranium, including items used for shielding and compounds used for research purposes. ASNO inspectors have found that much of the uranium based chemical compounds (e.g. uranyl acetate) used for microscopy and in many other chemical laboratories contain depleted uranium rather than natural uranium. Also, shielding for radiography cameras used widely in industry is commonly made from depleted uranium.

Re-regulation has imposed a significant workload on ASNO. During the period of deregulation, items of depleted uranium in non-nuclear use were not tracked. As ownership changed, information on where these items were located was lost. Also many items containing depleted uranium were imported. ASNO is now engaged in the task of re-establishing owners of depleted uranium, and issuing permits.

Permit requirements for owners of small amounts of nuclear material are not onerous, and usually only require yearly inventory reports and notification of import/export and domestic transfers. All ASNO's permits are issued free of charge. ASNO is happy to assist companies and individuals if they are uncertain whether the requirement for a permit applies to them.

BACKGROUND

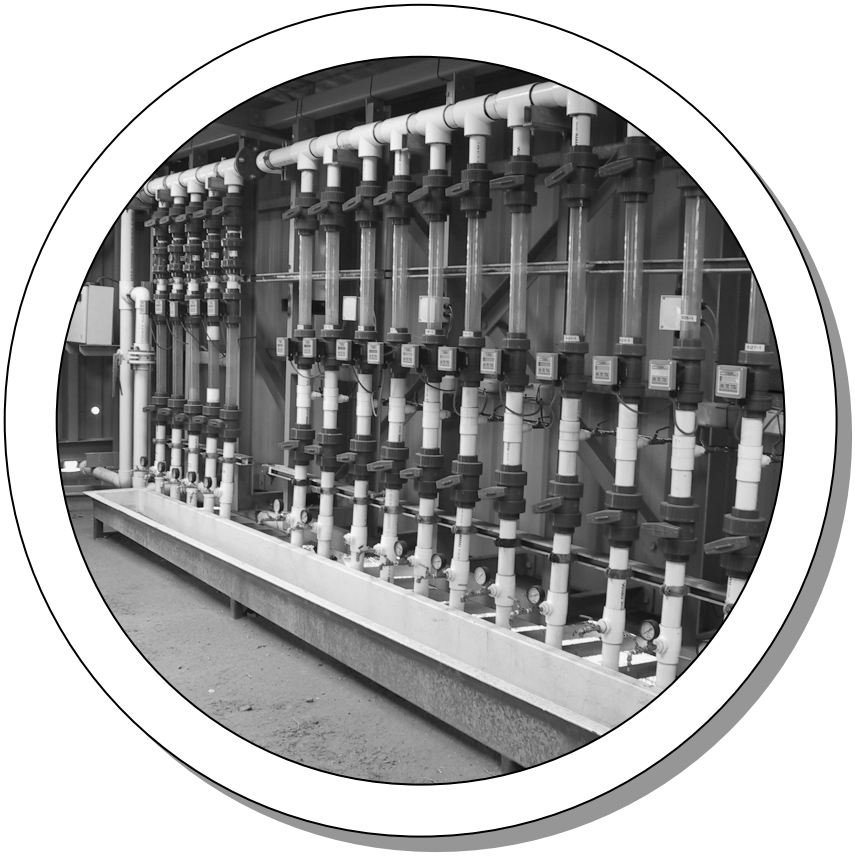


Figure 31—Injector flow control, Honeymoon uranium mine.

BACKGROUND

BRIEF OUTLINE OF THE NUCLEAR FUEL CYCLE

Currently there are 441 nuclear power reactors in operation in over 30 countries worldwide. In many cases they supply a substantial proportion of national electricity requirements (see Table 7 on page 88).

Reactor types

The majority of the world's power reactors are of the light water type (LWRs—light water reactors), where ordinary water acts as both moderator, slowing down neutrons to efficient speeds for nuclear fission to occur, and coolant, transferring heat from the nuclear reaction to steam generators for producing electricity.

Because ordinary water is an inefficient moderator, LWRs must be operated on enriched uranium, that is, uranium in which the proportion of the fissile isotope U-235 has been increased from the level in natural uranium, 0.71%, usually to between 3% and 5%. Some reactor types can be operated on natural uranium, by using more efficient moderators, such as heavy water, which has a proportion of the heavier hydrogen isotope deuterium, or graphite. Typical examples of this type of reactor are the Canadian CANDU, which is moderated and cooled by heavy water, and gas-cooled graphite-moderated reactors such as the UK Magnox.

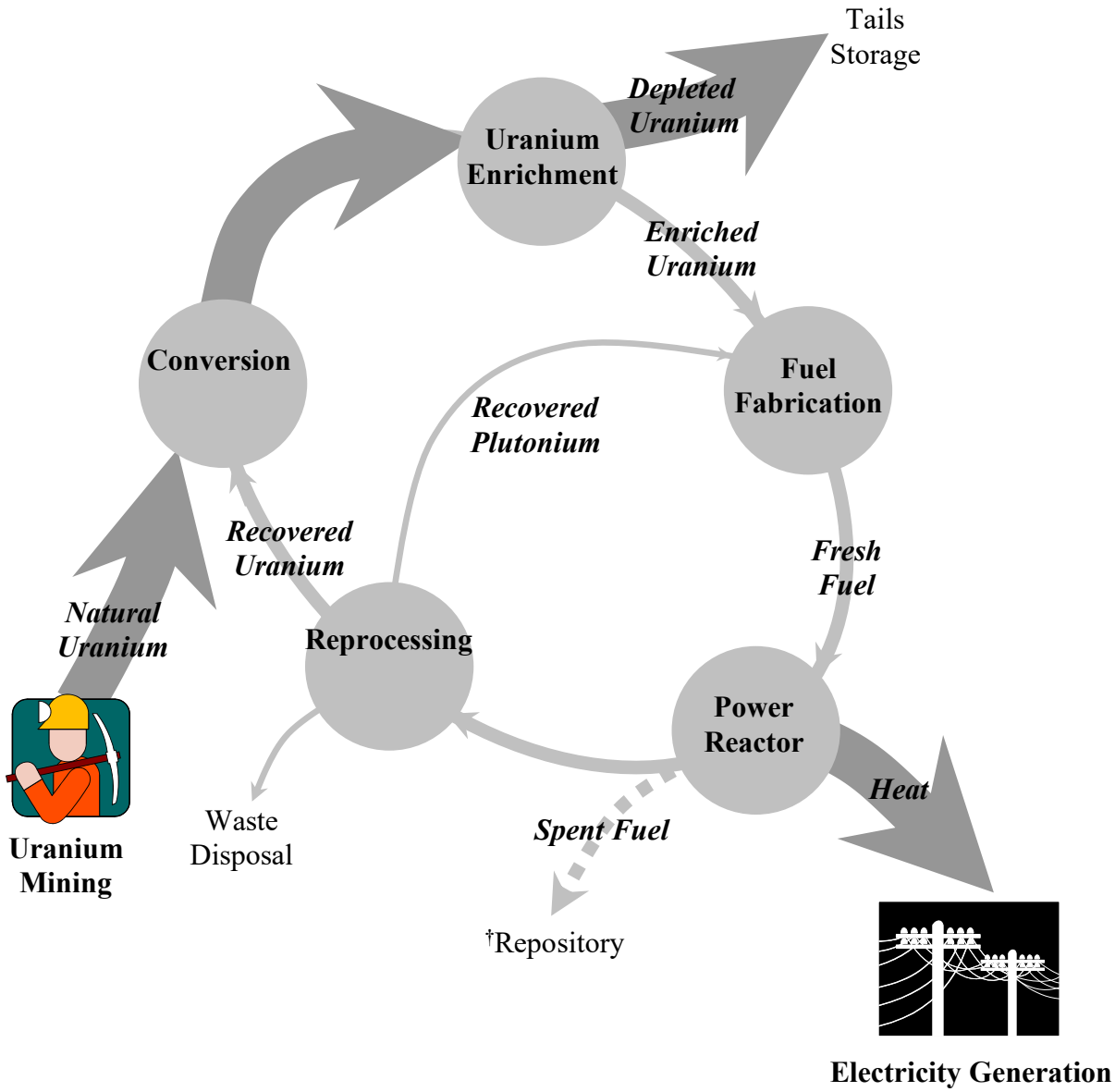
Fuel cycle stages

Following mining and milling of uranium and production of uranium ore concentrates (yellowcake), the stages of the light water fuel cycle are as follows (see Figure 32 on page 86):

- Conversion: natural uranium is formed into a gaseous compound, uranium hexafluoride (UF_6), prior to enrichment.
- Enrichment: a process by which the proportion of the U-235 content is increased. The main technologies in use are gaseous diffusion and centrifuge. The product is described as low enriched uranium (LEU), typically containing between 3% and 5% U-235.
- Fabrication: manufacture of LEU into uranium oxide fuel pellets, which are assembled into fuel rods, and the fuel rods assembled into fuel elements for use in a reactor.
- Reactors: a power reactor uses the heat from a controlled nuclear chain reaction to drive a turbine to generate electricity. Typically the turbine(s) is driven by steam. In the case of pressurised water reactors, as well as liquid metal-cooled reactors and some gas-cooled reactors, steam for the turbines is produced in a secondary circuit. There are some high-temperature gas-cooled reactors where the generating turbine is gas-driven.
- In a typical LWR, fuel elements are used over 3–4 operating cycles, each of 12–18 months (i.e. the reactor might be unloaded every 12 months, with a third of the core being replaced each time).
- Reprocessing: spent fuel is dissolved for the separation of highly radioactive fission products, and for the recovery of plutonium and uranium. Uranium can be re-enriched

for further reactor use. Plutonium is mixed with uranium to produce MOX (mixed oxide) fuel and used both in LWRs and potentially in fast neutron reactors.

Partly because depressed uranium prices are impacting on the economics of reprocessing, a number of countries have committed to, or are considering, the once-through cycle, where spent fuel will be disposed of without reprocessing.



†Some countries choose to dispose of their spent fuel in repositories instead of recycling it.

Figure 32—Civil Nuclear Fuel Cycle-Outline

Military fuel cycle

There are five acknowledged nuclear-weapon states (the US, Russia, the UK, France and China) and three 'threshold' states, two of which have conducted nuclear explosive tests (India and Pakistan) and one which is suspected of having a nuclear weapon capability (Israel). In addition the DPRK has said it has nuclear weapons. In all these cases the military nuclear programs developed ahead of civil power programs. Military programs involve the production of special grades of nuclear material, substantially different to the material used in civil programs.

Nuclear weapons are based on the following nuclear materials:

Plutonium

Plutonium is formed through the irradiation of uranium in a reactor. The uranium-238 isotope absorbs a neutron, leading to the formation of plutonium-239. Longer irradiation times lead to the formation of higher plutonium isotopes, Pu-240, Pu-241 and Pu-242.

Weapons-grade plutonium predominantly comprises the isotope Pu-239 and contains no more than 7% of the isotope Pu-240. Pu-240 (and the higher isotope Pu-242) are undesirable for weapons purposes because their rate of spontaneous fission causes pre-initiation (a premature chain reaction). By contrast, 'reactor-grade' plutonium from the normal operation of a LWR contains high levels of Pu-240, typically around 25%.

Because of the need to minimise the Pu-240 content, weapons-grade plutonium is produced in dedicated plutonium production reactors, usually natural uranium-fuelled, graphite-moderated, where irradiated fuel can be removed after short irradiation times (i.e. at low burn-up levels).

Uranium

Weapons-grade uranium is very highly enriched, usually to 90% or more U-235. This compares with normal civil enrichment levels of around 3–5% U-235. High enrichment levels are produced in enrichment plants specially designed and operated for this purpose.

Table 6—Comparison of Quality (Isotopic Composition) of Materials in Civil and Military Nuclear Fuel Cycles (figures are approximate)

Material	*Civil*	*Military*
Plutonium	60% ^{239}Pu	93% ^{239}Pu
Uranium	4% ^{235}U	90% ^{235}U

The US, Russia, the UK and France have announced that they have ceased production of fissile material for nuclear weapons purposes, and China is believed to have done so. Australia is a strong supporter of a Fissile Material Cut-off Treaty (FMCT) under which this situation will be formalised, and extended to India, Israel and Pakistan. The FMCT will prohibit production of fissile material for weapons purposes, and will provide for verification of relevant facilities and material.

Table 7—World Nuclear Electricity Generation at 31 December 2002

Country	*Operating Reactors*	*Capacity (GWe)*	*% of Total Electricity in 2002*	*Reactors under Construction*	
				Number	*(GWe)*
*USA	104	98.2	20.3		
*France	59	63.1	78.0		
*Japan	54	44.3	34.5	3	3.7
*Germany	19	21.3	29.9		
Russia	30	20.8	16.0	3	2.8
*ROK	18	14.9	38.6	2	1.9
*UK	31	12.3	22.4		
Ukraine	13	11.2	45.7	4	3.8
*Canada	14	10.0	12.3		
*Sweden	11	9.4	45.8		
*Spain	9	7.6	25.8		
*Belgium	7	5.8	57.2		
China	7	5.3	1.4	4	3.3
*Taiwan, China	6	4.9	20.5	2	2.7
*Czech Republic	6	3.5	24.5		
*Switzerland	5	3.2	39.5		
Bulgaria	4	2.7	47.3		
*Finland	4	2.7	29.8		
India	14	2.5	3.7	7	3.4
Lithuania	2	2.4	80.1		
Slovak Republic	6	2.4	65.4	2	0.8
Brazil	2	1.9	4.0		
South Africa	2	1.8	5.9		
*Hungary	4	1.8	36.1		
*Mexico	2	1.4	4.1		
Argentina	2	0.9	7.2	1	0.7
Romania	1	0.7	10.3	1	0.7
Slovenia	1	0.7	40.7		
*Netherlands	1	0.5	4.0		
Armenia	1	0.4	40.5		
Pakistan	2	0.4	2.5		
Iran	-	-	-	2	2.1
DPRK	-	-	-	1	1.0
World total	441	358.6	(est) 16.0	32	26.9

* Countries having bilateral agreements with Australia for the use of AONM (Taiwan is covered by an agreement between Australia and the US). These countries operate 354 power reactors, accounting for over 85% of world nuclear generating capacity.

Source: IAEA Press Release, *IAEA Releases Nuclear Power Statistics for 2002*, 30 May 2003.

(http://www.iaea.org/worldatom/Press/P_release/2003/prn0309.shtml)

IAEA SAFEGUARDS STATEMENT FOR 2002

The safeguards statement is published annually by the IAEA—the following text is taken from the IAEA Annual Report 2002 (page 65).

In fulfilling the safeguards obligations of the Agency in 2002, the Secretariat—having evaluated all the information acquired in implementing safeguards agreements and all other information available to the Agency—found no indication of the diversion of nuclear material placed under safeguards or of the misuse of facilities, equipment or non-nuclear material placed under safeguards. On this basis, the Secretariat concluded that, in 2002, with the exception of the nuclear material in the Democratic People's Republic of Korea (DPRK), the nuclear material and other items placed under safeguards remained in peaceful nuclear activities or were otherwise adequately accounted for.

As a result of the unilateral actions of the DPRK to interfere with or remove the Agency containment and surveillance equipment at its nuclear facilities and to expel Agency inspectors, at the end of 2002 the Secretariat was unable to verify that no nuclear material placed under safeguards in the DPRK had been diverted. The DPRK remained in non-compliance with its existing safeguards agreement pursuant to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

On 27 November 2002, the Agency resumed inspections in Iraq, pursuant to relevant United Nations Security Council resolutions, now including resolution 1441 (8 November 2002). From then on, the Agency's safeguards activities in Iraq under the NPT safeguards agreement were again subsumed under these resolutions. At the end of 2002, no conclusions had been drawn with regard to the mandate from the United Nations Security Council, pending further verification activities although no evidence was detected of prohibited nuclear or nuclear-related activities. The Agency verified the presence of the nuclear material that had remained under safeguards.

In 2002, safeguards were implemented in 28 States with comprehensive safeguards agreements and additional protocols in force or being provisionally applied. Only in such States are Agency safeguards able to provide credible assurance of the absence of undeclared nuclear material and activities. In 2002, for 13 of these States, the Secretariat—having evaluated all the information obtained through activities pursuant to the States' comprehensive safeguards agreements and additional protocols, and all other information available to the Agency—found no indication of undeclared nuclear material or activities. On this basis, and taking into account the conclusion referred to in the first paragraph of this Statement, the Secretariat concluded that all nuclear material in those States or under their jurisdiction or control had been placed under safeguards and remained in peaceful nuclear activities or was otherwise adequately accounted for. In the case of the other 15 States with comprehensive safeguards agreements and additional protocols in force, the Secretariat's evaluations for drawing such a conclusion are in progress.

AUSTRALIAN URANIUM EXPORTS

In 2002-03 Australia exported 9,592 tonnes of uranium ore concentrates (U_3O_8 or U_3O_8 equivalent), amounting to 8,134 tonnes contained uranium. This quantity of uranium is sufficient for the annual fuel requirements of some 41 reactors (each of 1000 MWe), producing around 330 billion kilowatt hours (i.e. 330 terawatt hours—TWh) of electricity—well in excess of Australia's own electricity production, which in 2002-03 totalled about 200 TWh.

Australia holds about 44% of the world's uranium resources recoverable at less than US$40/kg. In 2002-03, the Ranger and Olympic Dam mines were respectively the world's second and fourth largest uranium producers, and overall Australia was the world's second largest uranium exporter.

While Australia recognises the importance of this substantial uranium holding as a source of energy for other countries not as well endowed with natural resources, strong support for the nuclear non-proliferation regime has always been a paramount consideration.

Australia exports uranium only to countries within its network of bilateral safeguards agreements—details of these agreements and the conditions under which Australia exports uranium are given in the following pages.

Australia has 18 bilateral agreements, covering 27 countries and Taiwan, China. These agreements are listed in Table 9 on page 93. Those bilateral partners which imported Australian uranium in 2002 are listed in Table 8 below.

Table 8—Countries to which Australian Uranium was supplied in 2002

Country	*Tonnes UOC (U_3O_8)*	*% of total (rounded)*
Belgium	88.45	1.08
Canada	123.82	1.51
Germany	158.76	1.94
Finland	58.97	0.72
France	497.16	6.06
UK	486.06	5.93
Japan	1,818.02	22.17
ROK	750.00	9.14
Sweden	165.10	2.01
USA	4,055.12	49.44
Total	8,201.46	100.00

These figures are for transfers of Australian uranium to approved end-users from available converter stocks in the calendar year 2002 and do not correspond exactly to exports for the same period. The destinations are based on the contracted end user at the time of export and do not take account of possible on-selling to other countries within Australia's bilateral network

As at the end of 2002 there were 441 power reactors in operation in over 30 countries, with a total electrical generating capacity of almost 360 GWe, and an electrical output of around 2,574 TWh. These reactors produced about 16% of the world's electricity (see Table 7 on page 88). Of these, 354 reactors were operated by countries eligible to use AONM under bilateral agreements with Australia. The reactors in these countries produced 13.6% of

total world electricity: nuclear energy's contribution to electricity production in countries eligible to use Australian uranium ranged from 4% in Netherlands to 78% in France.

In 2002-03, exports of Australian uranium corresponded to around 13% of global nuclear electricity production. Through generating electricity by nuclear energy rather than fossil fuels, countries using Australian uranium thereby avoided carbon dioxide emissions of around 370 million tonnes—equivalent to over 95% of Australia's total net carbon dioxide emissions from all sources (based on data for 2000).

Figure 33—Uranium in shipping containers ready for export.

SAFEGUARDS ON AUSTRALIAN URANIUM EXPORTS

A fundamental tenet of the Government's uranium policy is that exports are permitted only under stringent safeguards. Uranium exports are made only to selected countries and are covered by a bilateral safeguards agreement. Bilateral safeguards are concluded between the supplier and the recipient of nuclear items and serve as a mechanism for applying conditions additional to IAEA safeguards: for example, restrictions on retransfers, high enrichment, and reprocessing. The safeguards requirements Australia applies to uranium exports are bilateral; they are elaborated in a series of treaty-level agreements with each country involved. These requirements are outlined below.

The key point is that Australia's safeguards requirements are superimposed on IAEA safeguards. IAEA safeguards provide the basic assurance that nuclear material is not being diverted from peaceful to non-peaceful purposes.

It should be noted that IAEA safeguards are generally not concerned with origin attribution, that is, the 'flag' and conditions attached by suppliers (for the IAEA there are limited exceptions, e.g. under certain non-NPT safeguards agreements). This is the purpose of bilateral safeguards agreements.

Australia's safeguards requirements are intended to ensure that:

- AONM (Australian Obligated Nuclear Material—discussed below) is appropriately accounted for as it moves through the nuclear fuel cycle;
- AONM is used only for peaceful purposes in accordance with the applicable agreements;
- AONM in no way enhances or contributes to any military process.

Australia's Safeguards Conditions

The application of Australia's requirements starts with a careful selection of those countries eligible to receive AONM:

- it is a minimum requirement that, in the case of non-nuclear-weapon states, countries must meet the NPT full scope safeguards standard, that is, IAEA safeguards must apply to all existing and future nuclear activities; and
- in the case of nuclear-weapon states, there must be a treaty level assurance that AONM will be used only for peaceful purposes, and arrangements must be in place under which AONM is covered by IAEA safeguards.

A basic requirement is the conclusion of a safeguards agreement between Australia and the country concerned, setting out the various conditions which apply to AONM. The principal conditions for the use of AONM set out in Australia's bilateral safeguards agreements are summarised as follows:

- an undertaking that AONM will be used only for peaceful purposes and will not be diverted to military or explosive purposes, and that IAEA safeguards will apply;

- none of the following actions can take place without Australia's prior consent:
  - transfers to third parties
  - enrichment to 20% or more in the isotope uranium-235
  - reprocessing[1];
- provision for fallback safeguards or contingency arrangements in case NPT or IAEA safeguards cease to apply in the country concerned;
- an assurance that internationally agreed standards of physical security will be applied to nuclear material in the country concerned;
- detailed 'administrative arrangements' between ASNO and its counterpart organisation, setting out the procedures to apply in accounting for AONM;
- regular consultations on the operation of the agreement; and
- provision for the removal of AONM in the event of a breach of the agreement.

Table 9—Australia's Bilateral Safeguards Agreements and their Dates of Entry into Force.

Country[2]	*Date of EIF*
Republic of Korea (ROK)	2 May 1979
UK	24 July 1979
Finland	9 February 1980
USA	16 January 1981
Canada	9 March 1981
Sweden	22 May 1981
France	12 September 1981
Euratom[3]	15 January 1982
Philippines[4]	11 May 1982
Japan	17 August 1982
Switzerland	27 July 1988
Egypt[4]	2 June 1989
Russian Federation[5]	24 December 1990
Mexico	17 July 1992
New Zealand[6]	1 May 2000
Czech Republic[4]	17 May 2002
USA covering supply to Taiwan, China	17 May 2002
Hungary	15 June 2002

1. Consent has been given in advance to reprocessing on a programmatic basis in the case of five Agreements: Euratom, France, Japan, Sweden and Switzerland.
2. This list does not include Australia's NPT safeguards agreement with the IAEA, concluded on 10 July 1974 (reproduced as Schedule 3 to the *Nuclear Non-Proliferation (Safeguards) Act 1987*). In addition to these Agreements, Australia also has an Exchange of Notes constituting an Agreement with Singapore Concerning Cooperation on the Physical Protection of Nuclear Materials, which entered into force on 15 December 1989. The texts of these Agreements are published in the Australian Treaty Series.
3. Euratom is the atomic energy agency of the European Union. For further details see Glossary.
4. In the case of the Czech Republic, Egypt and the Philippines, Administrative Arrangements pursuant to the Agreements have not been concluded, so in practice the Agreements have not yet entered into operation.
5. The Australia/Russia Agreement covers the processing (conversion, enrichment or fuel fabrication) of AONM in Russia on behalf of other partner countries, but does not permit the use of AONM by Russia.
6. The Australia/New Zealand agreement covers the supply of uranium for non-nuclear use.

Australian Obligated Nuclear Material (AONM)

A characteristic of the civil nuclear fuel cycle is the international interdependence of facility operators and power utilities. Apart from the nuclear-weapon states, it is unusual for a country to be entirely self-contained in the processing of uranium for civil use—and even in the case of the nuclear-weapon states, power utilities will seek the most favourable financial terms, often going to processors in other countries. Thus it is not 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 UK. The international flow of nuclear material enhances safeguards accountability, through 'transit matching' of transfers at the different stages of the fuel cycle.

The international nature of nuclear material flows means that uranium from many sources is routinely mixed during processes such as conversion and enrichment. Uranium is termed a 'fungible' commodity, that is, at these processing stages uranium from any source is identical to uranium from any other—it is not possible physically to differentiate the origin of the uranium. This is not unique to uranium, but is also the case with a number of other commodities. The fungibility of uranium has led to the establishment of conventions used universally in the industry and in the application of safeguards, namely equivalence and proportionality. These are discussed below.

Because of the impossibility of physically identifying 'Australian atoms', and also because Australian obligations apply not just to uranium as it moves through the different stages of the nuclear fuel cycle, but also to material generated through the use of that uranium, e.g. plutonium produced through the irradiation of uranium fuel in a reactor, the obligations under Australia's various bilateral safeguards agreements are applied to Australian Obligated Nuclear Material (AONM). 'AONM' is a shorthand way of describing the nuclear material which is subject to the provisions of the particular bilateral agreement.

This approach is also used by those other countries applying bilateral safeguards comparable to Australia's, principally the US and Canada. These countries attach a safeguards 'obligation' to nuclear material which they upgrade, hence giving rise to the situation of 'multi-labelling', for example, AONM enriched in the US will also become US obligated nuclear material (USONM), and its subsequent use will have to meet the requirements of both Australian and US agreements. This is a common situation, that is, a significant proportion of AONM is also characterised as USONM and is accounted for both to ASNO and its US counterpart (DOE).

The equivalence principle provides that where AONM loses its separate identity because of process characteristics (e.g. mixing), an equivalent quantity is designated AONM, based on the fact that atoms or molecules of the same substance are indistinguishable, any one atom or molecule being identical to any other of the same substance. In such circumstances, equivalent quantities of the products of such nuclear material may be derived by calculation or from operating plant parameters. It should be noted that the principle of equivalence does not permit substitution by a lower quality material, e.g. enriched uranium cannot be replaced by natural or depleted uranium.

The proportionality principle provides that where AONM is mixed with other nuclear material, and is processed or irradiated, a proportion of the resulting material will be regarded as AONM corresponding to the same proportion as was AONM initially.

Some people are concerned that the operation of the equivalence principle means there cannot be assurance that 'Australian atoms' do not enter military programs. This overlooks the realities of the situation, that uranium atoms are indistinguishable from one

another and there is no practical way of attaching 'flags' to atoms. The objective of Australia's bilateral agreements is to ensure that AONM in no way materially contributes to or enhances any military purpose. Even if AONM were to be in a processing stream with nuclear material subsequently withdrawn for military use, the presence of the AONM would add nothing to the quantity or quality of the military material (NB as noted elsewhere in this Report, those nuclear-weapon states eligible for the supply of Australian uranium have ceased production of fissile material for nuclear weapons).

Accounting for AONM

Australia's bilateral partners holding AONM are required to maintain detailed records of transactions involving AONM, and ASNO's counterpart organisations 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; and
- reconciliation of any discrepancies with counterparts.

NUCLEAR REGULATORY RESPONSIBILITIES IN AUSTRALIA

Australia has two nuclear regulatory agencies: ASNO and ARPANSA—the Australian Radiation Protection and Nuclear Safety Agency.

ASNO is responsible for nuclear safeguards and physical protection: ensuring that nuclear materials and nuclear items—facilities, equipment, technology and nuclear-related materials—are appropriately regulated and accounted for. 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 cover nuclear materials—uranium, thorium and plutonium—not radioactive materials as such. ASNO's legislation applies to all persons or organisations in Australian jurisdiction having relevant materials, items or technology. Principally this applies to ANSTO, as Australia's only nuclear operator, but 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.

REPORTING REQUIREMENTS

Table 10—Checklist of Reporting Requirements

Reporting Requirements	Page
Letter of Transmittal	ii
Contact Officer for additional information	iv
Corporate Overview	2, 22
Staffing overview	22-24
Aggregate financial, staffing and resources data	22-26
Program Performance Reporting	29-59
Freedom of Information	98
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Information not included in this Report

Financial statements in respect of ASNO appear in the Annual Report of the Department of Foreign Affairs and Trade. The Auditor General does not audit ASNO/CWCO/ACTBO finances separately (some financial information is given at page 22 of this Report).

Information on the operations of ASNO also appears in the 2002-03 Annual Report of the Department Foreign Affairs and Trade. In particular, any involvement in:

- industrial democracy;
- occupational health and safety;
- advertising and market research;
- ecologically sustainable development and environmental performance; and
- the Commonwealth Disability Strategy

appears in that Report.

FREEDOM OF INFORMATION ACT 1982
SECTION 8 STATEMENT

This statement is published in order to meet the requirements of section 8 of the *Freedom of Information Act 1982* which commenced operation on 1 December 1982.

Section 8 requires departments and prescribed agencies to publish statements about their organisation, functions, decision-making powers, consultative arrangements, categories of documents maintained and facilities and procedures to enable members of the public to obtain access to documents under the Act. Departments and agencies must publish updated statements annually.

Information about the organisation and functions, decision-making powers and consultative arrangements of ASNO is found in earlier parts of this Annual Report. This statement provides additional details (where appropriate) of consultative arrangements and categories and availability of documents maintained by ASNO. The Report describes the Office as it existed in 2002-03 within the Foreign Affairs and Trade portfolio.

Documents are listed under three main headings: agreements; legislation and related documents; and other. All agreements/treaties are available from the Australian Treaty Series from Australian Government Bookshops (until October 2003) or on line at http://www.noie.gov.au. Treaty documents are also available from the ASNO website http://www.asno.dfat.gov.au.

All Acts and Regulations are available from the Australian Government Bookshops (until October 2003) or on line at http://www.noie.gov.au. Some legislation is available from the Internet sites:

http://www.austlii.edu.au/au/legis/cth/consol_act

or

http://scaleplus.law.gov.au

Except where indicated, none of the documents under 'other' is available for a fee or for purchase by the public nor are they customarily made available free of charge.

Applications for release of documents under the *Freedom of Information Act 1982* should be addressed to the Director General, Australian Safeguards and Non-Proliferation Office.

Arrangements for outside participation

ASNO liaises with Federal, State and Territory government departments and authorities, authorities in countries with which Australia has bilateral nuclear safeguards agreements, the IAEA, the OPCW, the Provisional Technical Secretariat of the CTBTO, the private sector, and non-government organisations.

Views, suggestions, and comments in relation to policy formation and administration of enactments and regulations may be addressed to the Director General, Australian Safeguards and Non-Proliferation Office or to the Minister for Foreign Affairs.

General and media enquires relating to ASNO activities and responsibilities should be directed to the Director General, Australian Safeguards and Non-Proliferation Office—telephone number: (02) 6261 1920.

CATEGORIES OF DOCUMENTS HELD BY ASNO

Agreements

- Treaty on the Non-Proliferation of Nuclear Weapons. (This Treaty is reproduced as Schedule 2 to the *Nuclear Non-Proliferation (Safeguards) Act 1987*).
- Convention on the Physical Protection of Nuclear Material. (This Convention is reproduced as Schedule 4 to the *Nuclear Non-Proliferation (Safeguards) Act 1987*).
- Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction. (The Convention is reproduced as the Schedule to the *Chemical Weapons (Prohibition) Act 1994*.)
- Comprehensive Nuclear-Test-Ban Treaty. (The Treaty is reproduced as the Schedule to the *Comprehensive Nuclear Test-Ban Treaty Act 1998*.)
- Agreement between Australia and the IAEA for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons, covering nuclear material within Australia under NPT safeguards. (This Agreement is reproduced as Schedule 3 to the *Nuclear Non-Proliferation (Safeguards) Act 1987*.)
- Protocol additional to the Agreement between Australia and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons.
- Agreements and Exchanges of Notes constituting an Agreement between the Government of Australia and other governments, and Agreements between the Government of Australia and the European Atomic Energy Community, concerning the peaceful uses of nuclear energy, covering transfers of nuclear material, material, equipment, components, information, technology and sensitive technology, and cooperation on the physical protection of nuclear materials. (For a complete list and texts of agreements, see the *Australian Treaties Library* available at www.austlii.edu.au/au/other/dfat or the *Australian Treaties Database* available at www.info.dfat.gov.au/treaties).

Legislation and Related Documents

- *Chemical Weapons (Prohibition) Act 1994.*
- Regulations under the *Chemical Weapons (Prohibition) Act 1994.*
- *Chemical Weapons (Prohibition) Amendment Act 1998.*
- *Comprehensive Nuclear Test-Ban Treaty Act 1998.*
- *Nuclear Non-Proliferation (Safeguards) Act 1987.*
- *Nuclear Non-Proliferation (Safeguards) (Consequential Amendments) Act 1988.*
- Declaration under the *Nuclear Non-Proliferation (Safeguards) Act 1987* regarding 'associated equipment' and 'associated material', dated 31 March 1987 (available from ASNO).
- Regulations under the *Nuclear Non-Proliferation (Safeguards) Act 1987.*
- *Nuclear Safeguards (Producers of Uranium Ore Concentrates) Charge Act 1993.*
- *South Pacific Nuclear Free Zone Treaty Act 1986.*

- *Non-Proliferation Legislation Amendment Bill 2003* which was introduced in Parliament in June 2003.

Other

- The Annual Reports of the Director of Safeguards, Director, CWCO and Director, ACTBO are included in the ASNO Annual Report (available from ASNO).
- Papers prepared in whole or in part by ASNO officers for presentation at conferences and meetings. Papers which are in the public domain are listed in Annex K to this Report.
- Technical and other reports, extracts from published literature and publications (including newspaper, newsletter and journal clippings), representations and other general correspondence, discussion papers, position papers, briefings to the Minister and senior officers, extracts from Parliamentary debates, questions and answers associated with nuclear safeguards issues. Working papers and files related to ASNO's safeguards, CWC and CTBT responsibilities.
- Minutes and working documents of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).
- Industry information booklets and leaflets on the CWC (available from ASNO).
- Survey forms completed and returned by Australian companies and organisations relating to the applicability of the *Chemical Weapons (Prohibition) Act 1994*. Information in forms has been provided on a 'Commercial-in-Confidence' basis.
- A copy of Executive Council papers related to proclamation of Division 1 of Part 7; and sections 95, 96, 97, 99, 102, 103, and 104 of *the Chemical Weapons (Prohibition) Act 1994*.
- Documents related to the designation of the office of Director of Safeguards as the office whose occupant is the Director of the Chemical Weapons Convention Office, and to the designation of the Controller of Permits and Notifications under the Act.
- Minutes and working documents of the Organisation for the Prohibition of Chemical Weapons and of its Preparatory Commission.
- A register of the permits and notifications issued pursuant to the *Chemical Weapons (Prohibition) Act 1994*.
- Copies of forms approved by the Director for use pursuant to provisions of the *Chemical Weapons (Prohibition) Act 1994* (available from ASNO).
- Administrative Arrangements pursuant to bilateral nuclear agreements. The Administrative Arrangements are not available for public viewing as they have been agreed as being confidential between the Parties to the Agreements.
- Administrative Security Arrangements pursuant to the SILEX Agreement.
- Joint Australian-United States Classification Guide for Enrichment of Uranium by the SILEX Process.
- Arrangement between the Australian Safeguards and Non-Proliferation Office and the US Department of Energy Concerning Research and Development in Nuclear Material Control, Accountancy, Verification, Physical Protection, and Advanced Containment and Surveillance technologies for International Safeguards.

- Arrangement between the Government of Australia and the Preparatory Commission of the Comprehensive Nuclear-Test-Ban Treaty Organization on the conduct of activities including post-certification activities, relating to international monitoring facilities for the Comprehensive Nuclear-Test-Ban-Treaty.
- Arrangement between the Australian Safeguards and Non-Proliferation Office and the Indonesian Nuclear Energy Control Board Concerning Cooperation on Nuclear Safeguards and Related Matters.
- Memorandum of Understanding for Cooperation and Exchange of Information in Nuclear Regulatory Affairs between the Australian Safeguards and Non-Proliferation Office and the Australian Radiation Protection and Nuclear Safety Agency.
- Permits and authorities (and registers thereof) issued by the Minister for Foreign Affairs or the Minister's delegate pursuant to sections 13, 16 or 18 of the *Nuclear Non-Proliferation (Safeguards) Act 1987*.
- A Nuclear Materials Accountancy and Control Procedures Manual.
- Delegations to the Director of Safeguards to exercise powers under the *Nuclear Non-Proliferation (Safeguards) Act 1987*.
- Documents relating to the declaration under section 57 of *the Nuclear Non-Proliferation (Safeguards) Act 19*87 of persons as inspectors for the purposes of that Act. List of persons so declared.
- Agendas, minutes and working documents of the IAEA, mostly concerned with the activities of its Department of Safeguards.

ANNEXES

Figure 34—ERA's Ranger Uranium Mine operations at night. *Photo courtesy of ERA.*

ANNEX A—NUCLEAR MATERIAL WITHIN AUSTRALIA

Table 11—Nuclear Material within Australia at 30 June 2003

Category	*Quantity*[1]	*Intended End-use*
Source Material:		
Uranium ore concentrates (UOC) at mines	809 tonnes U	Exports for energy use pursuant to bilateral agreements
Other UOC	3 tonnes U	Research
Natural Uranium (other than UOC)	10,822 kg	Research and shielding
Depleted Uranium	13,223 kg	Research and shielding
Thorium (Th) in ore residues	59 tonnes Th	Storage/disposal
Thorium (other than ore residues)	1,957 kg	Research, industry
Special Fissionable Material:		
Uranium-235	191,386 g[2]	Research, radioisotope production
Uranium-233	4 g	Research
Plutonium (except Pu-238)[3]	2,027 g[4]	Research, neutron sources

1. These figures are based on reports received pursuant to Permit requirements and were correct at the time of preparing this Annual Report.
2. Most of this U-235 is contained in irradiated fuel elements which have been used in ANSTO's HIFAR reactor. The figure given here is based on the weight of U-235 in each fuel element before irradiation, in accordance with the accounting convention used in the application of IAEA safeguards to HIFAR and Moata fuel prior to shipment from ANSTO.
3. Plutonium with an isotopic concentration of plutonium-238 exceeding 80% is exempt from safeguards.
4. Because of the IAEA accounting convention mentioned above, this figure does not include any plutonium in irradiated reactor fuel. However this quantity is very small and in the event of reprocessing of the fuel, the contained plutonium is considered practicably irrecoverable.

ANNEX B—ASSOCIATED ITEMS WITHIN AUSTRALIA

Table 12—Associated Items within Australia at 30 June 2003

Category[1]	*Quantity*	*Intended End-use*
Associated Material:		
Deuterium and Heavy Water	18.1 tonnes	Research, including reactor operation
Nuclear grade graphite	115 tonnes	Incorporated in HIFAR and Moata reactors, and in storage
Associated Equipment:		
HIFAR research reactor		
Moata research reactor[2]		
Fuel charging and discharging machines	2	
HIFAR control rods (not in reactors)	9	
HIFAR safety rods (not in reactors)	2	
Gas centrifuge components	-	Dismantled
SILEX equipment	-	Enrichment R&D

1. In addition to the associated items listed, associated technology is held by ANSTO, Silex Systems Ltd., patent attorneys, and IP Australia.
2. The reactor fuel has been discharged and the control room dismantled pending final decommissioning.

ANNEX C—AONM OVERSEAS

Australian Obligated Nuclear Material Overseas[1]

Table 13—Locations and Quantities of AONM as at 31 December 2002

Category	*Location*	*Quantity (tonnes)*
Natural Uranium	Canada, Euratom, Japan, ROK, USA	19,703
Uranium in Enrichment Plants	Euratom, Japan, USA	10,198
Depleted Uranium	Euratom, Japan, USA	58,900
Low Enriched Uranium	Canada, Euratom, Japan, ROK, Switzerland, USA, Mexico	8,116 [2]
Irradiated Plutonium	Canada, Euratom, Japan, ROK, Switzerland, USA	69.4
Separated Plutonium	Euratom, Japan	0.6
Total (tonnes)		96,988

1. The end-use for all AONM is for the production of electric power in civil nuclear reactors and for related R&D. AONM cannot be used for any military purpose.

   In accordance with the relevant agreements, Australia's bilateral safeguards agreement partners report on a calendar year basis.

   The actual quantities of AONM held in each country, and accounted for by that country pursuant to the relevant agreement with Australia, are considered by ASNO's counterparts to be confidential information. Totals above are based on annual reports under Australia's bilateral agreements (in the case of the US, provisional data were used, see page 40) and other information held by ASNO.

   All quantities are given as tonnes weight of the element uranium, plutonium or thorium. In the case of uranium, the isotope weight of uranium-235 is, for natural uranium 0.711% of the element weight, and for low enriched uranium in the range 1-5%.

   Irradiated plutonium comprises plutonium contained in irradiated power reactor fuel, or plutonium reloaded in a power reactor following reprocessing. Plutonium recovered from reprocessing is categorised as separated plutonium until it has been fabricated with uranium as MOX (mixed oxide) fuel and returned to a reactor for further power generation.

   Thorium previously listed has been removed because it is in the form of ore residues, not suitable or intended for nuclear use.

   There may be minor discrepancies in the above figures due to rounding.

2. An estimated 80-90% of Australian obligated low enriched uranium is in the form of spent reactor fuel.

Table 14—Transfers of AONM during 2002

Process[1]	*Quantity Uranium (tonnes)*	*Transfer Destination*
Conversion	864	Canada
	3,559	Euratom
	1,887	USA
Total transfers between jurisdictions to conversion plants	**6,310**	
Enrichment	358	USA
	1062	Euratom
	172	Japan
Total transfers between jurisdictions to enrichment plants	**1,592**	
Fuel Fabrication		
	131	Japan
	187	USA
	231	ROK
	< 1 Kg	Euratom
Total transfers between jurisdictions to fuel fabrication plants	**549**	
Reactor Irradiation	<10 Kg	Australia

1. The above figures are for transfers completed during 2002 and do not include transfers made in earlier years. The figures do not include transfers of AONM made within the fuel cycle of a state (or of Euratom), only between jurisdictions.

ANNEX D—ACCOUNTING REPORTS TO THE IAEA

Australian Accounting Reports generated for the IAEA for the period 2002-03 under Australia's NPT Safeguards Agreement with the IAEA.

Table 15—Numbers of Accounting Reports generated for the IAEA

Number of Reports Sent	*MBA*	*ICR*	*PIL*	*MBR*	*Total*
HIFAR, ANSTO	AS-A	6	1	1	8
Moata, ANSTO	AS-B	1	1	1	3
R&D Laboratories, ANSTO	AS-C	13	3	1	17
Vault Storage, ANSTO	AS-D	1	0	0	1
Miscellaneous Locations	AS-E	12	6	2	20
Replacement Research Reactor	AS-F	0	0	0	0
Silex Laboratories	AS-G	3	2	2	7
Total		36	13	7	56

Table 16—Numbers of Entries covered by Accounting Reports generated for the IAEA

Number of Entries Covered by These Reports	*MBA*	*ICR*	*PIL*	*MBR*	*Total*
HIFAR, ANSTO	AS-A	21	40	8	69
Moata, ANSTO	AS-B	1	4	8	13
R&D Laboratories, ANSTO	AS-C	196	228	41	465
Vault Storage, ANSTO	AS-D	1	0	0	1
Miscellaneous Locations	AS-E	496	493	56	1045
Replacement Research Reactor	AS-F	0	0	0	0
Silex Laboratories	AS-G	39	18	13	70
Total		754	783	126	1663

Table 17—Routine Safeguards Inspections and Complementary Access performed by the IAEA during 2002-03

2002	*Type*	*2003*	*Type*
6-7 November	MBA AS-A SN MBA AS-C CA	7-11 April	MBAs AS-A, AS-B, AS-C, AS-G, RI,CA
8 November	MBA AS-E, Research Lab, CA	14-15 April	MBAs AS-D, AS-F, DI

RI Routine Inventory Verification Inspection

CA Complementary Access

SN Short Notice Inventory Verification Inspection

DI Design Information Verification Inspection

MBA Material Balance Area

ICR Inventory Change Report

PIL Physical Inventory Listing

MBR Material Balance Report

LHSTC Lucas Heights Science and Technology Centre

ANNEX E—IAEA STATEMENTS OF CONCLUSIONS FOR AUSTRALIA

IAEA Statements of Conclusions of Inspections in Australia.

During 2002-03 the IAEA carried out inspections in four of Australia's seven Material Balance Areas (MBAs): AS-A, AS-B, AS-C and AS-G. However, this is not the only monitoring of Australia carried out by the IAEA, as the Agency carries out a range of other activities, such as short notice inspections, complementary accesses, verification exercises and increased data collection and analysis.

The IAEA provides statements of conclusions of inspections under Article 91(b) of Australia's NPT Safeguards Agreement. At the time of writing this Report, the 91(b) statements for the annual inventory verifications of AS-A, AS-B, AS-C and AS-G, conducted in April 2002, had not been received from the IAEA. However, previous Article 91(b) statements have stated the conclusions set out in Table 18, and ASNO anticipates this year's statement will be similar.

Table 18—IAEA Conclusions of Inspections in Australia during 2002

	Applicable MBAs	*Verification Activity*	*Conclusion*
(1)	AS-A,C,D	Examination of records	'The records satisfied the Agency requirements.'
(2)	AS-A,C,D	Examination of Reports to the Agency	'The reports satisfied the Agency requirements.'
(3)	AS-A,C,D	Application of Containment and Surveillance Measures	'The application of containment and surveillance measures adequately complemented the nuclear material accountancy measures.'
(4)	AS-A,C,D	Verification of Physical Inventory	'The physical inventory declared by the operator was verified and the results satisfied the Agency requirements.'
(5)	AS-C	Verification Activities for Timely Detection	'The Verification activities for timely detection during the material balance period satisfied the Agency requirements'
(6)	AS-C	Verification of the Quality and Functioning of the Operator's Measurement System	'The operator's measurement system satisfied the Agency Requirements'

Explanatory note on MBAs AS-E and AS-F

MBA AS-E covers all locations in Australia where safeguardable nuclear material is present, other than at Lucas Heights.

No IAEA statement under Article 91(b) of Australia's NPT Safeguards Agreement has been provided for this MBA since the IAEA has not inspected the nuclear material located there due to the small quantities involved in the past. A considerable number of items have been added to the MBA AS-E inventory during the past year and the IAEA planned to carry out a Physical Inventory Verification in July 2003. However, due to restructuring of responsibilities at the IAEA in June 2003 this inspection has been postponed.

MBA AS-F is the Replacement Research Reactor currently under construction at Lucas Heights. There is not yet any inventory of nuclear material in this MBA so the IAEA has

not carried out any inventory verification activities there. The IAEA did visit the site in 2002-03 to verify design information.

Conclusions of Complementary Accesses

The IAEA provides statements of conclusions for each State in which strengthened safeguards are in force. These are provided under Article 10.c. of the Additional Protocol to Australia's NPT Safeguards Agreement. The Statement for calendar year 2002 concluded as follows.

> 'Access pursuant to Article 4.a.(i) did not indicate the presence of undeclared nuclear material or activities at:
>
> National Medical Cyclotron at the Royal Prince Alfred Hospital
> Lucas Heights Science and Technology Centre
> ISEM, Wollongong University.
>
> These conclusions are pending the results of environmental samples.'

ANNEX F—IAEA SAFEGUARDS STATISTICS[1]

Table 19—IAEA Safeguards Expenditure (US$ million)

	2000	*2001*	*2002*
Regular Budget expenditure	70.617[2]	69.971[2]	78.500
Extra budgetary funds expenditure	10.311	15.172	19.700

Table 20—IAEA Verification Activities

	2000	*2001*	*2002*
Number of inspectors	217	231	243
Inspections performed	2,467	2,487	2,430
Person-days of inspection	10,264	10,314	10,084
Number of seals applied to nuclear material or safeguards equipment, detached and subsequently verified	25,484	26,195	26,071
Films, video tapes and digital storage media items reviewed	6,099	5,402	4,308

Table 21—Approximate Quantities of Material Subject to IAEA Safeguards on 31 December 2000, 2001 and 2002

Tonnes	*2000*	*2001*	*2002*
Plutonium contained in irradiated fuel	644	678.9	732
Separated plutonium outside reactor cores	72.2	77.5	82
Highly enriched uranium	21.8	20.9	31.8
Low enriched uranium	49,722	50,079	52,225
Source material (natural uranium or thorium)	91,699	94,940	96,412

Table 22—Number of Installations under IAEA Safeguards or Containing Safeguarded Material on 31 December 2000, 2001 and 2002

	Number of Installations		
Facility Type	*2000*	*2001*	*2002*
Power reactors	236	238	239
Research reactors and critical assemblies	168	160	158
Conversion plants	13	14	14
Fuel fabrication plants	43	41	41
Reprocessing plants	6	6	6
Enrichment plants	13	12	10
Separate storage facilities	75	79	80
Other facilities	95	94	86
Subtotals	649	645	634
Other locations and non-nuclear installations	454	454	325
Totals	1,094	1,099	959

1. Source of information: IAEA Annual Reports and Safeguards Implementation Reports for 2000-2002. All figures given are for calendar years.
2. The decrease in Regular Budget expenditure in 2000 and 2001, in US$, reflected currency movements—the IAEA's accounts are paid in Austrian Schillings/Euro.

ANNEX G—EXPENDITURE BY OPCW AND CTBTO PREPCOM

Table 23—Expenditure by the OPCW (Organisation for the Prohibition of Chemical Weapons) and CTBTO (Comprehensive Nuclear-Test-Ban Treaty Organization) Preparatory Commission (US$ million)

	2000	2001	2002
OPCW[1]	56.2	49.8	71.9
CTBTO[2]	79.9	93.3	71.7

1. OPCW budget is in Netherlands Guilders—the above figures are unofficial conversions to US$ based on exchange rates as at 31 December in each year. Sources—'Report of the Organisation on the Implementation of the Convention' for 2000, 2001 and 2002.
2. Sources—CTBTO PrepCom Annual Reports, Programme and Budget documents.

ANNEX H—AUSTRALIAN SAFEGUARDS SUPPORT PROGRAM

CURRENT PROJECTS

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

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

ANSTO is currently investigating the applicability of the methodology for measurements of isotopes of plutonium.

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.

Under this task ASNO has prepared a number of papers for the IAEA—on timeliness verification goals, the categorisation of nuclear material, unannounced inspections and continuity of knowledge—which have been extensively used by the IAEA for the conceptual development of integrated safeguards. Work on papers on continuity of knowledge and the starting point of safeguards were completed during the reporting period.

Expansion of the 'Physical Model' The Physical Model was developed for the IAEA by a panel of international experts (including ASNO staff) in support of enhanced information analysis in the context of strengthened and integrated safeguards. The Model identifies, describes and characterises all known fuel cycle technologies and processes, especially those required for the acquisition of weapons-usable fissile material, as a guide for IAEA analysts and inspectors.

As developed, the Physical Model is a living document subject to periodic review and update. A general revision process has been set in train, initially looking particularly at the volumes on reprocessing and enrichment, and consideration is being given to the further development of an electronic version of the Model.

Support for Information Review and Evaluation Since 1997, ASNO has undertaken for the IAEA a number of consultancy subtasks in this area which support the implementation of strengthened safeguards. Activities during the reporting period were as follows.

To evaluate information on mining and milling of uranium for safeguards purposes This task seeks to determine: the circumstances under which the IAEA might undertake complementary access to a uranium mining/milling site; what verification activities might be undertaken; and how declared information about mining/milling activities would be taken into account in an assessment on possible undeclared activities.

ASNO and the IAEA are examining the use of remote sensing (satellite imagery) to confirm the operational status of uranium mines. ASSP and the Canadian Safeguards Support Program (CSSP) are cooperating on the analysis of these and related images. A paper presenting some preliminary results was presented at the 2002 INMM meeting and a further paper will be presented at the 2003 INMM meeting. The completion date for this very successful project is set as December 2004.

TASKS COMPLETED DURING 2002-03

Support for Information Review and Evaluation *To evaluate the ways in which technology transfers (both within and outside the internationally established export control regimes) contribute to clandestine weapon programs* Under this subtask, the routes for transfer of technology needed to establish an undeclared capability for nuclear weapon production are being studied. ASNO's report was accepted and the subtask closed.

ANNEX I.1—MEDIA RELEASES 2002-2003

ASNO contributed to the following media releases during 2002-2003. Those marked with an asterisk are reproduced in this Annex.

29 July 2002/ FA107: New Director General for Chemical Weapons Organisation

15 September 2002/ FA131: Boost for Nuclear Disarmament. *

15 November 2002/ FA173: KEDO Oil Shipments to North Korea Halted.

23 December 2002/ FA196: North Korea's Removal of IAEA Monitoring Equipment.

7 January 2003/ D1: Australia's Statement to the IAEA Board of Governors following the IAEA Director General's Report on the Implementation of the Nuclear Non-Proliferation Treaty Safeguards Agreement between the IAEA and North Korea - Vienna 6 January 2003.

10 January 2003/ FA2: Australia to Send Senior Envoy to Pyongyang.*

13 February 2003/ FA11: UN Security Council to Consider North Korea's Nuclear Non-Compliance.

28 February 2003/ FA15: Australian to Head Review of On-Site Inspection Program.*

6 June 2003/ FA63: The Australia Group: Strengthening Measures to Prevent the Spread of Weapons of Mass Destruction. *

ANNEX I.2—MEDIA RELEASE

FA131 - 15 SEPTEMBER 2002

Boost for Nuclear Disarmament

I am pleased to announce that 16 countries joined me on 14 September in reaffirming our strong commitment to the Comprehensive Nuclear Test Ban Treaty (CTBT).

A declaration launched by Australia, Japan and the Netherlands and signed today by Foreign Ministers or their representatives confirms the Test Ban Treaty's central role in global efforts to prevent the spread of nuclear weapons and promote nuclear disarmament.

The declaration calls upon all States which have not yet signed and ratified the Treaty to do so without delay to enable entry into force as soon as possible. The Treaty has been ratified by 93 countries to date, establishing it as a powerful moral force against further nuclear testing. But to enter into force and realise its full potential, the Treaty must be ratified by 44 specified countries.

Australia does not underestimate the obstacles ahead but will work steadfastly with other supporters of the Test Ban Treaty until our goal of entry into force is achieved.

The terrible events of 11 September last year and their aftermath have underlined the importance of renewed international commitment to the non-proliferation of weapons of mass destruction.

Australia played a key role in the negotiation and acceptance of the Test Ban Treaty. In 1996, I led international action to bring the Treaty to the United Nations General Assembly in New York where it was approved by an overwhelming majority.

The Declaration signed in New York today also underlines the importance of building up the Test Ban Treaty's verification machinery.

Australia is hosting 20 CTBT monitoring stations and one laboratory, the third-largest number of any country after the United States and Russia. Australia has the largest number of stations certified as meeting CTBT standards of any Treaty [Signatory].

The Test Ban Treaty verification regime, with the International Monitoring System at its core, offers very high assurance of verifying Treaty compliance. When completed, the International Monitoring System will be global network of 321 monitoring stations and 16 laboratories, unprecedented in its global reach.

ANNEX I.3—MEDIA RELEASE

FA2 - 10 JANUARY 2003

Australia to Send Senior Envoy to Pyongyang

I am sending a senior delegation to Pyongyang from 14 to 18 January.

Australia has a vital interest in finding a constructive, diplomatic solution to address the nuclear question. During the visit, the delegation will convey Australia's concerns to the North Korean government about its nuclear weapons program.

Mr Murray McLean, First Assistant Secretary, North Asia Division in the Department of Foreign Affairs and Trade will lead the Australian delegation to Pyongyang. Mr John Carlson, Director General of the Australian Safeguards and Non-Proliferation Office will be a member of the delegation.

The delegation will meet senior North Korean officials, and hear North Korean perspectives first hand. This will build on the exchanges I and my Department are having with the North Korean Embassy in Canberra, and our extensive discussions with key players in the Asia-Pacific region.

Australia is well placed to play a part in international efforts to convince North Korea to step back from its nuclear weapons ambitions. We have formal diplomatic relations, and a long history of providing humanitarian and technical assistance to North Korea.

ANNEX I.4—MEDIA RELEASE

FA15 - 28 FEBRUARY 2003

Australian to Head Review of On-Site Inspection Program

I welcome the announcement that former Australian diplomat Richard Starr will lead a review of the development of arrangements for on-site inspection under the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

On-site inspections will be an important mechanism for investigating serious concerns about compliance with the Test-Ban Treaty. Details of how such inspections should work are being developed by the CTBT's Preparatory Commission, and Australia is an active contributor to that development.

Mr Starr will lead an international group that will meet in Vienna in May 2003 to review progress of this work and to make recommendations on how best to advance preparations ahead of entry into force of the Treaty.

Before retiring, Mr Starr held appointments as Australia's Ambassador for Disarmament in Geneva and Permanent Representative to the UN for Arms Control and Disarmament from 1994 to 1996. He was Australia's chief negotiator for the CTBT negotiations.

Australia's strong support for the Test-Ban Treaty is based on the view that a complete and effective ban on nuclear testing will help prevent the proliferation of nuclear weapons and constrain their development.

The work of the CTBT Preparatory Commission on On-Site Inspection involves the development of technical verification methods and procedures which must take account of a wide range of national concerns. The Commission is also tasked with establishing a global monitoring system intended to detect any clandestine nuclear testing. Australia will host 21 of the 337 facilities in that system.

ANNEX I.5—MEDIA RELEASE

FA63 - 6 JUNE 2003

The Australia Group: Strengthening Measures to Prevent the Spread of Weapons of Mass Destruction

I welcome the decisions taken by the Australia Group at its annual meeting in Paris (2-5 June 2003) to further strengthen export controls on goods and technologies that could be used in chemical and biological weapons (CBW) programs.

Under Australia's leadership, the Group agreed on measures that will make a significant contribution to the fight against the spread of CBW. These include

- the addition of 14 human pathogens that could potentially be used in WMD programs to the Australia Group Biological Control List;
- the endorsement of a cooperative program of action to engage countries in the Asia-Pacific region on CBW-related export control issues;
- the approval of a practical guide for compliance and enforcement officers to help detect, identify and prevent illegitimate transfers of items controlled by the Australia Group;
- new procedures for improving transparency and enhancing information sharing among members.

I welcome the continued high priority placed by members of the Australia Group on preventing the spread of CBW in the fight against terrorism, and their commitment to strengthening export control measures.

The Australia Group is an informal network of countries that consult on and harmonise their national export licensing measures on CBW-relevant items. Participants work together to prevent the inadvertent export of goods and technology for use in CBW programs. Currently, 33 countries - from Europe, the Asia-Pacific and the Americas, plus the European Commission - participate in the Group. Australia has chaired the Group since 1985.

ANNEX J—STATUS OF AUSTRALIAN IMS STATIONS
[CTBT International Monitoring System]

Table 24—Australian IMS Stations—Status as at 30 June 2003

	Status[1]	*Operator*[2]
Primary Seismic Stations		
Warramunga, NT	C	ANU
Alice Springs, NT	X	GA/USA
Stephens Creek, NSW	C	GA
Mawson, Antarctica	C	GA
Auxiliary Seismic Stations		
Charters Towers, QLD	T	GA
Fitzroy Crossing, WA	T	GA
Narrogin, WA	T	GA
Infrasound Stations		
Warramunga, NT	C	ANU
Hobart, TAS	T	GA
Shannon, WA	U	*GA*
Cocos Islands	S	*GA*
Davis Base, Antarctica	S	*GA*
Radionuclide Stations		
Melbourne, VIC	C	ARPANSA
Perth, WA	C	ARPANSA
Townsville, QLD	C	ARPANSA
Darwin, NT	C	ARPANSA
Cocos Islands	T	ARPANSA
Macquarie Island, TAS	S	*ARPANSA*
Mawson, Antarctica	S	*ARPANSA*
Radionuclide Laboratory		
Melbourne, VIC	XU	ARPANSA
Hydroacoustic Stations		
Cape Leeuwin, WA	C	*GA*

1. Status codes

X existing station (upgrade required—except radionuclide lab).
S site survey work underway or completed.
U establishment/upgrade work underway or completed.
T testing and evaluation underway for certification against CTBT standards.
C certified against CTBT standards.

2. Operators

GA Geoscience Australia
ANU Australian National University
ARPANSA Australian Radiation Protection and Nuclear Safety Agency

(Anticipated operators shown in italics.)

ANNEX K—ASNO PUBLICATIONS AND PRESENTATIONS

Publications and presentations by ASNO staff (in some cases in collaboration with others) during 2002-2003 which are available to the public:

Nuclear

1. John Carlson, *The Importance of Additional Protocols to Secure Non-Proliferation: Australia's Perspective*, International Conference for Strengthening IAEA Safeguards, Tokyo, 9-10 December 2002.

2. John Carlson, *The Place of Special Inspections in Contemporary Safeguards.*

The following papers were prepared during the reporting period, and presented at the Annual Meeting of the Institute of Nuclear Materials Management (INMM), Phoenix, Arizona, 13-17 July 2003:

3. John Carlson, Russell Leslie and Annette Berriman, *Strengthening the Non-Proliferation Regime*.

4. John Carlson, *Non-Proliferation—The DPRK Challenge*.

5. John Carlson, Russell Leslie, Peter Riggs and Annette Berriman, *Back To Basics—Re-Thinking Safeguards Principles.*

6. Russell Leslie, John Carlson, Peter Riggs and Annette Berriman, *The Effectiveness of Safeguards Activities: Performance and Reporting*.

Chemical/biological

7. John Howell, *Australia's Experience in Tracking Systems for International Trade in Chemicals Listed in the Chemical Weapons Convention Schedules of Chemicals*, published by The Organisation for the Prohibition of Chemical Weapons, The Hague, 9 May 2003

8. CD ROM, *International Chemical Trade Control*, Version 1.0 January 2003 (contains information for importers and exporters of chemicals), produced by the Department of Defence in conjunction with ASNO.

CTBT

9. Malcolm Coxhead, *Confidential Information in Reporting of a CTBT On-Site Inspection—Looking for a Balance,* On-Site Inspection Workshop 9, Hiroshima, Japan, June 2003.

GLOSSARY OF ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABACC	Brazilian-Argentine Safeguards Agency.
ACTBO	Australian Comprehensive Test Ban Office, the Australian national authority responsible for implementing Australia's obligations in relation to the CTBT—ACTBO is part of ASNO.
Additional Protocol	Published as IAEA document INFCIRC/540, the Additional Protocol is 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.
AG	Australia Group: the Australian-chaired export control group for chemical and biological weapons-related materials and equipment.
ANSTO	Australian Nuclear Science and Technology Organisation.
AONM	Australian Obligated Nuclear Material is nuclear material which is subject to obligations pursuant to one of Australia's bilateral safeguards agreements. In practice it relates to Australian uranium and nuclear material derived from it (e.g. uranium hexafluoride, low enriched uranium, depleted uranium, plutonium).
AOPu	Australian Obligated Plutonium (i.e. plutonium which is AONM).
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency.
ASO	Australian Safeguards Office—the Australian national authority responsible for implementing Australia's nuclear safeguards obligations. ASO was the predecessor to ASNO, and now forms part of ASNO along with CWCO and ACTBO.
ASSP	Australian Safeguards Support Program.
BAPETEN	Nuclear Energy Control Board (Indonesia).
BATAN	National Nuclear Energy Agency (Indonesia).
BWC	Biological Weapons Convention—full title: Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction.
BWR	Boiling Water Reactor: an LWR in which the moderator/coolant is used directly to produce steam for electricity generation.
CD	Conference on Disarmament.
Challenge inspection	Under the CWC, an inspection that can be initiated by a State Party to resolve suspicions about a particular site.
Classical safeguards	The system of safeguards based on the IAEA's document INFCIRC/153.
Complementary Access	The right of the IAEA pursuant the Additional Protocol to access a 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.

Conversion	Processing of natural uranium into a gaseous compound, uranium hexafluoride, for use as the feedstock for uranium enrichment.
CPPNM	Convention on the Physical Protection of Nuclear Material.
CTBT	Comprehensive Nuclear-Test-Ban Treaty.
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization—Vienna-based international organisation established to give effect to the CTBT.
CTBT PrepCom	Comprehensive Nuclear-Test-Ban Treaty Preparatory Commission.
CWC	Chemical Weapons Convention—full title: Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction.
CWCO	Chemical Weapons Convention Office, the Australian national authority responsible for implementing Australia's obligations under the CWC—CWCO is part of ASNO.
DBT	Design Basis Threat—potential adversary used as basis for planning physical protection measures.
Depleted uranium	Uranium having a U-235 content less than that found in nature (i.e. 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, high-enriched uranium (HEU) and U-233.
Discrete organic chemical (DOC)	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 (CAS) 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 U-235 from its level in natural uranium, 0.711%: for LEU fuel the proportion of U-235 (the enrichment level) is typically increased to between 3% and 5%.
ESARDA	European Safeguards Research and Development Association.
Euratom	The Atomic Energy Agency of the European Union. Euratom's Safeguards Office is responsible for the application of safeguards to all nuclear material in Austria, Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and Sweden; and to all nuclear material in civil facilities in France and the UK.
Facility	(for CWC purposes) A plant, plant site or production/processing unit. [NB. for legal purposes, the term 'Facility', as it appears in provisions of the *Chemical Weapons (Prohibition) Act*, has the same meaning as 'plant site'].
Facility	(for safeguards purposes) A document agreed between the IAEA

Attachment	and the relevant Member State which specifies the nuclear materials accountancy system for a specific facility, and defines the format and scope of inspection activities.
Fast breeder reactor (FBR)	A type of fast neutron reactor—see below.
Fast neutron	A neutron in the 'fast' energy range (>0.1 MeV).
Fast neutron reactor	A reactor that operates mainly with neutrons in the fast energy range. Because a moderator is not used, a fuel with a high energy density is required, usually plutonium (more specifically, MOX with a high proportion, e.g. 20-30%, of plutonium) or HEU. Through transmutation of U-238, a *fast breeder reactor* is designed to produce more plutonium than it consumes. However fast neutron reactors can also be operated as net plutonium consumers.
Fissile	Referring to a nuclide capable of undergoing fission by 'thermal' neutrons (e.g. U-233, U-235, Pu-239).
Fission	The splitting of an atomic nucleus into roughly equal parts, often by a neutron. In a fission reaction, a neutron collides with fissile nuclide (e.g. U-235) and splits, releasing energy and new neutrons. Many 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. Pu-240, Pu-242).
FMCT	Proposed Fissile Material Cut-off Treaty.
Full Scope Safeguards	The application of IAEA safeguards to all of a state's present and future nuclear activities—now more commonly termed *comprehensive safeguards*.
GA	Geoscience Australia (formerly Australian Geological and Seismic Organisation, AGSO).
Graphite	A form of carbon, used as a moderator in certain types of nuclear reactor. Graphite is a very efficient moderator, enabling uranium to be used in a fission reactor without enrichment.
GW	Gigawatt (Giga = billion, 10^9).
GWe / GWt	Gigawatts of electrical / thermal power.
Heavy water (D_2O)	Water containing 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 uranium to be used in a fission reactor without enrichment.
HEU	High enriched uranium. Uranium enriched to 20% or more in U-235. *Weapons-grade* HEU has been enriched to over 90% U-235.
HIFAR	High Flux Australian Reactor: the 10 MWt research reactor located at ANSTO's Lucas Heights Research Laboratories.
HTGCR	High temperature gas-cooled reactor.
Hydroacoustic	Term referring to underwater propagation of pressure waves (sounds).
IAEA	International Atomic Energy Agency.

ICR	Inventory Change Report. A term used in nuclear materials accountancy.
IDC	International Data Centre. Data gathered by monitoring stations of the CTBT IMS network are 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, low-enriched uranium (LEU), and thorium.
INFCIRC	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. In the case of non-nuclear-weapon states 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 negotiating safeguards agreements with non-nuclear-weapon states party to the NPT.
INFCIRC/225 Rev.4.(Corr)	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.
Infrasound	Sound in the frequency range of 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.
INMM	Institute of Nuclear Materials Management—an international professional association.
Integrated safeguards	The combination of 'classical' and strengthened safeguards measures to give optimal effectiveness and cost-efficiency.
ISD	International Security Division, DFAT.
Isotopes	Nuclides with the same number of protons, but different numbers of neutrons, e.g. U-235 (92 protons and 143 neutrons) and U-238 (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.
LEU	Low Enriched Uranium; uranium enriched to less than 20% in U-235. Commonly, LEU for use as LWR fuel is enriched to between 3% and 5% U-235.
LWR	Light Water Reactor. The most common type of power reactor, using ordinary (light) water as the moderator and coolant. Because light water is not an efficient moderator the uranium fuel

	must be slightly enriched (LEU).
MBA	Material Balance Area. A term used in nuclear materials accountancy.
MBR	Material Balance Report. A term used in nuclear materials accountancy.
Moata	ANSTO's 'university training reactor' (Moata means 'firestick' in an Aboriginal language). Now defuelled and undergoing decommissioning.
Moderator	A material used to slow *fast* neutrons to *thermal* speeds where they can readily be absorbed by U-235 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—for fresh LWR fuel the plutonium content is typically around 5-7%.
MUF	Material Unaccounted For. A term used in nuclear materials accountancy—the difference between operator records and the verified physical inventory.
MW	Megawatt (Mega = million, 10^6).
MWe / MWt	Megawatts of electrical / thermal power.
Natural uranium	In nature uranium consists predominantly of the isotope U-238 (approx. 99.3%), with the fissile isotope U-235 comprising only 0.711%.
NCG	National Consultative Group, established by the Minister for Foreign Affairs in 1998 to provide advice in the context of negotiations on strengthening the BWC.
NAC	Nuclear Accountancy and Control.
NNWS	Non-nuclear-weapon state(s)—see NWS.
NPT	Treaty on the Non-Proliferation of Nuclear Weapons.
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): those states recognised by the NPT as having nuclear weapons when the Treaty was negotiated (specifically, as at 1 January 1967), namely, US, Russia, UK, France and China.
OCPF	Other Chemical Production Facility: a facility that produces discrete organic chemicals in quantities exceeding thresholds defined in the CWC.
OPCW	Organisation 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 serious non-compliance the testing prohibition.
PACIA	Plastics and Chemicals Industries Association, Australia.
PIL	Physical Inventory Listing. A term used in nuclear materials accountancy.
Plant	For CWC purposes, is defined as a relatively self-contained area, structure or building containing one or more units for the

	production, processing or consumption of a chemical, along with associated infrastructure.
Plant site	For CWC purposes, is defined as the local integration of one or more plants, with any intermediate administrative levels, which are under one operational control, and includes common infrastructure.
PrepCom	Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty.
Production	For CWC purposes, is defined as 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.
Programmatic	Refers to an agreed delineated fuel cycle program (facilities and activities).
PTS	Provisional Technical Secretariat for the Comprehensive Nuclear-Test-Ban Treaty.
PWR	Pressurised water reactor: an LWR in which the moderator/coolant heats a secondary cooling circuit that produces steam for electricity generation.
R&D	Research and Development.
Reprocessing	Processing of spent fuel to separate uranium and plutonium from highly radioactive fission products.
ROK	Republic of Korea.
S/RD	Shipper/Receiver Difference. A term used in nuclear materials accountancy.
SAGSI	Standing Advisory Group on Safeguards Implementation: an international group of experts advising the Director General of the IAEA.
SPNFZ	South Pacific Nuclear Free Zone.
SSAC	State System of Accounting for and Control of Nuclear Material: the national safeguards system required of each state under its safeguards agreement with the IAEA.
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.
TW	Terawatt (tera = trillion, 10^{12}).
TWh	Terawatt hours.
U-233	Isotope 233 of uranium, produced through neutron irradiation of thorium-232.
U-235	Isotope 235 of uranium (occurs as 0.711% of natural uranium), comprising 92 protons and 143 neutrons.
U-238	Isotope 238 of uranium (occurs as about 99.3% of natural uranium), comprising 92 protons and 146 neutrons.
UF_4	Uranium tetrafluoride, a compound of uranium and fluorine that is a mid-stage product in the conversion of uranium dioxide (UO_2) to uranium hexafluoride (UF_6).

UF_6	Uranium hexafluoride, a gaseous compound of uranium and fluorine used as the feedstock for most enrichment processes.
UNMOVIC	United Nations Monitoring, Verification and Inspection Commission, mandated to disarm Iraq of its weapons of mass destruction.
UOC	Uranium Ore Concentrates (e.g. yellowcake).
UO_2	Uranium dioxide, a chemical form of uranium commonly used in power reactors.
U_3O_8 equivalent	Not all UOC has the same composition, thus all weights in this Report are given as the quantity of U_3O_8 that contains the same amount of uranium as the UOC in question.
WMD	Weapons of mass destruction (nuclear, chemical, biological). Sometimes radiological weapons are also encompassed by this term.

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