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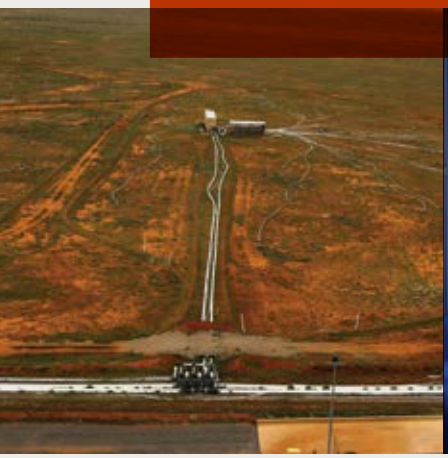
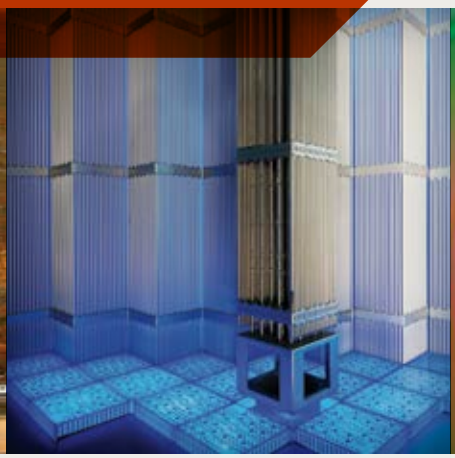
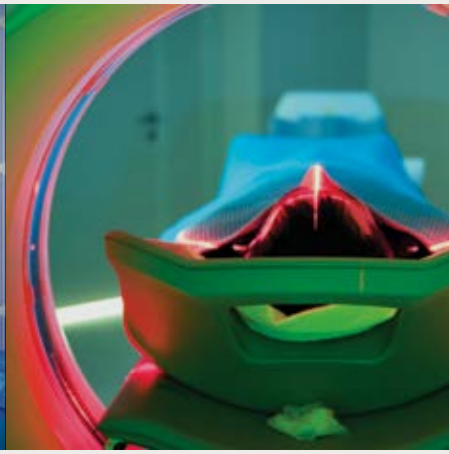
Australian Safeguards and Non-Proliferation Office

ANNUAL REPORT

2015–2016







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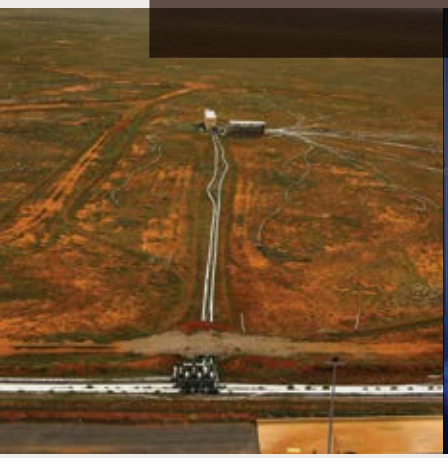

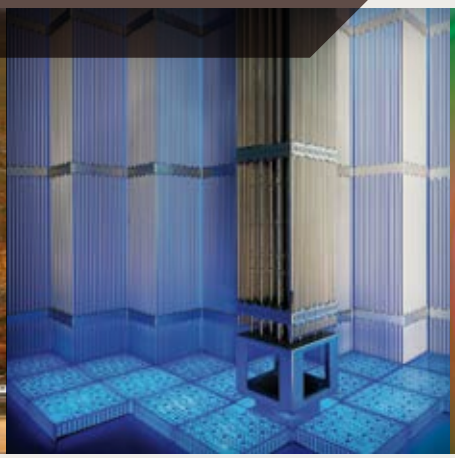

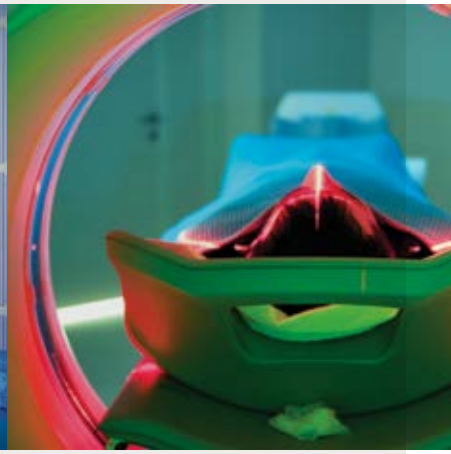

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Cover

Photo 1: Uranium mine well field

Photo 2: Nuclear fuel rod assemblies

Photo 3: Medical imaging

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Australian Government

Australian Safeguards and Non-Proliferation Office

7 October 2016

The Hon Julie Bishop
Minister for Foreign Affairs
Parliament House
CANBERRA ACT 2600

Dear Minister

I submit the Annual Report on the operations of the Australian Safeguards and Non-Proliferation Office (ASNO) for the financial year ended 30 June 2016. This report is made in accordance with section 51 of the *Nuclear Non-Proliferation (Safeguards) Act 1987*, section 96 of the *Chemical Weapons (Prohibition) Act 1994* and section 71 of the *Comprehensive Nuclear Test-Ban Treaty Act 1998*.

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

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

Yours sincerely

Rob Floyd

Dr Robert Floyd
Director General

Guide to the Report

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

The report has five parts:

- report by the Director General ASNO on key developments in 2015–16 and a preview of the year ahead
- summary of current major issues
- functional overview of ASNO, including its operating environment and outcomes – outputs structure – the first outcome demonstrates accountability to Government; the second outlines public outreach and education
- report on ASNO's performance during 2015–16
- key features of ASNO's corporate governance and the processes by which ASNO is directed, administered and held accountable.

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

- financial statements
- corporate governance and accountability framework
- external scrutiny
- human resource management, including work health and safety
- asset management
- purchasing
- agency-specific social inclusion strategies
- advertising and market research
- ecologically sustainable development and environmental performance.

A checklist of information included against annual report requirements is set out in the List of Requirements.

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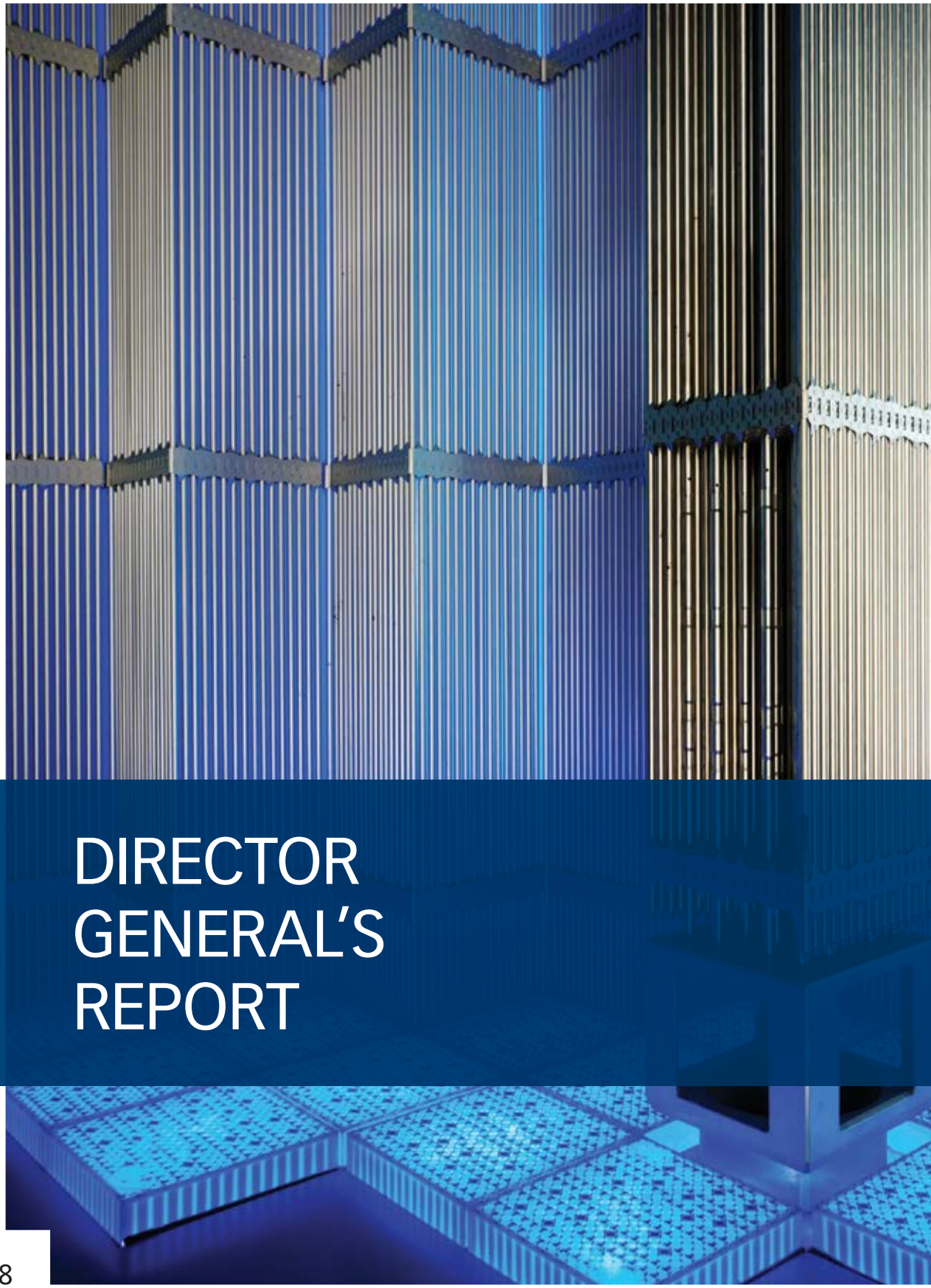


DIRECTOR GENERAL'S REPORT

1

SECTION

Director General's Report

The Year in Review

Dr Robert Floyd, Director General ASNO.

Nuclear Non-Proliferation and Safeguards Developments

The International Non-Proliferation Environment

The principal challenges for the non-proliferation regime during the 2015-16 reporting period included the detonation of a fourth nuclear device by the Democratic People's Republic of Korea (DPRK – or North Korea), finalisation and implementation of the Joint Comprehensive Plan of Action between the P5+1 (United States, United Kingdom, France, Russia and China plus Germany), along with the European Union, and Iran and ongoing efforts to ensure complete removal of chemical weapons from Syria and prevent the spread of chemical weapons to non-State actors in the Middle East.

On 14 July 2015, after two years of negotiation, an agreement was finally reached between the P5+1 along with the EU and Iran on The Joint Comprehensive Plan of Action (JCPOA). Following on from this historic agreement the United Nations Security Council passed resolution 2231 on 20 July 2015 endorsing and operationalising the Agreement. The JCPOA puts tight controls on all declared Iranian facilities capable of producing fissile material for 10 – 15 years. These controls curtail both the enriched uranium and plutonium pathways to nuclear weapons development by severely restricting centrifuge enrichment of uranium and closing the plutonium pathway by requiring re-design of the Arak heavy-water research reactor.

The key outcome of the JCPOA is an increase in the breakout time of the Iranian nuclear program. The breakout time being the time it takes to produce enough weapons grade uranium or plutonium for one nuclear weapon, where one nuclear weapon requires a 'significant quantity' of fissile material: either 25 kg uranium enriched to 20% or greater or 8 kg of Pu (predominantly ^{239}Pu). Prior to the JCPOA it was estimated that Iran's breakout time was between two and three months based on the large number of operating centrifuges and the growing stockpile of 20% enriched uranium. With the JCPOA in effect, it's estimated that over the next decade Iran's breakout time will be more than one year. The IAEA will play a key role in verifying Iran's compliance with the requirements of the JCPOA.

The DPRK has continued efforts to develop its nuclear weapons capability and on 6 January 2016 announced that it had conducted a fourth nuclear test. Kim Jong-un claimed the test was a successful test of a hydrogen bomb, but experts question the validity of this claim, particularly due to the relatively small yield, about 3.5 kT, of the test. To put this into perspective, the first test of an H-bomb (also known as a thermonuclear weapon) by the United States in 1952 produced a yield of 10 400 kT. North Korea has also continued with development of delivery systems for a nuclear weapon including land-based ballistic missiles and submarine launched ballistic missiles (SLBM). Expert analysis of North Korea's SLBM tests through July 2016 concluded that the tests were not successful and there is little evidence that North Korea has developed a nuclear weapon that is adequately miniaturised for missile delivery.

Destruction and disposal of Syria's remaining chemical weapons agents by international donors was completed, outside of Syria, by the end of 2015. International efforts to eliminate

Syria's chemical weapons arsenal have been largely successful, but the unstable security situation in Syria has so far prevented OPCW verification of the destruction of three remaining chemical weapons production facilities and there are some ongoing concerns about Syria's initial declaration to the OPCW.

On 7 August 2015, United Nations Security Council Resolution 2235 (2015) was adopted and subsequently an OPCW-United Nations Joint Investigative Mechanism (JIM) was established on 24 September 2015 to identify the perpetrators, organisers, sponsors or those otherwise involved in the use of chemicals as weapons in Syria. As raised in its first two reports, the JIM has examined the outcomes of the OPCW's fact finding missions to investigate alleged use of chemical weapons in Syria, as well as collecting further information as part of its independent investigations.

International Atomic Energy Agency Safeguards

The most significant development in IAEA safeguards over the 2015-16 reporting period was the conclusion and implementation of the Joint Comprehensive Plan of Action.

There are two significant confidence building safeguards measures in the JCPOA. The first is Iran's agreement to provisionally implement the IAEA's Additional Protocol in accordance with Article 17(b) of the Additional Protocol. Iran's implementation of the Additional Protocol commenced 16 January 2016. The Additional Protocol gives the IAEA greater access to information and locations in a state and is firmly established as part of the NPT safeguards standard. With the more expansive verification toolkit the Additional Protocol provides, the IAEA is better empowered to verify the absence of undeclared nuclear material and activities. The second confidence building measure is Iran's agreement to fully implement the modified Code 3.1 of the Subsidiary Arrangements to its Comprehensive Safeguards Agreement. Code 3.1 is a very important and standard provision in all subsidiary arrangements. It obliges States to notify the IAEA of a new facility as soon as the decision to authorise construction is made – thereby bringing in the IAEA at a very early stage for verification activities and ensuring design features can support safeguards. Code 3.1 was modified by the IAEA in the early 1990s as part of a suite of strengthened safeguards measures.

Aside from the significant developments with Iran, steady progress continued to be made at the practical implementation level with the adherence to IAEA safeguards instruments and improving the effectiveness and efficiency of IAEA safeguards. In the reporting period, two more countries brought the IAEA's Additional Protocol into force, namely Côte d'Ivoire and Liechtenstein, taking the number of Additional Protocol adherents to 129.

Regarding new comprehensive safeguards agreements (the agreements all non-nuclear-weapon States Parties to the NPT are obliged to conclude), one country, Liberia, had its comprehensive safeguards agreement approved by the IAEA Board of Governors – which will hopefully enter into force in the near future. There still remain twelve States Parties to the NPT that have not yet brought a comprehensive safeguards agreement into force. None of these have nuclear facilities, but it is important to entrench the normative value of IAEA safeguards by universalising comprehensive safeguards agreement.

At the September 2015 IAEA General Conference, an important achievement was the adoption by consensus for the third year in a row of the resolution on 'Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards' (known as the Safeguards Resolution). ASNO played a significant role in the negotiation of this resolution. During the reporting period the IAEA has completed the first new State-level approaches for a few countries under the State-level concept. Developing and securing Member State support for the State-level concept was very challenging for the IAEA over the last 4-5 years so it is good to see that the IAEA is now able to focus on implementation of this important development in how the IAEA targets its verification efforts.

Regional Safeguards Activities

A highlight for regional developments in the reporting period was the hosting of the 6th annual meeting of the Asia-Pacific Safeguards Network (APSN) by the new chair, the Japanese Ministry of Foreign Affairs, in October 2015.

The meeting was well-attended by countries in the Asia-Pacific region, as well as representatives from the IAEA and UK-based organisation, VERTIC (Verification Research, Training and Information Centre) as observers.

Domestic Safeguards

During the reporting period, the IAEA conducted two design information verification inspections, two routine inventory inspections and two random interim inspections in Australia. It also undertook five complementary access visits in accordance with Australia's Additional Protocol, three at buildings at ANSTO, one at the laboratories of Silex Systems Ltd, and one at the Olympic Dam uranium mine. The IAEA used the results from these inspections, plus its evaluation of Australia's reports and other safeguards-relevant information, to draw its compliance conclusions for Australia. The IAEA reported that it found no indication of the diversion of declared nuclear material from peaceful nuclear activities and no indication of undeclared nuclear material or activities, and therefore concluded that all nuclear material in Australia remained in peaceful activities (the "broader conclusion"). The IAEA has been drawing the broader conclusion with respect to Australia since 2000. The details of the IAEA's conclusions on Australia are in Appendix D, and its overall statement of conclusions for all states is in Appendix E.

The construction of the new molybdenum-99 production plant at ANSTO's Lucas Heights site was close to completion at the end of the reporting period. There were promising developments in the IAEA's efforts in devising a measurement technique for verifying the uranium in the solid waste produced by this plant. Finding a technical solution is important as, using existing procedures, the IAEA is currently unable to meet its inspection goals for this part of ANSTO.

The University of Western Australia's (UWA) Centre for Microscopy, Characterisation and Analysis and ANSTO continued to contribute to the IAEA's Network of Analytical Laboratories (NWAL) during the period. The IAEA uses this Network for the analysis of environmental samples and destructive assay samples taken during inspections. UWA and ANSTO make a significant contribution to this very important work of the IAEA.

ASNO completed a comprehensive review during the reporting period of ANSTO's permits to possess nuclear material and associated items, and of the model permits for holders of small quantities of nuclear material, such as universities and industrial radiography companies. These reviews resulted in some changes to the design of permits to streamline permit management by ASNO and permit holders and to ensure a clearer connection between permit requirements and various IAEA arrangements and guidelines.

Bilateral Safeguards

During 2015-16, all AONM was accounted for in accordance with the procedures and standards prescribed under relevant bilateral nuclear cooperation agreements. In addition, the network of Australian countries where AONM can be sent expanded with the Australia-India and Australia-UAE Nuclear Cooperation Agreements becoming operational.

ASNO's 2014-15 Annual Report highlighted signing on 5 September 2014 of the Australian – India nuclear cooperation agreement. The agreement was tabled in Parliament in October 2014 for consideration by the Joint Standing Committee on Treaties (JSCOT). JSCOT presented its report (Report 151) on 8 September 2015 recommending that, subject to consideration of other report recommendations, binding treaty action be taken. The Government tabled its response to Report 151 on 11 November 2015.

The Agreement between the Government of Australia and the Government of India on Cooperation in the Peaceful Uses of Nuclear Energy entered into force on 13 November 2015 and the administrative arrangement consistent with Australia's requirements for robust safeguards and accountability was signed on the same day.

Following entry into force of the Australia – UAE nuclear cooperation agreement on 14 April 2014, ASNO negotiated with the UAE the administrative arrangement under the agreement. The arrangement which is consistent with Australia's requirements for robust safeguards and nuclear material accountancy

was signed on 20 November 2015 and is now operational.

In December 2014, then Prime Minister Abbott and Ukrainian President Poroshenko discussed the possibility of Australian uranium supply to Ukraine. Negotiation of the text for an Australia – Ukraine Nuclear Cooperation Agreement was completed in Kiev in October 2015. The Agreement was signed by Foreign Minister Bishop and Ukraine Minister for Energy and Coal Industry Demchyshyn in Washington in the margins of the Nuclear Security Summit on 31 March 2016. Tabling of the Agreement in Parliament and referral to JSCOT is anticipated in the final quarter of 2016. Exports of Australian uranium to Ukraine can only commence after the nuclear cooperation agreement enters into force and an administrative arrangement has been agreed.

Foreign Minister Bishop signing the nuclear cooperation agreement with the Ukraine Minister for Energy and Coal Industry Demchyshyn while Ukrainian President Poroshenko observes.

Nuclear Security Developments

Foreign Minister Bishop represented Australia at the fourth and final Nuclear Security Summit in Washington DC on 31 March and 1 April 2016. The Summit produced a communiqué and five action plans covering the activities of the IAEA, United Nations, Global Initiative to Combat Nuclear Terrorism and the Global Partnership against the Spread of Weapons and Materials of Mass Destruction.

Following considerable effort in the lead-up to the Nuclear Security Summit, the 2005 Amendment of the Convention on the Physical Protection of Nuclear Material finally entered into force on the 18 May 2016. Entry into force required ratification by two thirds of the States Parties (101 States) to the Convention. Australia ratified the Amendment in 2007.

For the third time in succession, Australia ranked highest on the Nuclear Threat Initiative's (NTI) Nuclear Security Index - first for measures against the theft of nuclear material among 24 states with more than one kilogram of high-enriched uranium or separated plutonium.

After reviewing the risk of maritime piracy in the Gulf of Aden, ASNO now permits the use of that route to transport Australian UOC to Europe using international best practice risk mitigation standards. A shipment of Australian UOC to France via the Gulf of Aden was completed without incident.

Comprehensive Nuclear-Test-Ban Treaty

In the twenty years since the Comprehensive Nuclear-Test-Ban Treaty (CTBT) was negotiated, support for that treaty and its objectives has continued to build. The norm against nuclear testing has strengthened notwithstanding the fact that eight key ratifications of the treaty remain outstanding. Efforts to promote those outstanding ratifications are now a regular feature of the diplomatic calendar. This has been particularly the case in 2016, the twentieth year since the CTBT opened for signature. The article at page 32 of this report reviews the history of efforts to achieve a comprehensive nuclear test ban.

Around 90 percent of International Monitoring System facilities have been established, including 20 of the 21 that Australia will host. The final facility that Australia will host, is now being built at Davis Station in the Australian Antarctic Territory.

On 6 January 2016, the DPRK announced that it had conducted a nuclear test. Even before their public announcement, seismic waves from the test were detected by the CTBT's nuclear test monitoring infrastructure, including in Australia. Analysis indicated an explosion with a likely nuclear explosive yield comparable to the 2013 test, or slightly smaller at 3.5 kT. Its location was in the vicinity of the P'unggye nuclear test site in north-eastern DPRK, the site of the declared 2006, 2009 and 2013 tests. Of significance, is the DPRK's Permanent Mission to the UN's press release of 6 January stating "it was confirmed that the H-bomb test conducted in a safe and perfect manner had no adverse impact on the ecological environment. The test means a higher stage of the DPRK's development of nuclear force…." The very small yield of this test differs markedly from that expected of a successful hydrogen bomb test. When the United States detonated "Ivy Mike", the world's first such weapon in 1952, its yield was 10 400 kTs.

Chemical Weapons Convention

Domestic Activities

During the reporting year ASNO submitted comprehensive and timely annual declarations in accordance with the requirements of the Chemical Weapons Convention (CWC) to the Organisation for the Prohibition of Chemical Weapons (OPCW). These included reports of Australia's chemical trade and other chemical activities in industrial and Defence laboratories, as well as Australia's national programs for assistance and protection against chemical weapons.

ASNO facilitated two routine OPCW inspections at declared chemical production facilities bringing the total number of inspections in Australia to 49 since entry-into-force of the CWC in 1997. All inspection reports have confirmed Australia's declared information and the absence of undeclared CWC-Schedule 1 chemicals and/or their production.

ASNO continued to inform Australia's policy positions through provision of technical advice on CWC and verification-related issues, including endorsement of the OPCW's proposal for enhancing its international coordination role in the field of chemical security.

International Activities

The OPCW has made a significant contribution to chemical weapons disarmament and non-proliferation over the past 19 years since entry into force of the CWC. This achievement was commemorated by the OPCW Foundation Day, an international event attended by DG

ASNO from 2-4 May 2016 in The Hague (further details on 29.

In 2015 the number of States Parties to the CWC increased to 192 with Myanmar and Angola joining. The CWC continues to enjoy the highest membership of all WMD treaties. The four remaining States not yet party to the CWC (Israel, Egypt, South Sudan and the Democratic People's Republic of Korea) have been called upon by the OPCW to expeditiously ratify or accede.

The OPCW continued its chemical weapons disarmament work having verified, as at 30 June 2016, the destruction of 91.5% of the 72 525 metric tonnes of declared chemical weapons. The remaining chemical weapons stockpiles in Russia (at Kizner) and the United States (at Blue Grass, Kentucky, and Pueblo, Colorado) are expected to be destroyed by their planned completion dates of 2020 and 2023, respectively.

All of Libya's Category 1 and 3 chemical weapons stockpiles have been destroyed. However, due to an unstable security environment and unavailability of technology needed for safe disposal, the removal of its remaining Category 2 chemical weapons for destruction purposes is not expected until late 2017.

OPCW-UN team takes samples near the site of an alleged chemical attack in Syria.

Destruction and disposal of Syria's remaining chemical weapons agents by international donors was completed, outside of Syria, by the end of 2015. By June 2016, 24 out of 27 chemical weapons production facilities (CWPFs) in Syria were verified by the OPCW as destroyed. The unstable security situation in Syria has so far prevented OPCW verification of the destruction of three remaining CWPFs.

In the context of increasing focus on preventing the re-emergence of chemical weapons, Australia issued a joint working paper at the 20th Session of the Conference of the States Parties (CSP20) in December 2015 with cross regional support from 22 co-sponsors. The joint paper aimed to increase awareness about the dangers of the use of aerosolised central nervous system-acting chemicals (CNSACs) in law enforcement, and to encourage States Parties to articulate their national positions. DG ASNO co-chaired a well-attended Australia-Swiss sponsored side event with Ambassador Mr Urs Breiter, in the margins of CSP20, to raise awareness about the CNSAC issue among capital-based representatives attending the Conference. Much of this support can be attributed to efforts of the Australian Embassy in The Hague.

Australia's statements at the side event, as well as to CSP20 and Executive Council meetings, reaffirmed that it is not developing, producing, using or stockpiling any CNSAC for law enforcement purposes.

DG ASNO, Dr Rob Floyd co-chairing a side meeting on central nervous system-acting chemicals during the CWC Conference of the States Parties.

HE Brett Mason, Permanent Representative of Australia to the OPCW at the 20th Conference of States Parties, December 2015.

Other Non-Proliferation and Disarmament Activities

International Partnership for Nuclear Disarmament Verification (IPNDV)

Future treaty frameworks for nuclear disarmament will need to be underpinned by effective verification. Techniques for conducting such verification can build on existing mechanisms such as IAEA safeguards, but new and unique approaches and technologies will be needed also. Information about the design of nuclear weapons is highly sensitive in terms of proliferation risk, and for the security interests of the states that possess them.

In late 2014, the United States announced the International Partnership for Nuclear Disarmament Verification (IPNDV) to bring together both nuclear and non-nuclear weapon states under a cooperative framework to further understand and find solutions to the complex challenges involved in the verification of nuclear disarmament. The IPNDV builds on technical work carried out by some of the nuclear weapon states and through the UK-Norway Initiative on nuclear disarmament verification.

The practical work of IPNDV got underway in November 2015 in Oslo with the formation of its three working groups. Australia is participating in each of the working groups and, together with a representative from Poland, DG ASNO chairs Working Group 2, which is addressing procedures for the conduct of on-site inspection to monitor the dismantlement of nuclear warheads. ASNO's Malcolm Coxhead participated also in the working groups which met three times during the year. The article at page 31 of this report provides further information on the IPNDV and its objectives.

Fissile Material Cut-Off Treaty (FMCT)

Initiatives by a number of countries in the United Nations and the Conference on Disarmament (CD) have been unable to break the diplomatic impasse preventing negotiations on a fissile material cut-off treaty (FMCT) since May 2009. The requirement that all CD members agree to negotiations has continued to be an impediment to commencing negotiations. ASNO's experts stand ready to contribute to technical discussions when the negotiations commence.

The Year Ahead

The work of ASNO over the year ahead will focus on domestic regulatory functions and strengthening the operation and effectiveness of treaty regimes through bilateral, regional and multilateral engagement. ASNO will continue to work with stakeholders and other government agencies to reduce 'red-tape' without compromising the effectiveness of our regulatory efforts.

The Agreement between the Government of Australia and the Government of Ukraine on Cooperation in the Peaceful Uses of Nuclear Energy will be tabled in the Australian Parliament for referral to JSCOT for their consideration. ASNO will also seek to negotiate and finalise the administrative arrangement with Ukraine.

ASNO will continue to promote the undertakings and goals of the Nuclear Security Summits including its action plans through active participation at points of contact meetings and other nuclear security forums. The 2nd IAEA International Conference on Nuclear Security in Vienna in December 2016, where ASNO will attend, present and support senior representation, will be a key forum for countries to determine the way forward following the Nuclear Security Summits.

ASNO will complete its review of transport security requirements and subsequent revision of transport permits. This work involves regular consultation with stakeholders including state / territory regulators and industry.

Following on from the successful IPPAS mission to ANSTO in November 2013, ASNO will prepare for a follow-up IPPAS peer review mission to be held in late 2017. ASNO continues to develop internationally recognised expertise in the International Physical Protection Advisory Service (IPPAS) mission process, not only through the successful mission to Australia, but through engagement and leadership of IPPAS missions in other countries.

ASNO has played a major role in providing technical advice in relation to efforts to commence negotiations on a fissile material cut-off treaty (FMCT), notably during the FMCT Group of Government Experts process during 2014 – 15. We will continue to engage in ongoing efforts to commence negotiations on an FMCT.

ASNO will continue its outreach program to build operational capability in the areas of safeguards and nuclear security and non-proliferation treaty implementation (such as the CTBT and CWC), including through active support of and participation in the Asia-Pacific Safeguards Network (APSN). DG ASNO will continue in the role of chair of the IAEA Director General's Standing Advisory Group on Safeguards Implementation (SAGSI).

A number of diplomatic initiatives are planned for late 2016 to promote entry into force of the Comprehensive Nuclear-Test-Ban Treaty as well as a global moratorium on nuclear testing pending that goal. There are welcome indications that Thailand and Myanmar will ratify the CTBT in the near future and ASNO has been pleased to support Australia's outreach to Myanmar on the CTBT in early July 2016. Australia's technical support to the CTBTO Preparatory Commission in establishing the verification regime for the treaty will continue.

The first phase of work by the IPNDV runs over 2016 and 2017. ASNO's support will continue to focus on IPNDV's Working Group 2 dealing with on-site inspection as a means to monitor and verify the dismantlement of a number of nuclear explosive devices. Working Group 2 has set a frame for the detailed analysis it expects to produce by the end of 2017 and ASNO expects to contribute significantly to those products.

Australia's resumption of a seat on the OPCW Executive Council for a four-year term in May 2016 will mean increased demands on ASNO to provide technical advice and support in the development of Australia's policy positions with regards to issues being considered at the OPCW.

ASNO will continue to support Australia's efforts to seek agreement on the commencement of discussions within the OPCW on the dangers of aerosolised use of CNSACs in law enforcement. The intention is to gain support from additional State Parties for the joint working paper as co-sponsors and to resubmit this working paper at CSP21 to be held 28 November to 2 December 2016.

Australia will host an OPCW Analytical Skills Development Programme for CWC States Parties in Asia from 21 November to 2 December 2016. ASNO will provide support to the Defence Science and Technology Group in organising and delivering this course to enhance national capacities for analysis of chemicals related to implementation of the CWC.

CURRENT TOPICS

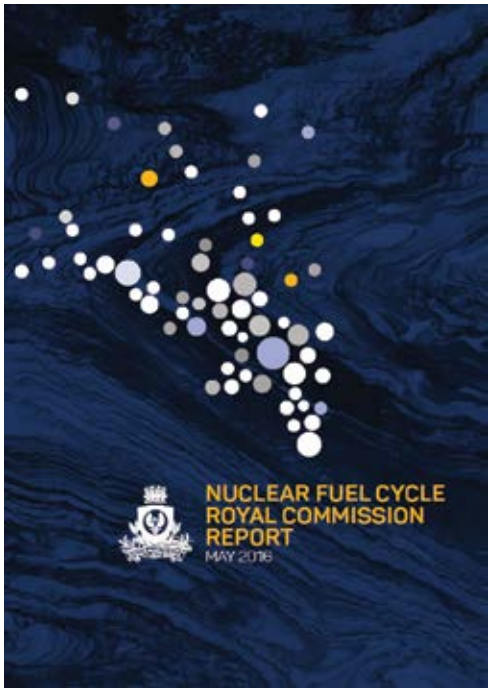
2

SECTION

Current Topics

Nuclear Fuel Cycle Royal Commission of South Australia

In March 2015, the Government of South Australia established a formal inquiry into the nuclear fuel cycle. The inquiry was set up as a Royal Commission, which functions independently of government. Its purpose was to investigate and report on the potential for the state to participate in four aspects of the nuclear fuel cycle. These were: uranium mining; front-end processing and manufacturing; electricity generation; and waste management. Following its investigations, the Commission handed its final report to the South Australian Government on 6 May 2016.



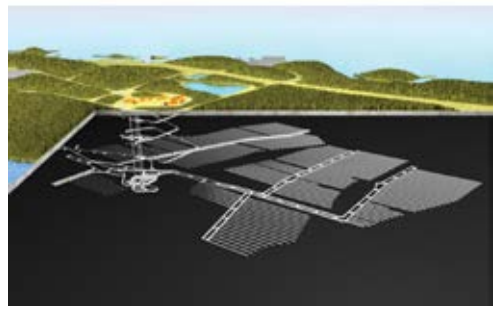
Cover of the Nuclear Fuel Cycle Royal Commission Report.

ASNO provided independent advice to the Commission during its inquiry. On 12 August 2015, the Australian Government submitted their consolidated response to the Commission's issues papers. For the response, ASNO contributed expertise on domestic regulation and international security and safeguards oversight. ASNO also responded to various requests from the Commission for information regarding nuclear security and safeguards.

ASNO's largest contribution of expert advice was during the public sessions program. On 25 November 2015, DG ASNO, was called as a witness to the Commission. Dr Floyd was asked about the security and safeguards implications for further participation in the nuclear fuel cycle. His response covered the role of ASNO and broad policy considerations down to specific risks at each stage of the fuel cycle.

The overarching theme of Dr Floyd's message was that international confidence in Australia's non-proliferation standing and credentials is built on a mindset of cooperation and transparency. Dr Floyd noted that there was a high-level of confidence in Australia's non-proliferation credentials, but this should not be taken for granted. He explained that further participation in the nuclear fuel cycle will be accompanied by a greater level of scrutiny and oversight and that Australia may need to go beyond minimum requirements to maintain international confidence. Such additional confidence-building measures could include multilateral approaches for proliferation-sensitive stages of the fuel cycle, further use of safeguards-by-design principles and increased international oversight of facilities.

Many of the findings in the Commission's final report related to waste management. In essence, the Commission found that South Australia could safely manage used fuel from other countries. Further, it found that it would be highly profitable if the fuel was held in an above-ground store before being consigned to a geological disposal facility.



Used fuel disposal facility planned for Finland, courtesy of Posiva Oy.

At present, there are no operating used fuel disposal facilities anywhere in the world. Finland and Sweden are the most advanced countries in this respect. Both have chosen sites and expect to receive waste in next decade. The projects in Finland and Sweden are intended to only receive used fuel and waste arising from nuclear power use in their respective countries, not used fuel and waste from other countries. In the case of Finland, disposal galleries will be constructed from the existing rock characterisation facility, 'Onkalo'. The main IAEA safeguards measures that will be undertaken at the Finnish and Swedish facilities are likely to comprise: container tracking systems for nuclear material accountancy; surface monitoring techniques such as ground-penetrating radar to confirm the facility design; and satellite imagery to confirm the absence of undeclared exit routes. Any facility for the disposal of international used fuel would require similar safeguards-verification measures.

It is important to remain vigilant against the proliferation and security risks of nuclear fuel cycle programs, but these risks can be readily managed with the application of best practice regulatory standards. The highest standards of safeguards and security would be important for maintaining Australia's strong non-proliferation reputation and a social license for the activities undertaken.

The Climb to the 2016 Washington Nuclear Security Summit

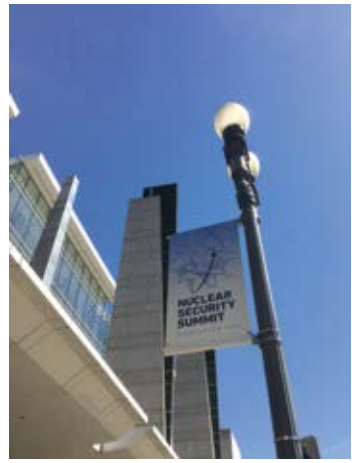
Nuclear Security Summits (NSS) were originally established by President Obama to support his call, in his April 2009 Prague speech, to secure all vulnerable nuclear material within four years where he identified acquisition of a nuclear weapon by terrorists as "the most immediate and extreme threat to global security".

The first Nuclear Security Summit was held on 12-13 April 2010 and was attended by 47 countries, the United Nations, the European Union and the International Atomic Energy Agency. The Leaders attending the Summit discussed plans to strengthen nuclear security by preventing the misuse of nuclear materials by non-state actors, thus reducing the threat of nuclear terrorism. The Summit produced a substantive communiqué and work plan. The nature of the initiative demanded strong follow-up action by Leaders thus further summits were planned.

The Republic of Korea and the Netherlands hosted the second and third Nuclear Security Summits in March 2012 and 2014, respectively. Each of these summits produced a new communiqué, increased the scope of activities and contained more detailed plans and actions. These summits also featured a number of joint statements (so called "gift baskets") offered by groups of states on specific nuclear security topics. The number of participating countries increased to 53 and INTERPOL also joined the summits.

President Obama led the fourth and final Nuclear Security Summit in Washington DC on 31 March to 1 April 2016. The summit was attended by 52 countries, the International Atomic Energy Agency (IAEA), the United Nations, INTERPOL, and the European Union. Thirty-seven countries were represented by their head of state/government. Russia chose not to attend this summit.

The fourth Summit was held in the shadow of terrorist attacks in Paris, Turkey, Pakistan and, just prior to the Summit, in Belgium. The existence of video footage, found in the apartment of a suspected militant linked to extremists, surveilling a senior Belgian nuclear official gave the summit heightened global relevance.



Washington D.C. Nuclear Security Summit, April 2016.

The key outcome documents from the Summit in addition to a new communiqué were five action plans related to the IAEA, UN, INTERPOL, the Global Initiative to Combat Nuclear Terrorism (GICNT) and the Global Partnership against the Spread of Weapons and Materials of Mass Destruction (GP), and a collection of 28 Gift Baskets and Joint Statements. All these can be found at www.nss2016.org.

The Washington Summit also featured a Scenario Based Policy Discussion which centred on a fictitious, but realistic scenario of aerial dissemination of radiological, chemical or biohazardous materials. Interventions recognised the need to secure nuclear and radioactive material to mitigate this threat and address the root-cause of terrorism. President Obama used this scenario to discuss the threat of Islamic State and recent terrorist attacks.

The most welcome development at the Summit was the imminent entry-into-force of the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM), which had reached a sufficient number of ratifications on the eve of the Summit. A late surge in ratifications (16 in the last six months) was clearly associated with the final Summit.

Other key outcomes of the Summit included:

- States re-affirmed the importance of the central role of the IAEA in nuclear security, as well as the importance of the UN, INTERPOL and GICNT in the nuclear security architecture;
- A number of states pledged funds for nuclear security including for the IAEA's Nuclear Security Fund, the IAEA's Seibersdorf analytical laboratories, and the Global Partnership;
- Japan announced it had completed ahead of schedule the removal of all highly-enriched uranium (HEU) and separated plutonium fuels from its Fast Critical Assembly (FCA);
- China opened a nuclear security centre-of-excellence;
- As a transparency measure, US publicised specific information outlining the measures used to secure military nuclear materials and declassified and publically released updated data on the national inventory of HEU (https://www.whitehouse.gov/the-press-office/2016/03/31/fact-sheet-united-states-military-nuclear-material-security) ;
- More States (Canada, China, Germany, Japan, Switzerland) repatriated HEU or separated plutonium from nuclear facilities and converted reactors from HEU to low-enriched uranium fuel; and
- Additional Summit highlights are described in the Summit website (http://www.nss2016.org/news/2016/4/5/highlights-from-national-progress-reports-nuclear-security-summit).

Foreign Minister Bishop making Australia's statement at the 2016 Washington Nuclear Security Summit.

Foreign Minister Bishop's statement at the Summit pointed to Australia's efforts to reduce global reliance on HEU and the experience gained from hosting an IAEA Physical Protection Advisory Service (IPPAS) peer-review mission. (http://foreignminister.gov.au/speeches/Pages/2016/jb_sp_160401.aspx)

Aside from measuring up well against the Summit's goals and commitments, Australia was involved in a number of Summit related activities by:

- co-chairing the group that drafted the IAEA Action Plan;
- subscribing to 14 of the 17 available gift baskets and joint statements and taking up the leadership of the Joint Statement on Forensics in Nuclear Security (http://www.nss2016.org/document-center-docs/2016/4/1/joint-statement-on-forensics-in-nuclear-security);
- involvement in key nuclear security dialogues (e.g. Nuclear Threat Initiatives

Global Dialogue) in the lead-up to the summit;

- attending two key summit side-events, namely the Nuclear Industry Summit and the NGO Summit (Solutions for a Secure Nuclear Future). Australia was represented on the Board of Advisors for the Industry Summit; and
- hosting at the Australian Embassy in Washington, a joint Carnegie Corporation of New York-MacArthur Foundation event which announced a grant of $25 million toward nuclear security efforts.

Australia's national statement to the Summit (http://www.nss2016.org/document-center-docs/2016/4/1/national-statement-australia) outlined the areas Australia would focus on for the sustainment of the Nuclear Security Summit's objectives and goals, namely:

- supporting the existing nuclear security treaties, organisations and initiatives, consistent with and beyond the commitments made in the action plans delivered at this summit;
- being active in a post-summit contact group to promote the implementation of nuclear security commitments and identify emerging trends that may require more focused attention;
- involvement in track 1.5 dialogues and programs of government, industry and non-government experts for the enhancement of global nuclear security; and
- participating in regional initiatives for capacity building in nuclear security.

Since the first summit was foreshadowed there have been:

- 79 ratifications of the CPPNM Amendment;
- 52 ratifications of ICSANT;
- the removal or disposition of over 3.8 metric tons of nuclear material (enough for over 150 nuclear weapons);
- over 25 IPPAS missions conducted; and
- at least 15 centres of excellence in nuclear security established worldwide.

Australia's national interest has and will continue to be well served by the outcomes of the nuclear security summits, not least by the increased awareness by the leaders of nations. In that sense the summits have been a success.

Since 2010, Dr Floyd (DG ASNO) has served as Australia's summit sherpa and Dr Bayer (Director Nuclear Security Section) as sous-sherpa throughout the NSS process. ASNO will continue to support the goals of the summit, implementation of the IAEA action plan and the above-mentioned focus areas in cooperation with domestic and international stakeholders as key priority for ASNO.

Entry-into-force of the 2005 Amendment to the CPPNM

The Convention on the Physical Protection of Nuclear Material (CPPNM) is the only legally binding international instrument dedicated to the physical protection of nuclear material. The 2005 Amendment to the CPPNM (the Amendment) finally entered into force on 8 May 2016, just after the 2016 Washington Nuclear Security Summit.

The Original Convention – Limited in scope

The need for an international agreement on the physical protection of nuclear material was raised during the 1975 NPT review conference, which urged that "action be pursued to elaborate further, within the IAEA, concrete recommendations for the physical protection of nuclear material in use, storage and transit."

Government representatives gathered at the IAEA in 1977 to consider the preparation of a convention. After nearly two years, the text of the CPPNM was adopted on 26 October 1979 and finally entered into force on 8 February 1987. Australia was one of many countries that originally desired a comprehensive convention which would have prescribed standards and measures of physical protection to be applied by each State Party to civil nuclear material within its territory. However, the scope of the Convention was ultimately restricted to physical protection during international transport and its

storage incidental to transport. The conclusion of the first CPPNM Review Conference in 1992 was that "the Convention provides a sound basis for physical protection during international transport and is acceptable in its current form".

Development of an Amendment

In November 1999 the Director General, IAEA convened an "Informal Open-Ended Expert Meeting" tasked with assessing whether any amendments needed to be made to the original Convention. This meeting concluded that there was a clear need to strengthen the international physical protection regime and recommended that a spectrum of measures be employed — including the drafting of an amendment to strengthen the Convention.

On 9 September 2001, the Director General – in response to the recommendations made by the Expert Meeting – convened an "Open-ended Group of Legal and Technical Experts to prepare a draft amendment to the Convention on the Physical Protection of Nuclear Material". In the ensuing years, Australia played an active role in negotiating the Amendments by initiating the formation of a core group of States Parties including Canada, the United States, France and the United Kingdom to develop a draft text.

It took until July 2005, for a Conference of States Parties to consider amendments that had been developed over the past several years. The Conference established a Drafting Committee of select countries (including Australia) and also elected Steve McIntosh (ANSTO) as Chairman of the Committee of the Whole. On 8 July 2005, the Conference successfully adopted by consensus an amendment to the Convention.

The Amendment to the Convention made it legally binding for States Parties to protect nuclear facilities and material in peaceful domestic use, storage and transport. It also provided for expanded cooperation between and among States regarding measures to locate and recover stolen or smuggled nuclear material, mitigate any radiological consequences of sabotage, and prevent and combat related offences. The Amendment also criminalised inter alia sabotage of nuclear facilities and trafficking and provides for greater cooperation amongst States in relation to extradition for relevant offences.

Long road to entry-into-force of the Amendment

As set out in Article 20, the Amendment would enter into force on the thirtieth day after the date on which two thirds of the States Parties had deposited their instruments of ratification, acceptance or approval with the depositary (the IAEA). The first country to deposit its instrument of ratification was Turkmenistan in September 2005. Australia was the 17th country to ratify in 2008, having completed domestic legislative requirements (see pp13-14 ASNO Annual Report 2006-07 & p34 ASNO Annual Report 2007-08).

When US President Obama delivered his Prague speech on 5 April 2009 calling for international action on nuclear security only 24 of 138 States Parties had ratified the Amendment. From the beginning of the nuclear security summit process entry-into-force of the Amendment was seen as a priority. At the 2016 Washington Nuclear Security Summit, sufficient States had completed their processes such that reaching the required two-thirds of States Parties was imminent. The Amendment entered into force on 8 May 2016.

Implementation

In Australia, the CPPNM including its amendment is given effect through the *Nuclear Non-Proliferation (Safeguards) Act 1987*, in particular through conditions imposed on holders of permits to possess nuclear material granted under the Act.

Article 14 of the Convention specifies that "Each State Party shall inform the depositary of its laws and regulations which give effect to this Convention. The depositary shall communicate such information periodically to all States Parties".

Australia informed the IAEA of its legislative arrangements for the Amendment on 14 March 2014, well ahead of the Amendment's entry-into-force.

While the Amendment sets out 12 Fundamental Principles of Physical Protection

of Nuclear Material and Nuclear Facilities for establishing a physical protection regime, it does not set out detailed standards or requirements for the protection of nuclear material and facilities. This has instead been set out in a less than treaty document, INFCIRC/225. There has long been a symbiotic relationship between the CPPNM and INFCIRC/225. Indeed, the Amendment's 12 Fundamental Principles were largely drawn from INFCIRC/225/Rev.4, while Chapter 3 of INFCIRC/225/Rev.5 is explicitly structured around the Fundamental Principles.

Australia sees INFCIRC/225/Rev.5 as vital to implementing a nuclear security regime as set out in the Amended CPPNM. Australia has long structured its regulatory requirements in line with each revision of INFCIRC/225 and in 2014 joined INFCIRC/869 in which a number of States gave a political commitment to implement the recommendations of the IAEA's Nuclear Security Series which includes INFCIRC/225/Rev.5 (NSS No. 13).

IAEA IPPAS missions use the Amended CPPNM and INFCIRC/225/Rev.5 (NSS No.13) as a basis for its examination of a State's nuclear security regime. Australia did not receive any recommendations for improvement explicitly based on the CPPNM's Fundamental Principles during its IPPAS mission in November 2013.

Looking ahead

While entry-in-force of the 2005 Amendment marks ratification by two-thirds of the 153 States Parties, the remaining third (about 50 States) which have not ratified are encouraged to give due priority to doing so and meanwhile act in accordance with the objectives and purpose of the Amendment.

Article 16 of the amended Convention provides for a conference of States Parties five years after entry-in-force of the Amendment (i.e. 8 May 2021) to review implementation of the Convention and its adequacy in the light of the prevailing situation. Given that May 2021 will be over 15 years after text of the Amendment was first adopted, it is highly likely that there will need to be serious consideration of the currency and sufficiency of the current Convention.

References:

Convention on the Physical Protection of Nuclear Material, Legal series; no. 12; IAEA; Vienna

Amendment to the Convention on the Physical Protection of Nuclear Material, IAEA IAEA International Law Series No. 2; IAEA; Vienna

The International Legal Framework for Nuclear Security, IAEA International Law Series No. 4; IAEA; Vienna

Report by the Director General, GOV/INF/2005/10-GC(49)/INF/6, 6 September 2005; IAEA; Vienna

Report 77 by the Joint Standing Committee on Treaties, The Parliament of the Commonwealth of Australia

Australian Participation in the CWC

Australia demonstrates its long-standing commitment to the Chemical Weapons Convention (CWC) through active participation in, and support of, the Organisation for the Prohibition of Chemical Weapons (OPCW) and other initiatives that advance the objectives of the CWC. This article provides recent examples of where Australians are making a contribution.

Australians Working at the OPCW

There are a number of Australians working at the OPCW such as in security/confidentiality, its inspectorate, public relations and legal divisions. Mr Peter Sawczak is the Head of Political Affairs and Protocol Branch of the OPCW and a key part of his role is to manage relationships with Member States, develop strategies and projects aimed at promoting universality and awareness of the Convention and to prepare speeches and briefing materials for the OPCW Director-General.

Australia recognises the importance of strengthening the OPCW's ability to effectively analyse environmental and biomedical samples both on-site and off-site in support of verification under the CWC. In May 2016, Mr Stuart Thomson, a scientist from Defence Science and Technology (DST) Group, took up an appointment as senior analytical

chemist at the OPCW Central Laboratory. This is the second time a DST Group chemist has provided technical support for inspection-related verification activities at the OPCW, the first appointment being Alex Theo (2011-2014).

Dr Veronica Borrett serves in her personal expert capacity on the 25-member OPCW Scientific Advisory Board (SAB) which advises the OPCW Director-General on issues related to developments in science and technology of relevance to the CWC. Dr Borrett participated in, and presented at, the OPCW/VERIFIN Workshop on "Chemical Forensics: Capabilities across the Field and the Potential Applications in CWC Implementation" held in Helsinki 20 to 22 June 2016. The workshop is one of a series intended to inform the report of the SAB on developments in science and technology to the 4th Review Conference to be held in 2018.

The OPCW also engages with universities through its internship program. In July 2016 Anna Mularski, a PhD student from Melbourne University working on antimicrobial peptides, took up an internship in the OPCW Office of Strategy and Policy with its Science Policy Adviser.

OPCW Day

In recognition of the achievements of the OPCW over the past 19 years since its inception, Australia participated in the OPCW [Foundation] Day held at its headquarters in The Hague from 2–4 May 2016. The Australian delegation was headed by HE Dr Brett Mason (Australia's Ambassador to The Hague), and included Dr Robert Floyd (Director General, ASNO), Dr Robert Mathews, Christina Bagas and Claudio Ceccato from DST Group.

This event featured theme-specific panel discussions, workshops and a dedicated exhibition area and poster sessions. The main theme was 'Chemical Safety and Security in a Technologically Evolving World'.

Australian delegation at the inaugural OPCW Foundation Day, 2–4 May 2016.

During the poster session, DST Group scientists showcased Australian initiatives to train forensic chemists in Australia and New Zealand in Chemical Weapons Agent analysis through the Chemical Warfare Agent Laboratory Network and research aimed to reduce the hazard in monitoring reactions of highly toxic chemicals using Solid Phase Micro Extraction. Both posters were well received by participants attending the event.

The Hague Ethical Guidelines and a new Global Chemists Code of Ethics

The Hague Ethical Guidelines meeting of experts.

Australia strongly supports measures, both at home and abroad, that aim to prevent the misuse of chemicals by State or non-State actors. For this reason it welcomed the development of "*The Hague Ethical Guidelines*" at a meeting of experts in September 2015. Australia was represented by Dr Mathews. Released in December 2015, *The Hague Ethical Guidelines* aims to promote a culture of

responsible conduct in the chemical sciences and to guard against the misuse of chemistry.

Having had a long-standing interest in promoting chemical ethics in support of preventing the re emergence of chemical weapons, Professor John Webb of Swinburne University of Technology, Melbourne, was one of a number of scientists from 18 countries who attended an international Workshop on this topic. Organised by the American Chemical Society and the Pacific Northwest National Laboratory in Kuala Lumpur from 4-6 April 2016, the Workshop aimed to develop a "*Chemical Code of Ethics*" to promote the peaceful uses of chemistry in accordance with Article XI of the CWC.

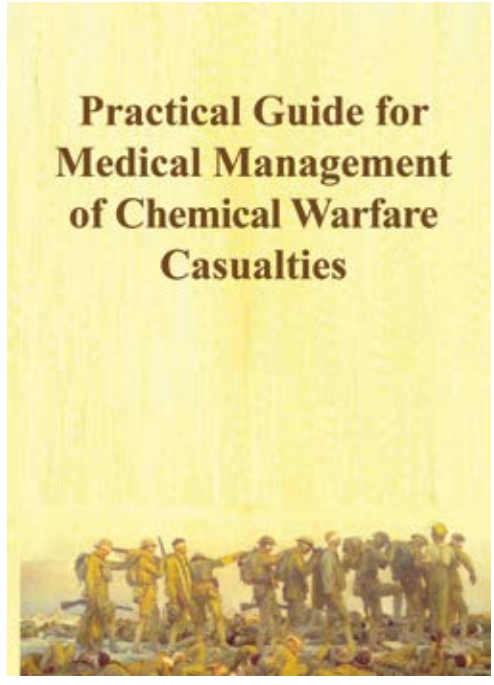
Code of Ethics Workshop, 4–6 April 2016.

Noting that a key deliverable of the Workshop was to develop a Global Chemists' Code of Ethics (GCCE), *The Hague Ethical Guidelines* was a useful basis as it identified key elements of a code providing a useful context for the GCCE. The GCCE aimed to address real-world ethical questions in the chemical industry by incorporating criteria such as safety, security and sustainability prepared for policy practitioners, industry professionals and academia. The challenge will be to implement the code globally. To this end, a Code of Conduct toolkit was also made available for participants to help promote discussion on developing or revising codes of ethics.

Practical Guide for Medical Management of Chemical Warfare Casualties

Dr Mathews (DST Group), Australian recipient of the inaugural OPCW-The Hague Award (2014), requested that the prize money for his award be used for the assistance of victims of chemical weapons. This valuable financial assistance has resulted in the recently published '*Practical Guide for Medical management of Chemical Warfare Casualties*'. This is the first guide of its type designed to assist medical practitioners in their treatment of the casualties of chemical warfare, whether accidental or deliberate.

Development of this Guide was the result of efforts of a team of internationally recognised experts in the field of medical treatment of chemical weapons injuries, brought together at the invitation of the OPCW. Dr Mathew's contribution to this team effort included authorship of one chapter and three annexes. The Guide covers useful information such as considerations for managing chemical casualties and basic concepts for medical personnel involved in the management of casualties caused by chemical weapons.



Cover of the Practical Guide for Medical Management of Chemical Warfare Casualties.

International Partnership for Nuclear Disarmament Verification

International debate on nuclear disarmament focuses on building the necessary political will for progress toward a world without nuclear weapons, and on fostering a security environment for that political will to succeed. To make headway, we also need to understand better how practical steps toward disarmament could actually work, and how the international community can have appropriate confidence in them. Agreement on instruments such as the Chemical Weapons Convention and the Comprehensive Nuclear-Test-Ban Treaty was clearly facilitated by prior technical discussions on how to verify these treaties. Likewise, the negotiation of future nuclear disarmament arrangements could be greatly aided if verification tools are available. This is the focus of the International Partnership for Nuclear Disarmament Verification (IPNDV).

IPNDV is an informal partnership of more than 25 countries, working jointly to develop technical solutions for monitoring and verification challenges across the nuclear weapons lifecycle. Research into verifying nuclear disarmament has been pursued since the 1990s by a few countries, including through bilateral cooperation. However, the IPNDV is the first international dialogue in this field among a substantial number of states, including those with and without nuclear weapons.

The detailed work of IPNDV began in November 2015 with three Working Groups established dealing with: 1) Monitoring and Verification Objectives; 2) On-Site Inspections; and 3) Technical Challenges and Solutions. A first phase of work over 2016 and 2017 is focusing on requirements for verifying the disassembly of a number of nuclear warheads, and initial storage of the dismantled components.

Australia (DG ASNO) and Poland are the co-chairs of Working Group 2 whose focus is the development of processes and procedures under which international inspectors could gain some assurance that an item presented for verification is a nuclear explosive device and then reliably track the device and its components through the disassembly process.

The tools and procedures that IPNDV is examining have to take account of the extraordinary sensitivity that surrounds nuclear weapons, to avoid exposure of information that could risk nuclear proliferation, as well as protecting national security information. Some IPNDV members with nuclear weapons are helping to lay out the specific challenges in this area and experts will work to find tools that achieve verification objectives but avoid disclosure of sensitive information.

Australian experts participate in each of IPNDV's working groups. Working Group 1 is giving focus to broader objectives of monitoring and verification activities and the confidence that these can give to states. Working Group 3 is examining technologies and equipment that could support verification, for example by testing attributes of an item under verification to check its consistency with a nuclear explosive device, but without revealing sensitive information. The design of equipment that can be trusted by both inspectors and an inspected State to give useful and accurate measurements of relevant information, but to not disclose sensitive and non-relevant information is one of the key challenges for verification involving nuclear weapons.

It is important that activities like IPNDV will examine the political and strategic needs of all states related to disarmament verification, alongside the legitimate interests of inspected states to protect sensitive information. Well-designed inspection tools and procedures can go a long way toward resolving differences, but a critical balance between inspection intrusiveness and protection of national interests will have to be struck during future negotiations on treaty instruments. IPNDV can do a lot to explore and assess options for future negotiators to consider.

IPNDV aims to promote discussion of nuclear disarmament in a way in which all nuclear weapon possessor states can participate constructively. For now, the focus of technical work is squarely on the disassembly step. Over time, IPNDV should also look at the tools and protocols needed for verification across the entire nuclear-weapon lifecycle.

IPNDV is still at the beginning of a long and complex task, but the enthusiasm of the experts and the quality of the ideas they have put forward so far suggests that we can look forward to valuable outcomes.

Twentieth Anniversary for the Comprehensive Nuclear-Test-Ban Treaty

The opening for signature of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) on 24 September 1996 was a significant achievement, and one in which Australian diplomacy played a critical role. On signing the treaty that day, US President Bill Clinton described it as the "longest sought, hardest fought prize in arms control history". The twentieth anniversary of the CTBT in 2016 is an opportunity to reflect on the history of international efforts to constrain and ultimately ban nuclear weapon testing, on what has been achieved, and on what remains to be done.

The period 1945 to 1970 was one of overt nuclear proliferation. The Soviet Union closely followed the United States into the nuclear age, conducting its first nuclear weapon test on August 29, 1949. The United States tested the first thermonuclear device in 1952, with the Soviet Union following in 1953. The UK conducted its first test in 1952, followed by France in 1960 and finally, China in 1964. Explosive testing was not just a technical requirement for the development of nuclear arsenals, but also became a form of "sabre-rattling", adding to cold-war tensions.

A first significant constraint was achieved through the 1963 Partial Test Ban Treaty, which banned nuclear explosions in the atmosphere, in outer space, and underwater, but not underground. The Parties to that treaty determined to continue negotiations toward a comprehensive ban. The continuing cold war and nuclear arms race were key influences delaying progress for a further thirty years. A further factor was the concerns that a nuclear test might be conducted in a way that would hide it from view, thereby nullifying the effectiveness of such a treaty. This led to the formation in 1976 of a Group of Scientific Experts (GSE) from different countries to conduct joint research into monitoring technologies and data analysis methods for the verification of a comprehensive test ban.

Australia was a leading supporter of a legally binding nuclear test ban regime long before negotiations for the CTBT began in 1994. Concern about nuclear testing in the South Pacific Ocean saw Australia contribute to efforts such as the GSE and build a national program to monitor nuclear tests, as well as applying diplomatic resources to ending nuclear testing. Australia played an active role in negotiations of the CTBT, helping to find some of the key solutions to enable agreement on a treaty. In 1996, Australia helped to break a deadlock in the Conference on Disarmament on the CTBT, by introducing the treaty to the UN General Assembly for its approval.

In the twenty years since 1996, Australia has worked closely with the CTBTO's Preparatory Commission to promote the CTBT, and to advance the significant task of putting in place the infrastructure that ensures the treaty can be effectively verified when it enters into force. The central component of that infrastructure is a global network of 337 International Monitoring System (IMS) stations and laboratories to detect and characterise a possible nuclear explosion anywhere on the Earth. Australia hosts the third-largest number of these facilities of any country, with all but one now in place.

Around 90% of all IMS stations are now operational meaning that CTBT Member States are already able to gain significant assurance that, with one notable exception, countries are continuing to observe a moratorium on nuclear weapons tests. The IMS has helped to make more transparent the nuclear test activities of that exception, the Democratic People's Republic of Korea (DPRK). Each of the DPRK's tests in 2006, 2009, 2013 and 2016 has been easily detected by the IMS and promptly notified to the international community. This and other experience with the IMS over the last twenty years has been a clear demonstration that the CTBT's verification regime will be, and is probably already serving as, an effective deterrent to any attempt to conduct a clandestine nuclear test explosion.

It is also encouraging that the CTBT IMS has ably demonstrated its utility in providing accurate real-time data relating to major earthquakes, tsunamis and nuclear accidents, as well as other civil scientific benefits for all States Signatories.

The technical development needed to ensure effective verification began twenty years before the CTBT was settled in 1996, and has continued for twenty years since. The science of nuclear test monitoring has seen great advances over those decades and the International Monitoring System has shown itself to be more capable than expected when the CTBT was negotiated. Even before the Treaty has entered into force, its verification system provides significant value for the international community. Of course the full value of the Treaty can only be realised with its entry into force and the availability of mechanisms such as on-site inspection.

The successful negotiation of the CTBT, and the strong international support for it its objectives and for establishment of its verification infrastructure, has done much to make nuclear test explosions in the 21st century the preserve only of rogue states, but entry into force of the Treaty remains elusive. Twenty years after it opened for signature, the CTBT has been signed by 183 countries and ratified by 164. By any measure, this represents strong support for the goals of the Treaty. However, the specific requirement that 44 named states must ratify for the Treaty to enter into force remains unfulfilled.

For more than a decade, Australia, Mexico and New Zealand have alternated as lead sponsor of the UN General Assembly resolution promoting the CTBT. Also, Australia is honoured to co-chair with Japan the six-country "Friends of the CTBT", which convenes biennially a ministerial-level meeting, alternating with the Article XIV Conference. This conference is designed to promote the CTBT entry into force, and is convened by the United Nations Secretary-General, as the depository of the Treaty. Australia is also a proud member of the 12 country Non-Proliferation and Disarmament Initiative (NPDI) and Chair of the Vienna Group of Ten through all of which we advocate CTBT Entry-Into-Force.

Australia urges all states that have not done so to sign and ratify the CTBT, in particular the remaining eight Annex 2 States. These states need to sign and ratify without delay in order to advance the mutually reinforcing goals of nuclear non-proliferation and disarmament. Pending its entry into force, Australia urges all states to refrain from any action that would defeat the object and purpose of the CTBT or undermine the global moratorium on testing it has under-written.

Australia's Uranium Production and Exports

Statistics related to Australia's exports of Uranium Ore Concentrates (UOC) are listed in Table 1 below.

Geoscience Australia estimates Australia's Reasonably Assured Resources (RAR) of uranium recoverable at costs of less than US$130 per kilogram uranium to be 1 151 000 tonnes uranium[1]. This represents around 31% of world resources in this category. In addition, Australia has an Inferred Resource (IR) of uranium recoverable at less than US$130/kg U of 704 000 tonnes, giving a combined estimate of Australia's uranium reserves of 1 706 100 tonnes uranium, or 29% of the world's uranium reserves[2].

In 2015, the Olympic Dam was the world's fourth largest (5% of world uranium production) uranium producer[3]. Overall, Australia is the third largest uranium producer after Kazakhstan and Canada[4]. In the past decade Kazakh uranium production has increased by over 500%, resulting in Kazakhstan being responsible for almost 40% of global uranium production in 2015[5].

1 From Geoscience Australia, Australia's Identified Mineral Resources 2015, August 2016, http://www.ga.gov.au/metadata-gateway/metadata/record/gcat_21a2c93c-b691-d570-e053-12a3070a9f90/Australia%27s+Identified+Mineral+Resources+2015

2 From OECD Nuclear Energy Agency and International Atomic Energy Agency in 'Uranium 2014: Resources, Production and Demand', https://www.oecd-nea.org/ndd/pubs/2014/7209-uranium-2014.pdf

3 http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/world-uranium-mining-production.aspx

4 As Australia's identified uranium reserves has not changed significantly in the last 40 years, variation in these figures over time is largely due to changes in the cost of mining moving deposits into different cost categories, and exploration and exploitation of uranium reverse internationally.

5 http://www.world-nuclear.org/information-library/country-profiles/countries-g-n/kazakhstan.aspx

Table 1: UOC Export And Nuclear Electricity Statistics[6, 7, 8]

Item	Data
UOC Exports	
Total Australian UOC exports 2015–16	8417 tonnes
Value Australian UOC exports	A$926 million
Australian exports as % world uranium requirements[6]	~10.7%
No. of reactors (GWe) these exports could power [7]	~41
Power generated by these exports	~257 TWh
Expressed as percentage of total Australian electricity production[8]	~103%

Worldwide, uranium mining provided the equivalent of 90% of the 2015 global nuclear power industry's uranium requirements.[9] The balance was met by secondary sources, such as recycled uranium and plutonium from used fuel (as mixed oxide fuel – MOX), re-enriched uranium tails, down-blending weapon grade nuclear material, civil stockpiles. While the global installed and operating capacity of nuclear power continues to steadily grow, with a net increase capacity of 9 GWe in the past year, improvements in reactor productivity and higher capacity factors continue to dampen the corresponding demand for uranium as less uranium are required per kWh output. This means that in the future, the global demand of uranium will increase more slowly than the net capacity of the global nuclear power sector. In the longer term, new technologies for recycling nuclear material and the potential use of thorium as a nuclear fuel will probably continue this trend, although all of these processes will require some uranium. Further, as more countries consider nuclear power as a means of addressing their energy deficits in an environmental aware setting, the future demand for uranium will steadily grow.

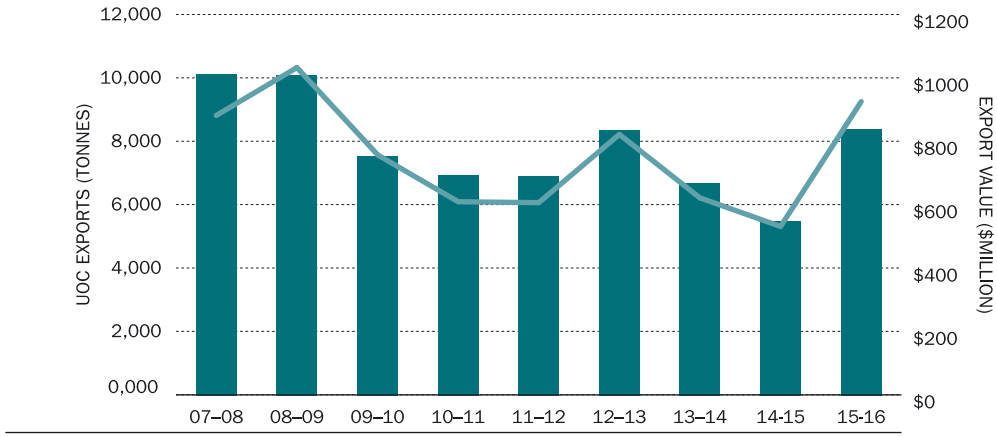
6 Based on 2015 world requirements of 78,875 tonnes UOC from the World Nuclear Association's World Nuclear Power Reactors & Uranium Requirements (1 January 2016) - http://www.world-nuclear.org/info/Facts-and-Figures/World-Nuclear-Power-Reactors-and-Uranium-Requirements/.

7 Based on a comparison of GWe of nuclear electricity capacity and uranium required, for countries eligible to use AONM from the World Nuclear Association's World Nuclear Power Reactors & Uranium Requirements (1 January 2016) - http://www.world-nuclear.org/info/Facts-and-Figures/World-Nuclear-Power-Reactors-and-Uranium-Requirements/.

8 Based on Australia's electricity generation in 2013-14 of 248 TWh from the Bureau of Resources and Energy Economics, 2015 Australian Energy Update (August 2015) - http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Pages/Australian-energy-statistics.aspx.

9 From World Nuclear Association's Uranium Markets (February 2015) - http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Uranium-Resources/Uranium-Markets/.

Figure 1: Quantity And Value Of Australian UOC Exports



	07–08	08–09	09–10	10–11	11–12	12–13	13–14	14-15	15-16
UOC Exports (tonnes)	10,140	10,114	7,555	6,950	6,917.5	8,391	6,701	5,515	8,417
Value (A$ million)	$882	$1,033	$758	$610	$607	$823	$622	$532	$926

Australia's nuclear safeguards policy

The Australian Government's uranium policy limits the export of Australian uranium to countries that are a party to the Nuclear Non-Proliferation Treaty (NPT),[10] have an Additional Protocol in force and are within Australia's network of bilateral nuclear cooperation agreements. These nuclear cooperation agreements are designed to ensure that IAEA safeguards and appropriate nuclear security are applied, as well as a number of supplementary conditions. Nuclear material subject to the provisions of an Australian nuclear cooperation agreement is known as Australian Obligated Nuclear Material (AONM). The obligations of Australia's agreements apply to uranium as it moves through the different stages of the nuclear fuel cycle, and to nuclear material generated through the use of that uranium.

All Australia's nuclear cooperation agreements contain treaty-level assurances that AONM will be used exclusively for peaceful purposes and will be covered by safeguards arrangements under each country's safeguards agreement with the IAEA.

In the case of non-nuclear-weapon states, it is a minimum requirement that IAEA safeguards apply to all existing and future nuclear material and activities in that country. In the case of nuclear-weapon states, AONM must be covered by safeguards arrangements under that country's safeguards agreement with the IAEA, and is limited to use for civil (i.e. non-military) purposes.

The principal conditions for the use of AONM set out in Australia's nuclear cooperation agreements are:

- AONM will be used only for peaceful purposes and will not be diverted to military or explosive purposes (here military purpose includes: nuclear weapons; any nuclear explosive device; military nuclear reactors; military propulsion; depleted uranium munitions, and tritium production for nuclear weapons);
- IAEA safeguards will apply;
- Australia's prior consent must be sought for transfers to third parties,

10 On 17 October 2012, the Australian Government announced that it would exempt India from its policy allowing supply of Australian uranium only to those States which are Parties to the NPT.

enrichment to 20 per cent or more in the isotope ^{235}U and reprocessing [11];

- Fall-back safeguards or contingency arrangements will apply if for any reason NPT or IAEA safeguards cease to apply in the country concerned;
- internationally agreed standards of physical security will be applied to nuclear material in the country concerned;
- detailed administrative arrangements are applied between ASNO and its counterpart organisation, setting out the procedures to apply in accounting for AONM;
- regular consultations on the operation of the agreement are undertaken; and
- provision is made for the removal of AONM in the event of a breach of the agreement.

Australia currently has 24 nuclear safeguards agreements in force, covering 42 countries plus Taiwan (see Appendix B)[12].

Accounting for Australian uranium

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

- reports from each bilateral partner
- shipping and transfer documentation
- calculations of process losses and nuclear consumption, and nuclear production
- knowledge of the fuel cycle in each country
- regular reconciliation and bilateral visits to counterparts
- regular liaison with counterpart organisations and with industry
- IAEA safeguards activities and IAEA conclusions on each country.

Australia's uranium transhipment security policy

For countries with which Australia does not have a bilateral safeguards agreement in force, but through which Australian uranium ore concentrates (UOC) are transhipped, there must be arrangements in place with such states to ensure the security of UOC during transhipment. If the state is:

- a party to the Convention on the Physical Protection of Nuclear Material (CPPNM)
- has adopted the IAEA's Additional Protocol on strengthened safeguards
- and acts in accordance with these agreements

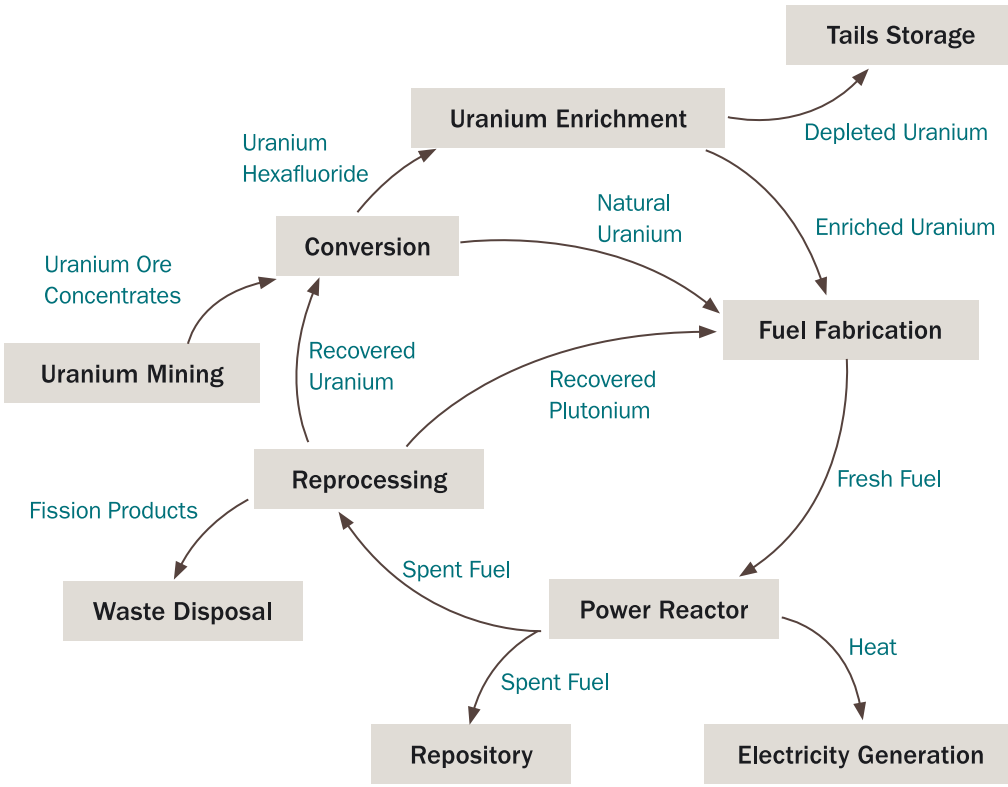
then arrangements on appropriate security can be set out in an instrument with less than treaty status . Any such arrangement of this kind would be subject to risk assessment of port security.

For states that do not meet the above requirements, treaty-level arrangements on appropriate security may instead be required.

11 Australia has given reprocessing consent on a programmatic basis to EURATOM and Japan. Separated Australian-obligated plutonium is intended for blending with uranium into mixed oxide fuel (MOX) for further use for nuclear power generation.

12 Twenty-eight of the countries making up this total are European Union member states.

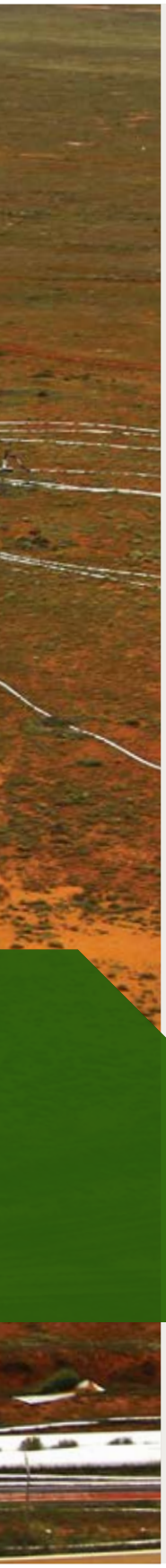
Figure 2: Civil Nuclear Fuel Cycle



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

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

OVERVIEW OF ASNO



3

SECTION

Overview of ASNO

Goal

The goal of ASNO is to enhance Australian and international security through activities which contribute to effective regimes against the proliferation of nuclear and chemical weapons.

Functions

The principal focus of ASNO's work is on international and domestic action to prevent the proliferation of nuclear and chemical weapons. Thus, ASNO's work relates directly to international and national security. ASNO performs domestic regulatory functions to ensure that Australia is in compliance with treaty commitments and that the public is protected through the application of high standards of safeguards and physical protection to nuclear materials and facilities. ASNO also works to strengthen the operation and effectiveness of relevant treaty regimes through the application of specialist knowledge to complex policy problems in technical areas, including treaty verification and compliance.

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

Nuclear Safeguards Functions

Entering into force in March, 1970, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is the cornerstone of the international nuclear non-proliferation regime and considered to be the United Nations' most successful multilateral treaty. The NPT has become almost universal, with 190 State Parties. India, Israel, Pakistan and South Sudan have never joined the NPT and DPRK (North Korea) announced its withdrawal from the NPT in 2003.

Under the NPT, non-nuclear-weapon states (NNWS) agree not to receive, manufacture or acquire nuclear weapons. The five nuclear-weapons states (NWS) agree not to transfer nuclear weapons or other nuclear explosive devices, and not in any way assist, encourage or induce an NNWS to acquire nuclear weapons.

The *Nuclear Non-Proliferation (Safeguards) Act 1987*

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

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

- the NPT;
- Australia's Comprehensive Safeguards Agreement and Additional Protocol with the IAEA;
- agreements between Australia and various countries (and Euratom) concerning transfers of nuclear items and cooperation in peaceful uses of nuclear energy;
- the Convention on the Physical Protection of Nuclear Material (CPPNM); and
- the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT).

The Safeguards Act also establishes a system for control over nuclear material and associated items in Australia through requirements for permits for their possession and transport. Communication of information

contained in sensitive nuclear technology is also controlled through the grant of authorities.

The functions of ASNO and Director General ASNO are set out in Part IV of the Safeguards Act and include:

- ensuring the effective operation of the Australian safeguards system;
- ensuring the physical protection and security of nuclear material and items in Australia;
- carrying out Australia's obligations under Australia's safeguards agreement and Additional Protocol with the IAEA carrying out Australia's obligations under Australia's nuclear cooperation agreements with other countries and Euratom;
- operating Australia's bilateral nuclear cooperation agreements and monitor compliance with the provisions of these agreements;
- undertaking, coordinating and facilitating research and development in relation to safeguards; and
- advising the Minister for Foreign Affairs on matters relating to the international nuclear non-proliferation regime and the international safeguards system.

Comprehensive Nuclear-Test-Ban Treaty Functions

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

To make the necessary preparations, a Preparatory Commission (PrepCom) was established in 1997, made up of CTBT States Signatories and supported by a Provisional Technical Secretariat. The tasks of the PrepCom include the establishment of an International Monitoring System (IMS) comprising 337 facilities around the world and an International Data Centre in Vienna. The PrepCom must also develop detailed procedures for the operation of these facilities and for the conduct of on-site inspections where concerns are raised about a possible nuclear explosion.

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

ASNO makes a strong contribution on behalf of Australia to the overall work of the PrepCom to develop the CTBT verification regime. ASNO also assists DFAT with efforts to encourage ratification of the CTBT by countries that have not yet done so.

Key CTBT functions include:

- national point of contact for liaison on CTBT implementation;
- establishing and maintaining legal, administrative and financial mechanisms to give effect to the CTBT in Australia;
- coordinating the establishment and operation of IMS facilities in Australia, and of measures to enable Australia to effectively monitor and analyse IMS and other CTBT verification data;
- contributing to the development of Treaty verification, through the PrepCom and its working groups; and
- participating in development and implementation of Australian policy relevant to the CTBT.

Comprehensive Nuclear-Test-Ban Treaty Act 1998

The *Comprehensive Nuclear-Test-Ban Treaty Act 1998* (CTBT Act) gives effect to Australia's obligations as a Party to the CTBT. It prohibits the causing of any nuclear explosion at any place within Australian jurisdiction or control and establishes a penalty of life imprisonment for an offence against this prohibition. The CTBT Act also prohibits Australian nationals from causing a nuclear explosion in any other place.

The CTBT Act requires the Australian Government to facilitate verification of

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

Article IV of the Treaty obliges States Parties to allow CTBT inspectors to inspect any place within their jurisdiction or control in an on-site inspection. The CTBT Act provides comprehensive powers for inspection arrangements, including the right for inspectors to gather information, to collect and remove samples, and to apply a range of monitoring and sensing techniques over a designated area. Access to locations by inspectors is by consent of the occupier of any premises, or by warrant issued by a magistrate.

The CTBT Act was assented to on 2 July 1998, but was not able to enter into effect, absent the entry into force of the CTBT, until amended by the *Non-Proliferation Legislation Amendment Act 2003*. On 11 June 2004, sections 3 to 9, 48 to 50, 62 to 65, 68 to 72, 74, 75 and 78; and Schedule 1 to the CTBT Act came into effect following proclamation by the Governor-General. The proclaimed provisions were to:

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

Chemical Weapons Convention Functions

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

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

Through a system of permits and notifications under the *Chemical Weapons (Prohibition) Act 1994* and the Customs (Prohibited Imports) Regulations 1956, ASNO gathers information from the chemical industry, traders, universities and research institutions to compile declarations that Australia must submit to the OPCW. ASNO has the right to conduct compliance inspections of relevant facilities in Australia, but such powers are exercised only in exceptional circumstances. ASNO conducts outreach activities, including site visits, to promote compliance and to check the accuracy of information provided by industry.

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

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

Key CWC functions are:

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

Chemical Weapons (Prohibition) Act 1994

The C*hemical Weapons (Prohibition) Act 1994* (CWP Act) was enacted on 25 February 1994. Division 1 of Part 7 of the CWP Act (establishing Australia's national authority for the CWC, 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 CWP 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 CWP Act, dealing with routine compliance inspections of Other Chemical Production Facilities, came into effect on 17 August 2000.

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

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

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

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

Other Functions

South Pacific Nuclear Free Zone Treaty

The South Pacific Nuclear Free Zone (SPNFZ) Treaty, (also known as the Treaty of Rarotonga) prohibits the manufacture, possession, stationing and testing of nuclear explosive devices, as well as research and development relating to manufacture or production of nuclear explosive devices, in any area for which the Signatory Parties are responsible. The SPNFZ Treaty also bans the dumping of radioactive waste at sea. Australia ratified the Treaty on 11 December 1986, providing the final trigger for its entry into force. The treaty has 13 full members: Australia, Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Samoa.

The SPNFZ Treaty has three protocols. Under Protocol 1 the US, UK and France, are required to apply the basic provisions of the Treaty to their respective territories in the zone established by the Treaty. Under Protocol 2, the US, France, UK, Russia and China agree not to use or threaten to use nuclear explosive devices against any party to the Treaty or to each other's' territories located within the zone. Under Protocol 3, the US, France, UK, Russia and China agree not to test nuclear explosive devices within the zone established by the Treaty. France and the UK have ratified all three protocols. Russia and China have ratified the protocols relevant to them, Protocols 2 and 3. The US is the only NWS yet to ratify the SPNFZ Treaty protocols; however, these were submitted to the US Senate on 2 May 2011 for advice and consent as part of the process prior to ratification.

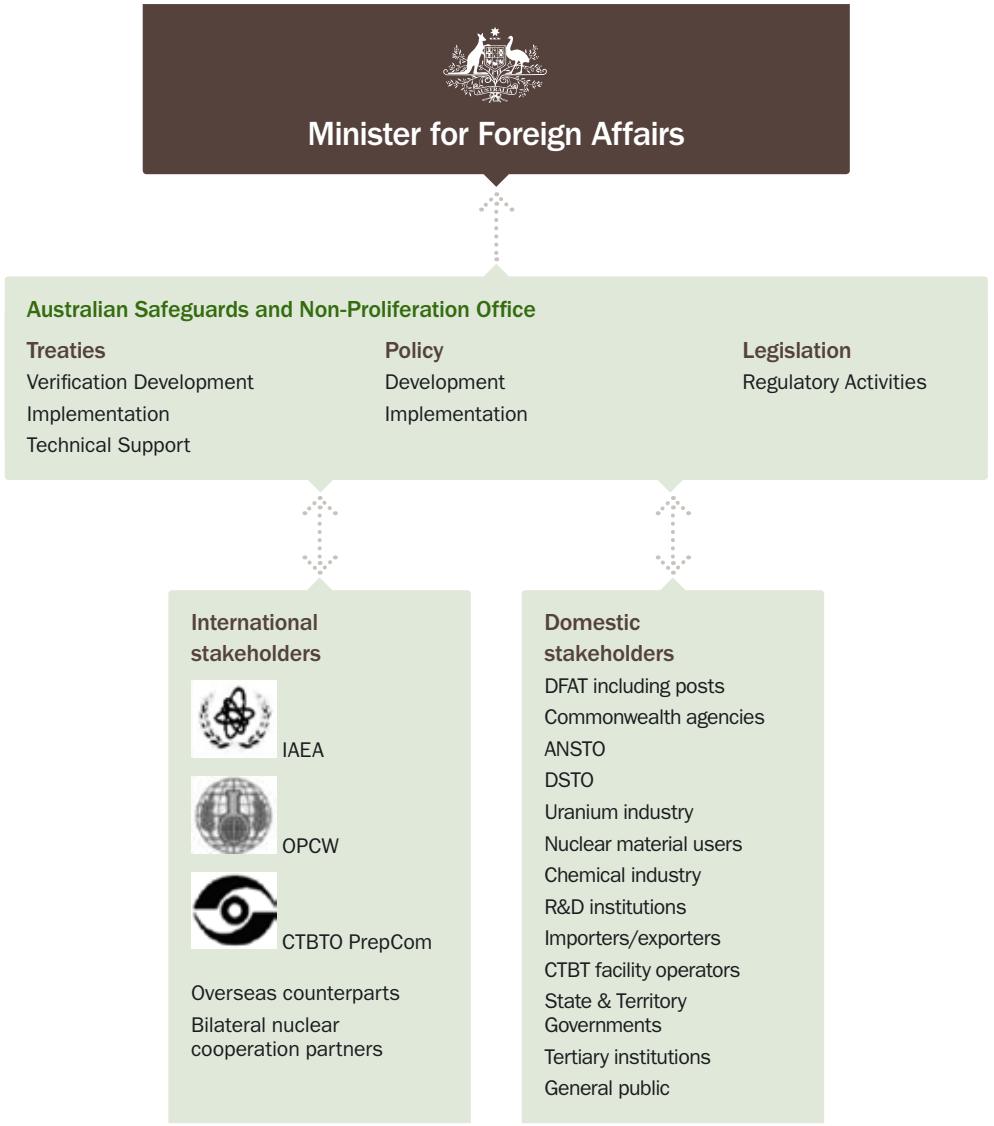
South Pacific Nuclear Free Zone Treaty Act 1986

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

An ASNO inspector holds a vial containing uranium ore concentrate.

Operating Environment

Figure 3: ASNO's Operating Environment



Outcomes and Outputs Structure

Figure 4: ASNO's Outcomes and Outputs Structure

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

PERFORMANCE

4

SECTION

Performance

Output 1.1: National Safeguards System

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

Performance Measures

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

Performance Assessment

International Obligations

Reporting Obligations under the Australia–IAEA Comprehensive Safeguards Agreement

ASNO met all of Australia's obligations during the reporting period for the submission of declarations and notifications on nuclear materials, facilities and activities, as required by Australia's safeguards agreement with the IAEA.

For each material balance area (summarised in Table 2), ASNO provided reports to the IAEA as required by the Comprehensive Safeguards Agreement (report statistics summarised in Table 3 and 4 below). These includes reports on changes to Australia's nuclear material inventory (e.g. acquisitions, transfers, imports/exports) on a monthly basis, and consolidated inventory reports on an annual basis. The high number of reports in Table 3 attributed to 'other locations' relates mostly to holdings of uranium and thorium based chemical salts held primarily by universities, and depleted uranium shielding held by industrial radiography companies. ASNO also reported on other nuclear-related activities and locations on an annual basis in declarations under the Additional Protocol (summarised in Table 7). As required, ASNO provided updates to the IAEA to design information questionnaires (DIQs) when there were changes of safeguards significance to features or systems in the facilities listed in Table 2.

Table 2: Material Balance Areas (MBAs) in Australia for IAEA safeguards purposes

Location	Material Balance Area[1] (MBA)	Associated facility name (as designated in Australia's Subsidiary Arrangements with the IAEA)
Lucas Heights	AS-A	HIFAR (Note: de-fuelled in 2007)
Lucas Heights	AS-C	Research and development laboratories
Lucas Heights	AS-D	Vault storage
Elsewhere	AS-E	Other locations in Australia (e.g. universities, industrial radiography companies, hospitals)
Elsewhere	ASE1	Other locations in Australia (e.g. universities, industrial radiography companies, hospitals)
Lucas Heights	AS-F	OPAL reactor
Lucas Heights	AS-H	Synroc Waste Immobilisation Plant[2]

(1) Material balance areas are delineations for nuclear accounting purposes as required under Australia's Comprehensive Safeguards Agreement with the IAEA.

(2) The Synroc Waste Immobilisation was designated a facility for safeguards purposes in 2014 upon the submission to the IAEA of the first design information questionnaire on this plant. As of the end of the reporting period, construction had not yet commenced.

Table 3: ASNO Reports (line entries) to the IAEA, 2010–16, by Facility

Facility	2010–11	2011–12	2012-13	2013-14	2014-15	2015-16
ANSTO research laboratories	989	1 291	1 040	990	1 242	1 134
HIFAR (de-fuelled 2007)	0	0	3	0	0	0
ANSTO vault storage	26	126	337	198	470	555
OPAL reactor	381	496	338	475	377	480
Other locations	2 940	2 879	3 310	3 777	3 680	4 688
TOTAL	**4 336**	**4 792**	**5 028**	**5 440**	**5 769**	**6 857**

Table 4: ASNO Reports (line entries) to the IAEA, 2010–16, by Data Type

Type of Data	2010–11	2011–12	2012-13	2013-14	2014-15	2015-16
Inventory Change Report	838	1 084	1 015	1 133	1 290	1 402
Physical Inventory Listing	1 541	1 551	1 694	1 856	1 942	2 188
Material Balance Report	132	143	187	154	161	167
Concise Note	1 825	2 014	2 138	2 297	2 368	3 100

Table 5 is a summary of total quantities of nuclear material by category in Australia. A small quantity (2.7 kg) of high enriched uranium is retained in Australia and used for a variety of purposes primarily due to the utility of the particular chemical, physical and isotopic characteristics. The quantity comprises several items in various locations around Australia such as ANSTO and some universities. The uses include: R&D related to nuclear non-proliferation activities; validating the commercial application of ANSTO's Synroc waste immobilisation technology; nuclear forensics for identifying illicit nuclear materials; development of detection technologies and nuclear materials chemistry work.

Table 5: Nuclear Material in Australia at 30 June 2016

Category	Quantity	Intended End-use
Source Material		
Uranium Ore Concentrates (UOC)	397 tonnes	Export for energy use pursuant to bilateral agreements
	7 tonnes	Storage
Natural Uranium (other than UOC)	4 512 kg	Research and shielding
Depleted Uranium	20 959 kg	Research and shielding
Thorium Ore Residues	59 tonnes	Storage/disposal
Thorium (other than Thorium Ore Residues)	1 912 kg	Research, industry
Special Fissionable Material		
^{235}U - low enriched	193 115 grams	Research, radioisotope production, storage
^{235}U - high enriched	2 741 grams	Research, storage
^{233}U	4 grams	Research
Plutonium (other than ^{238}Pu)	1 212 grams	Research, neutron sources

Nuclear Research and Development

ASNO ensured that all IAEA requirements were met during the reporting period with respect to reporting (under the Additional Protocol) of nuclear research and development in Australia, and ensured that any associated technology remained in exclusively peaceful use and did not contribute to any proliferation activity.

Table 6: Associated Items in Australia at 30 June 2016

Category	Quantity	Intended End-use
Associated Material		
Deuterium and heavy water	28.7 tonnes	Research, reactors
Nuclear grade graphite	83.4 tonnes	R&D and storage
Associated Equipment		
HIFAR(1)	1	Reactor
HIFAR coarse control arms (unused)	5	Reactor components
HIFAR coarse control arms (used)	14	Reactor components
HIFAR safety rods	3	Reactor components
HIFAR fuel charging and discharging machines	2	Reactor components
OPAL reactor(2)	1	Reactor
OPAL control rods	13	Reactor components
OPAL control rod drives	6	Reactor components

(1) The ANSTO Board decided to cease operation of HIFAR in January 2007. The reactor was de-fuelled in May 2007. It is awaiting decommissioning.

(2) Includes, inter alia, the reactor reflector vessel and core grid

Reporting Obligations under the Australia–IAEA Additional Protocol

Australia was the first country to sign and ratify the IAEA's Additional Protocol (AP) in 2007. The AP gives the IAEA greater access to information and locations related to nuclear fuel cycle activities, thereby allowing the IAEA to provide greater assurances on the absence of undeclared nuclear material and activities in States. ASNO prepares and provides annual declarations under a range of AP categories; as well as quarterly declarations on relevant exports. Table 7 lists the number of declarations Australia has made under each category.

Table 7: Number of Declarations Made under the Additional Protocol

Type of Declaration under Article 2.a and 2.b of the Additional Protocol	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16
2.a.i – Government funded, authorised or controlled nuclear fuel cycle-related research and development activities not involving nuclear material	-	1	2	2	2	3
2.a.ii – OPAL operational schedules	1	1	1	-	1	1
2.a.iii – General description of each building on each site, e.g. ANSTO, universities	160	158	189	175	154	156
2.a.iv – manufacturing or construction of specified nuclear related equipment	-	1	-	1	1	2
2.a.v –- Location, operational status and production capacity of uranium or thorium mines or concentration plants	4	4	4	4	4	4
2.a.vi – Information on source material that is not of a composition or purity that requires full IAEA safeguards requirements.	5	6	6	7	7	8
2.a.vii – Information on nuclear material exempted from safeguards	-	-	-	6	6	4
2.a.viii –- Information related to the further processing of intermediate or high-level waste containing plutonium	-	-	-	-	-	2
2.a.ix – Exports or imports of nuclear-related equipment listed in Annex II of the Additional Protocol	-	-	-	-	-	-
2.a.x – General 10-year plans related to nuclear fuel cycle activities	2	3	5	3	3	3
2.b.i –- Nuclear fuel cycle-related research and development activities not involving nuclear material and not funded, authorised or controlled by the Government	1	1	1	1	1	2

Safeguards Developments in Australia

The Australian Nuclear Science and Technology Organisation (ANSTO) continues to feature heavily in Australia's safeguards profile, being an operating nuclear facility with a range of nuclear research and application interests.

The ANSTO Nuclear Medicine (ANM) project includes a new nuclear medicine manufacturing facility and represents a $168.8 million investment by the Australian Government. The project which will enable Australia to help meet world demand for the most common radionuclide used in nuclear medicine, molybdenum-99. The ANM project is designed to allow Australia to secure continued supplies of nuclear medicines for the domestic market, and the ability to contribute significantly to international demand. The ANM project has recently reached a significant milestone with the first pour of high density concrete for hot cell shielding completed. The ANM plant will allow Australia to continue to produce nuclear medicine using low-enriched uranium (LEU). Compared with high-enriched uranium, LEU has a lower security and proliferation risk thus fulfilling Australia's commitment to minimise the use of HEU. A safeguards challenge that will apply to the ANM plant once operational is finding a way for the IAEA to verify the uranium content in solid waste generated from the plant. The design information questionnaire (DIQ) for the material balance area AS-C was updated and submitted to the IAEA in May 2016 to include detailed specifications required for the IAEA to explore options for measuring the solid waste.

Accompanying the ANM project is the Synroc waste immobilisation plant, which once established, will immobilise liquid waste from the ANM plant in a durable solid rock-like material. Construction of the Synroc plant is expected to commence in the second quarter of 2017. As construction has not commenced there was limited work on safeguards considerations during the reporting period. The Synroc plant will be co-located with the ANM facility to ensure the waste from radiopharmaceutical production is efficiently managed. The process is designed to enable the waste package to effectively lock up the radioactive waste (including any contained nuclear material) as it decays, significantly reducing the long-term environmental risk. When nuclear material is diluted or immobilised in such a way that it is considered practicably irrecoverable for IAEA safeguards purposes, IAEA safeguards can be terminated from the material. ASNO and ANSTO have begun discussions with the IAEA on safeguards termination criteria that would apply for the Synroc immobilisation technology.

Construction of the ANSTO Interim Waste Store (IWS) facility was completed in March 2015 and received the intermediate level solid wastes (20 vitrified canisters in a TN81 cask and 6 cemented drums in an ISO Container) from France. This waste arose from the reprocessing of HIFAR reactor (de-fuelled in 2007) that France completed over 2 years. It is intended that this waste will be managed at the ANSTO IWS until a national facility is built, at which point it will transfer to that new facility. It is intended that the new building at Lucas Heights will then be repurposed for work associated with medicine production (subject to regulatory approval).

In June 2016 Australia joined the Generation IV International Forum (GIF), a collaborative international endeavour set up to conduct research and development tasks needed to establish the feasibility and performance of generation IV nuclear energy systems. Australia joins 12 other nations and the European Union that will work together to address not only the construction and operation of the next generation of nuclear power reactors, but also to consider fuel efficiency, reduced waste production, and set stringent standards of safety and proliferation resistance. World class research capabilities and expertise at ANSTO will contribute to the GIF's goals. ASNO reported this development to the IAEA as required under the Additional Protocol.

Permits and Authorities System

ASNO continued to operate Australia's state system of accounting for and control of nuclear material in accordance with Australia's Comprehensive Safeguards Agreement with the IAEA and national legislation.

Table 8: Status of Safeguards Permits and Authorities at 30 June 2016

Permit or Authority	Current Total	Granted	Varied	Revoked	Expired
Possess nuclear material	109	9	77	4	3
Possess associated items	12	0	1	0	2
Transport nuclear material	18	2	1	1	4
Transport associated items	0	0	0	0	0
Establish a facility	2	1	0	0	0
Decommission a facility	1	0	0	0	0
Communicate information contained in associated technology	10	0	1	0	0
TOTAL	**152**	**12**	**80**	**5**	**9**

Notice of all permit changes was published in the Australia Government Gazette as required by subsection 20(1) of the *Nuclear Non-Proliferation (Safeguards) Act 1987* (Safeguards Act). Eleven permits were granted to organisations that possess or transport nuclear material and one permit was granted to establish a facility for physical and chemical testing of mineral ores for the mining industry. In the past year, 13 permits were varied at the request of the permit holder as a result of changes to organisational details and changes to approved locations. A further sixty-seven permits were varied as part of a bulk review of the permit system for industrial radiographers and universities. Four permits were revoked due to organisational restructures resulting in the companies no longer holding or transporting nuclear material. One permit was revoked due to a company ceasing operations.

In 2015-16 ASNO completed a comprehensive review of ANSTO's permits to possess nuclear material and associated items, and of the model permits for holders of small quantities of nuclear material, such as universities and industrial radiography companies. These reviews resulted in some changes to the design of permits. A change common to all permits (ANSTO and holders of small quantities) was to separate the more fundamental and higher-level permit conditions into the body of permits, with detailed implementation requirements in a separate compliance code common to all permits of the same type. Separating implementation details into a separate published code is a modern good practice for regulators as it streamlines the process of changing implementation conditions, and facilitates greater transparency of permit conditions. Another change common to all permits was to update permit conditions in relation to health and safety of ASNO and IAEA inspectors to better align with the *Work Health and Safety Act 2011*.

In the case of ANSTO, the previous permit to possess nuclear material, permit to possess associated material and permit to possess associated equipment and technology, were combined into one permit taking advantage of commonalities in safeguards and security requirements for these types of materials. Another change to ANSTO's permits was to ensure clearer connection between the permit (and compliance code) requirements and the various IAEA arrangements and guidelines, namely, the Subsidiary Arrangements (and each associated Facility Attachment) to Australia's Comprehensive Safeguards Agreement, the Additional Protocol, and the latest nuclear security guidance document, *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities*, INFCIRC/225/Rev.5. ANSTO's new combined permit was issued on 31 March 2016. ASNO is appreciative of the extensive work and constructive approach that the ANSTO safeguards and security teams applied during the permit review.

A significant change to the model permits for holders of small quantities of nuclear material (e.g. universities, industrial radiography companies, state and territory radiation safety regulators) was to establish a small number of template permits for different ranges of nuclear material holdings (rather than customising each permit to each permit holder)

and to introduce a risk-informed approach to the timeliness of reporting of transactions involving nuclear material. For example, for domestic transfers between permit holders of very small quantities of nuclear material (less than 5g of enriched uranium or plutonium, and less than 500kg of natural or depleted uranium or thorium) notifications to ASNO are no longer required at the time of the transfer, but must still be included in annual inventory and transaction reports to ASNO. This is in recognition of the security risks of these types and quantities of nuclear material being very low. By way of comparison, transport of less than 500kg of natural uranium or thorium, or 1,000kg of depleted uranium in Australia has always been exempt from the requirements under the Safeguards Act for transport permits. These quantities are also below thresholds in Nuclear Supplier Group (NSG) guidelines for exports [13]. It is important to note that the requirement on permit holders to account for and control all nuclear material inventory with appropriate levels of security and an accurate up-to-date inventory listing have not changed. It is also important to note that ASNO permit requirements relate to nuclear safeguards and security only, not radiation safety. As such, the changes in permit conditions have no bearing on other state or federal regulatory requirements related to radiation safety.

The changes to 29 permits issued to universities, research labs and some others, that were expiring at that time, were rolled out on 29 September 2015. In March and April 2016 ASNO rolled out the new model permit for radiography companies to 40 industrial radiography permit holders. There are 30-40 remaining permits that have not yet been updated that are due to expire over the next few years. ASNO plans to update these over 2016-17 in consultation with affected permit holders.

The review and re-design of the permits was done consistent with the governance and risk management policies under the Government's deregulation agenda. The new permits are designed to strike an appropriate regulatory balance between meeting current international requirements and guidelines, addressing gaps in the previous permits, streamlining and reducing some reporting requirements where warranted, and accommodating operational practices and approaches of permit holders where reasonable.

IAEA Inspections

During the reporting period the IAEA conducted inspections in accordance with standard arrangements under Australia's Comprehensive Safeguards Agreement and the Additional Protocol. Inspections were conducted at ANSTO's Lucas Heights site, Silex System Ltd laboratories, and the Olympic Dam uranium mine. Details on all inspections are provided in Table 9, and the IAEA's findings from these inspections (where available at the time of publishing this Annual Report) are listed in Appendix D. ASNO officers facilitated access for the IAEA inspectors in accordance with conditions under respective permits issued under the Safeguards Act and accompanied the Agency inspectors during all of their activities. ASNO in cooperation with the inspected agencies/organisations, ensured that all of Australia's IAEA obligations were met. The inspection objectives of the IAEA were fulfilled for all inspections, except the physical inventory verification inspection at ANSTO's research and development laboratories (material balance area AS-C), due to technical limitations with the IAEA's measurement tools for low concentrations of uranium in radioactive waste (further details below).

The IAEA inspections at ANSTO included two short notice random inspections (SNRI); each of which was accompanied by a complementary access (CA) activity under the Additional Protocol. The annual physical inventory verification (PIV) inspection covering OPAL and the Research and Development areas at ANSTO was conducted in May-June 2016. Design information verification (DIV) inspections of these two material balance areas (MBA) were conducted concurrently with the PIV.

The IAEA conducted the first SNRI at the OPAL reactor in the period in November 2015. With the standard three hours' notice, they were provided access to the ANSTO site and successfully conducted their verification activities. During this inspection and the day following, two complementary access activities

13 http://www.nuclearsuppliersgroup.org/en/guidelines

were conducted by the IAEA at ANSTO to confirm the absence of undeclared nuclear material and activities. These complementary access activities included the ANSTO Nuclear Medicine (ANM) construction site.

A further SNRI was conducted by the IAEA at the OPAL reactor in March 2016. During this SNRI the inspectors again conducted complementary access activities of other areas on the ANSTO site. The SNRI and complementary access inspections in November and March were conducted successfully and to the satisfaction of the IAEA inspectors.

The annual PIV for this period was conducted at the OPAL reactor and the Research and Development areas of ANSTO. The PIV of OPAL was successfully completed with the IAEA inspectors conducting non-destructive measurements of fresh fuel elements and target plates for molybdenum-99 production. The inspectors also conducted an inspection of active and spent fuel elements in the reactor core and spent fuel pond. During this inspection the inspectors conducted a DIV of the OPAL reactor to confirm that design features of the facility matched the design plans provided to the IAEA. Both the PIV and DIV were completed to the satisfaction of the IAEA inspectors.

The PIV of Research and Development areas followed that of the OPAL reactor. An ongoing challenge for the IAEA is how to measure the uranium content in liquid and solid waste from the molybdenum-99 production process. This is due to the technical challenges of quantifying the uranium content in radioactive waste. The uranium content in waste has been steadily building for many years (and reported regularly to the IAEA) from ANSTO's past and current molybdenum-99 production processes and now represents a significant proportion of all low-enriched uranium in that material balance area. The IAEA determined during the PIV inspection that the quantity of uranium unavailable for IAEA verification surpassed a technical threshold in 2014 in the IAEA's standard inspection criteria, meaning that the IAEA cannot meet its defined inspection goals.

This has been a regular issue on the agenda of safeguards implementation discussions between ASNO, ANSTO and the IAEA since 2012. The IAEA has recently proposed a practical solution that should allow them to meet their inspection goals without being overly disruptive to the molybdenum-99 production process. The details of this proposal are under discussion between ASNO, the IAEA and ANSTO and it is hoped that a prototype detection system can be tested and deployed in the next year or two.

A DIV inspection was conducted concurrent to the PIV inspection and included an examination of the design features of the new ANM facility. The IAEA inspectors were satisfied that the construction of the ANM facility matched the information provided as part of the design information questionnaire for the plant.

The DIV planned during the May-June PIV for AS-H (the future Synroc waste immobilisation plant), was cancelled by the IAEA inspectors as construction works had not yet commenced.

The shut-down reactor, HIFAR, is in the process of decommissioning. It was not inspected this year as it is currently on a four-year inspection cycle. The last DIV of HIFAR was conducted by the IAEA in 2015.

During the PIV inspection, the IAEA gave notice of a Complementary Access inspection at Silex Systems Ltd, which is co-located with ANSTO at the Lucas Heights Science and Technology Centre. The Silex facility (formerly material balance area AS-G) was decommissioned for safeguards purposes in 2013. The IAEA however has an ongoing right under Article 4.a.iii of the Additional Protocol to verify the decommissioned status of decommissioned facilities, which the IAEA invoked for this inspection. This is the first time in Australia that a Complementary Access has been undertaken for this purpose, as prior to 2013 there were no decommissioned facilities (the other was the former Moata reactor also decommissioned in 2013). The Agency inspectors were satisfied that the facility remained decommissioned.

The IAEA also exercised their complementary access rights by visiting the Olympic Dam uranium mine to assure the absence of undeclared nuclear material and activities. The Agency inspectors were satisfied with the operations they viewed.

IAEA and ASNO inspectors at Olympic Dam uranium mine during the CA Inspection June 2016.

Table 9: IAEA Safeguards Inspections 2015–16

Date	Facility	Material balance area(1)	Type(2)
24 November 2015	ANSTO	AS-C	Complementary Access (4.a.i)
24 November 2015	ANSTO	AS-F	Short Notice Random Inspection
25 November 2015	ANSTO	AS-F	Complementary Access (4.a.i)
10 March 2016	ANSTO	AS-C	Complementary Access (4.a.i)
10 March 2016	ANSTO	AS-F	Short Notice Random Inspection
30 May 2016	Silex Systems Ltd	AS-G	Complementary Access (4.a.i, 4.a.iii)
30 May–3 June 2016	ANSTO	AS-C AS-F AS-F AS-C	Design Information Verification Design Information Verification Physical Inventory Verification Physical Inventory Verification
6 June 2016	Olympic Dam	AS-E	Complementary Access (4.a.i)

(1) See explanation of each material balance area in Table 2

(2) Details on different types of inspections are outlined in Appendix D.

The IAEA reports the outcomes of safeguards inspections and complementary access in Australia under the Comprehensive Safeguards Agreement and the Additional Protocol (see Appendix D).

ASNO Inspections

The IAEA conducts a few inspections each year in Australia, and designated ASNO inspectors always accompany these inspections. ASNO inspectors attend to ensure that IAEA inspections are effectively facilitated, promoting successful conclusions. While the IAEA fulfils its distinct mandate by conducting structured inspections and drawing conclusions with respect to Australia's safeguards obligations, ASNO inspectors are able to make broader observations regarding processes and systems that permit holders have in place to implement permit conditions. ASNO inspectors also use these inspections as an opportunity to discuss current regulatory requirements as well as effective and efficient means of meeting these requirements.

In addition to accompanying IAEA inspections ASNO conducted one additional inspection of a permit-holder location during the reporting period, to assess permit compliance and to hold discussions on permit requirements. ASNO found no indication of unauthorised access to, or use of, nuclear materials or nuclear items during the inspections, so was satisfied permit conditions were being met.

During the reporting period, some small inventory differences were reported to the IAEA. Details are provided in Table 10. These were primarily due to re-measurement of batches at locations outside of ANSTO (e.g. universities). In particular the -0.66 kg difference in thorium was due to the re-measurement of a small number of batches prior to export. The plutonium difference of 22.13 g at ANSTO is as a result of a single item incorrectly reported in 2014 and 2015 as 22.13 g when the correct weight was approximately 22.13 µg.

Detailed descriptions on inventory differences have been provided to the IAEA for the period.

Table 10: Inventory Differences Recorded during 2015–16

Material Balance Area	Difference between Book and Physical Inventory	Comment
ANSTO research laboratories (AS-C)	-6.20 (-0.25) g enriched U-235	Re-measurement of batch weights
	-0.02 kg natural uranium	
	22.13 g plutonium	
Other locations (MBA AS-E)	-0.16 kg natural uranium	Rounding, re-measurements of batches and corrections of element of nuclear material.
	0.01 kg depleted uranium	
	-0.66 kg thorium	
Other locations (MBA ASE1)	0.02 kg depleted uranium	Rounding, re-measurements of batches and correction of element of nuclear material.

Output 1.2: Nuclear Security

Protection of Australia's nuclear facilities, nuclear material and nuclear items against unauthorised access and sabotage, including Australia's uranium supplied overseas.

Performance Measures

- Security of nuclear material, technology and facilities meets Australia's obligations under the Amended Convention on the Physical Protection of Nuclear Material (CPPNM), the International Convention for the Suppression of Acts of Nuclear Terrorism and bilateral nuclear cooperation agreements, as well as being in accordance with IAEA guidelines.
- Internationally agreed standards for the security of nuclear material are applied to all AONM.
- Proactive and professional contributions are made to the development and effective implementation of nuclear security worldwide.

Performance Assessment

International and Bilateral Obligations

ASNO's regulation of permit holders established that security arrangements at Australian nuclear facilities were in accordance with Australia's obligations under the CPPNM, its 2005 Amendment and relevant bilateral nuclear cooperation agreements, as well as being in accordance with IAEA recommendations. ASNO also met Australia's international shipment notification obligations under the CPPNM by notifying relevant parties of the transhipment of uranium ore concentrates (UOC) exported from Australia.

Exports of Australian Uranium

All Australian UOC exported overseas is transported under a transport security plan, including verifying the integrity of the containers. Container seals are checked at each port of unloading or transhipment to detect any breaches of integrity. There were no security incidents (malicious acts) involving the transport of UOC in Australia during the reporting period.

On 11 January 2016, there was a truck accident involving one container of Australian UOC in Canada. While a small amount of UOC was found on the exterior of the freight container, the Canadian Nuclear Safety Commission reported[14] that there was no radiological risk to the environment, the health and safety of the workers or the public from the incident.

Review of the transport of UOC through the Gulf of Aden

ASNO has been reviewing the prohibition on the transit of Australia origin uranium ore concentrates (UOC) through the Gulf of Aden, which was established in 2009 following the dramatic increase in the incidence of maritime piracy in that area.

As part of ASNO's review, the Inspector of Transport Security was commissioned to review the current situation with respect to maritime piracy in areas of high piracy risk and to provide advice on the current international best practice on the prevention of maritime piracy in all regions. The review confirmed that the level of pirate activity in the Gulf of Aden had decreased significantly and provided guidance for ASNO in preparing a set of requirements that would need to be met by shipping lines in order to minimise the risk of a successful

14 http://nuclearsafety.gc.ca/eng/acts-and-regulations/event-reports-for-major-nuclear-facilities/index.cfm#sec8

pirate attack. These measures were based on the document Best Management Practice Guidance[15] supported by the International Maritime Organisation. Based on the clear evidence of decreased risk of piracy, ASNO formally lifted the prohibition in December 2015. The first shipment of Australian UOC again using the Gulf of Aden was completed without incident.

Review of Surface Transport Security Requirements

Currently, UOC in Australia is transported by road and rail to either Adelaide or Darwin before export overseas. ASNO commenced a review of its surface transport security requirements for UOC by joining a UOC Transport Workshop held by the South Australia Environmental Protection Authority that was attended by federal and state authorities and by industry. The workshop aimed to discuss industry views on uranium transport with a view to improving the regulatory framework.

Nuclear Security at Lucas Heights

Subsequent to the completion of the periodic security review conducted by ASNO and ARPANSA early in 2015, ARPANSA and ASNO issued joint guidance for the conduct of licensee reviews of safety and security at the OPAL research reactor. The guidance sets out a number of safety and security factors to be reviewed which is to be then integrated into an overall assessment. The review encourages the examination of interfaces between safety and security factors.

As reported under Current Topics, ASNO revised the security and safeguards requirements at ANSTO as part of a review of all permit requirements. The new security requirements are aligned to international standards (namely IAEA Nuclear Security Series No. 13) and take into account the outcomes of the IPPAS mission and periodic security review mentioned above.

Silex Enrichment Technology

In April 2016, Silex Systems Limited reported that GE-Hitachi Nuclear Energy was looking to exit the SILEX Technology Licensee Global Laser Electric (GLE). Notwithstanding that announcement, research activities continue at the Silex Systems Limited Lucas Heights site. Silex Systems Limited continues to hold a Permit to Possess Associated Technology with ASNO. Regulatory activities are unchanged, including the securing of associated technology.

In May 2016, ASNO and the US Nuclear Regulatory Commission (NRC) concluded an update to the Administrative Security Arrangements (ASA) to the Australia-US cooperation agreement on SILEX technology. The update is the first substantive change to the ASA since it was first negotiated in 2000 and was done to incorporate changes in Australia's and USA's domestic arrangements for the protection of classified information and to recognise contemporary communications practices.

IPPAS Missions

International Physical Protection Advisory Service (IPPAS) missions comprise a team of international experts who assess a state's system of physical protection (nuclear security), compare it with international best practices, make recommendations for improvements and identify good practices. In recent years, IPPAS missions have been increasingly recognised globally as a valuable tool in improving national nuclear security regimes. Australia hosted an IPPAS mission in November 2013. During the reporting period Australia supported IPPAS missions in Canada, Norway, New Zealand and Malaysia by providing experts to these mission teams. Director NSS, ASNO was the team leader for the Malaysia IPPAS mission.

15 http://www.imo.org/en/MediaCentre/HotTopics/piracy/Documents/1339.pdf

Dr Stephan Bayer was team leader for the IAEA's IPPAS mission to Malaysia in April 2016.

AusIMM – Outreach to Industry

As part of ASNO's outreach and engagement activities, ASNO gave two presentations at the AusIMM International Uranium Conference in Adelaide on 7-8 June 2016. Director General, ASNO, delivered a keynote address on Global Nuclear Non-Proliferation Systems addressing the implications for nuclear fuel cycle activities in Australia in the wake of the South Australia Nuclear Fuel Cycle Royal Commission Report. Dr Martin Lyons also made a presentation on the safeguards and security of uranium products in Australia. The AusIMM International Uranium Conference also provided the opportunity to engage with the uranium industry and prospective uranium miners who do not yet have a formal regulatory relationship with ASNO.

Nuclear Security Summits

Foreign Minister Bishop led Australia at the fourth and final Nuclear Security Summit in Washington DC on 31 March and 1 April 2016. The Summit delivered a communiqué and five action plans covering the activities of the IAEA, United Nations, Global Initiative to Combat Nuclear Terrorism and the Global Partnership against the Spread of Weapons and Materials of Mass Destruction. Leading up to the summit, ASNO attended intersessional meetings of summit Sherpas in Kazakhstan and Sweden. A full report on the Nuclear Security Summits can be found under Current Topics.

Director General ASNO and Foreign Minister Bishop at the Washington Nuclear Security Summit.

Apex Gold

In the lead-up to the Washington Nuclear Security Summit Director General, ASNO represented Australia at a scenario based policy discussion exercise named "Apex Gold" held on 27-28 January 2016 at the United States Department of Energy's Lawrence Livermore National Laboratory in California. Ministerial level participants and other senior representatives from 37 countries and four international organizations – the United Nations, INTERPOL, the European Union, and the International Atomic Energy Agency (IAEA) focused on a fictitious international terrorist organization that illicitly acquired a quantity of highly-enriched uranium sufficient to make one nuclear weapon, triggering a transnational nuclear security crisis. The exercise was useful as preparation for a similar exercise held at the Washington Nuclear Security Summit.

Nuclear Threat Initiative - Nuclear Security Index

For the third time in succession, Australia ranked highest on the Nuclear Threat Initiative's (NTI) Nuclear Security Index [16]. Specifically, Australia ranked first for measures against the theft of nuclear material among 24 states with more than one kilogram of high-enriched uranium or separated plutonium. For the first time the NTI issued a separate score for measures against sabotage for which Australia was ranked second in the world after Finland. Australia's high score underlines its commitment to international nuclear security treaties and standards, and also derives from the use of low enriched uranium for the production of nuclear medicine.

IAEA Nuclear Security Guidance Committee and the Nuclear Security Series

Director, Nuclear Security Section attended the eighth and ninth meetings of the IAEA's Nuclear Security Guidance Committee (NSGC) held during 2-6 November 2015 and 20-23 June 2016, both held in Vienna and attended by some 50 member states. At these meetings six nuclear security series documents were approved for publication and another fourteen to progress in the publication process. The committee also made significant progress in developing recommendations-level guidance on cyber (computer) security for nuclear facilities.

In early 2016, the IAEA published a document "Nuclear Security in the Uranium Extraction Industry". ASNO had significant input into the publication of this document which has been used in IAEA workshops and training courses (see 2014-15 ASNO annual report).

16 www.ntiindex.org

Key Nuclear Security Regimes:

Convention on the Physical Protection of Nuclear Material (CPPNM):

The CPPNM is the only legally binding international instrument in the area of physical protection of nuclear material. It establishes measures related to the prevention, detection, and punishment of offences related to nuclear material. The CPPNM was amended in 2005 to make it legally binding for States Parties to protect nuclear facilities and to protect nuclear materials domestically as well as in international transport. Australia played a lead role in that revision process. The CPPNM Amendment entered into force on 8 May 2016.

International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT):

This Convention entered into force in July 2007, and requires, inter alia, all State Parties 'to make every effort to adopt appropriate measures to ensure the protection of radioactive materials'. Australia ratified the Convention on 16 March 2012.

United Nations Security Council Resolution (UNSCR) 1540:

The resolution was adopted in April 2004, establishing binding obligations on all UN member states under Chapter VII of the UN Charter to criminalise the proliferation of WMD and enforce effective measures against the proliferation of WMD, their means of delivery and related materials. In April 2011 UNSCR 1977 extended the mandate of UNSCR 1540 by 10 years until 2021.

Global Initiative to Combat Nuclear Terrorism: (GICNT):

The GICNT is a key forum for multilateral cooperation launched by the United States and Russia in 2006. Australia is a partner of the GICNT which as of 30 June 2016 has 86 partner nations and five observers (UNODC, UNICRI, IAEA, EU, and Interpol). The principles of the GICNT aim to encourage international cooperation and commitment to securing nuclear materials while improving enforcement and interdiction mechanisms to counter terrorists procuring or using radioactive or nuclear materials.

Output 1.3: Bilateral Safeguards

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

Performance Measures

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

Performance Assessment

Australian Obligated Nuclear Material

On the basis of reports from bilateral treaty partners, other information and analysis, ASNO concluded that all AONM is satisfactorily accounted for. Details are provided in Table 11. Based on ASNO's analysis of reports and other information from counterparts on AONM located overseas, ASNO concludes that no AONM was used for non-peaceful purposes in 2015.

Table 11: Summary Of Net Accumulated AONM By Category, Quantity And Location At 31 December 2015(1)

Category	Location	Tonnes(2)
Depleted Uranium	Canada, China, European Union, Japan, Republic of Korea, Russia, United States,	123 068
Natural Uranium	Canada, China, European Union, Japan, Republic of Korea, Taiwan, United States	26 400
Uranium in Enrichment Plants	European Union, Japan, United States	25 574
Low Enriched Uranium(3)	Canada, China, European Union, Japan, Mexico, Republic of Korea, Switzerland, Taiwan, United States	17 329
Irradiated Plutonium(4)	Canada, China, European Union, Japan, Mexico, Republic of Korea, Switzerland, Taiwan, United States	175
Separated Plutonium(5)	European Union, Japan	1.6
TOTAL		192 548

(1) Figures are based on yearly reports to ASNO in accordance with Australia's bilateral agreements and other information held by ASNO.

(2) All quantities are given as tonnes weight of the element uranium, plutonium or thorium. The isotope weight of ^{235}U is 0.711% of the element weight for natural uranium and from 1 to 5% for low enriched uranium.

(3) An estimated 80–90% of Australian obligated low enriched uranium is in the form of spent reactor fuel.

(4) Almost all Australian-obligated plutonium is irradiated, i.e. contained in irradiated power reactor fuel or plutonium reloaded in a power reactor following reprocessing.

(5) Separated plutonium is plutonium recovered from reprocessing, before return to reactors for re-use in reactors for further power generation. This plutonium is used for reactor fuel after being mixed with uranium—termed mixed oxide (MOX) fuel. A significant proportion of Australian obligated separated plutonium is stored as MOX. Separated plutonium holdings fluctuate as plutonium is fabricated as MOX fuel and returned to reactors. On return to reactors the plutonium returns to the "irradiated plutonium" category.

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

Table 12: Supply Of Australian Uranium By Region During 2015

Region	Tonnes UOC (U_3O_8)	% of Total
Asia	560.0	8.0
Europe	885.7	12.7
North America	5 523.4	79.3
TOTAL	6 969.2	100.0

Table 13: Summary Of AONM Transfers During 2015[1]

	Destination	U (tonnes)
Conversion	Canada	1 203
	China	475
	European Union[2]	753
	United States[3]	2 962
Enrichment	European Union	3 507
Fuel Fabrication	Republic of Korea	161
	Japan	7
	United States	141
	European Union	6

(1) Figures are for transfers completed between jurisdictions from 1 January to 31 December 2015. Figures do not include transfers of AONM made within the fuel cycle of a state (or of Euratom), return of heels (residual UF6 remaining in cylinders after emptying), or damaged product.

(2) Includes transfers from Cameco Corp (Blind River, Canada) to Springfields Fuels, Ltd (United Kingdom).

(3) Includes transfers from Cameco Corp (Blind River, Canada) to Uranium One (USA).

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

Bilateral Agreements

Reporting

Reports from ASNO's counterpart organisations were received in a timely fashion and in the agreed format, which enabled analysis and reconciliation with ASNO's records. Figures provided in Table 12 and Table 13 are based on ASNO's analysis of all available information at the time of publication.

Australia-India Nuclear Cooperation Agreement

On 13 November 2015 the Australia-India Nuclear Cooperation Agreement (signed 5 September 2014) entered into force. The Agreement also became operational the same day with the signing of the Administrative Arrangement consistent with Australia's requirements for robust safeguards and accountability.

The Joint Standing Committee on Treaties (JSCOT), which tabled its report on the Agreement on 8 September 2015, recommended binding treaty action be taken subject to recommendations addressing nuclear non-proliferation and nuclear safety. The Government tabled its response to JSCOT's report on 11 November 2015.

Australia-United Arab Emirates Nuclear Cooperation Agreement

Following entry into force of the Australia-UAE Nuclear Cooperation Agreement on 14 April 2014, ASNO has been negotiating with the UAE on the Administrative Arrangement under the Agreement. The arrangement which is consistent with Australia's requirements for robust safeguards and accountancy was signed in November 2015, and as a result exports of Australia to the UAE can commence.

Ambassador Hamad Alkaabi, UAE Permanent Representative to the IAEA and DG ASNO Dr Rob Floyd signing the Australia-UAE Administrative Arrangement.

Australia-Ukraine Nuclear Cooperation

In December 2014, then Prime Minister Abbott and Ukrainian President Poroshenko discussed the possibility of Australian uranium supply to Ukraine. Text of the nuclear cooperation agreement required before Australian uranium can be used in civilian nuclear power generation in Ukraine was agreed during one round of negotiations held in Kyiv in October 2015.

While in Kyiv, Assistant Secretary ASNO Dr John Kalish and then Australian Ambassador Trappett led a delegation to the Chernobyl Exclusion Zone which houses the site of the 1986 Chernobyl Reactor 4 nuclear disaster. Due to the extensive decontamination work undertaken within the zone, ASNO staff were able to safely view Reactor 4 and tour the engineering site of the new containment structure expected to be completed and moved into place during 2017.

Australia contributed to this effort with a €1 million contribution to the Chernobyl Shelter Fund in 2012. ASNO staff also visited the nearby abandoned city of Pripyat which was hauntingly beautiful in its autumn colours.

The Agreement was signed on 31 March 2016 by Foreign Minister Bishop and Ukrainian Energy and Coal Industry Minister, Mr Volodymyr Demchyshyn in the margins of the Nuclear Security Summit in Washington.

Once the Agreement has been considered by JSCOT and enters into force, and the Administrative Arrangement has been agreed, the Agreement will allow for exports of Australian uranium to Ukraine, the last of the top 10 nuclear power generating countries in the world to sign an Agreement with Australia.

Multilateral Meeting on Nuclear Cooperation Agreements

In January 2016, ASNO hosted a meeting between Canada, Euratom, Japan and the US on bilateral nuclear cooperation agreements. This was the second time Australia had hosted the annual meeting since it was first held in 2008. This was the first meeting that also included a highly successful session inviting domestic uranium mines to facilitate interaction between domestic industry and its international regulators.

Looking through the Chernobyl Nuclear Power Plant Shelter, still under construction to Reactor 4 which was destroyed in the 1986 accident.

AS ASNO Dr John Kalish and then Australia Ambassador to the Ukraine, Doug Trappett led an Australian delegation on a visit to the Chernobyl Exclusion Zone, to view the Chernobyl Nuclear Power Plant, the nearly completed Chernobyl Nuclear Power Plant Shelter and the 'ghost town' of Pripyat.

Output 1.4: International Safeguards and Non-Proliferation

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

Performance Measures

- Contribute to the strengthening of international safeguards in ways that advance Australia's interests.
- Contribute to policy development and diplomatic activity by the Department of Foreign Affairs and Trade (DFAT).
- Contribute to the IAEA's Standing Advisory Group on Safeguards Implementation (SAGSI).
- Manage the Australian Safeguards Support Program (ASSP).
- Cooperate with counterparts in other countries in the strengthening of international safeguards and improvement of domestic safeguards implementation.
- Provide advice and assistance to the Australian Intelligence Community in support of national and international non-proliferation efforts.
- Manage ASNO's international outreach program.
- Assess developments in nuclear technology.

Performance Assessment

Strengthening International Safeguards

During the reporting period, ASNO continued to take an active role in the review, development and effective implementation of international safeguards, through engagement with the IAEA at management levels and operational levels; as well as through other international fora covering safeguards. This engagement enables ASNO to cultivate and maintain specialist knowledge on developments and emerging issues in safeguards. This effort in maintaining specialist knowledge supports ASNO's monitoring and administration of Australia's various bilateral nuclear cooperation agreements, and supports policy advice to Government on developments in IAEA safeguards and other international non-proliferation issues.

ASNO's engagement on safeguards issues included the IAEA Director General's Standing Advisory Group on Safeguards Implementation (SAGSI), technical meetings on IAEA safeguards projects, and various conferences and workshops. ASNO joined the Australian delegation to the IAEA Board of Governors and General Conference meetings in September 2015. At the General Conference ASNO contributed actively to the negotiations of the Safeguards Resolution ("*Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards*") to the successful outcome of a resolution agreed by consensus.

ASNO assesses that the IAEA safeguards system continues to effectively fulfil its objective of verifying that states uphold their respective non-proliferation commitments. As with any complex multi-faceted compliance system there are some on-going challenges with safeguards implementation that the IAEA and Member States continue to work on improving. Ensuring that State Systems of Accountancy and Control (SSAC) are effective in meeting each State's obligations is an ongoing focus. Given safeguards are

fundamentally about maintaining international confidence of the compliance of States with non-proliferation commitments, there is an important role both individually and collectively for States to assist each other in raising awareness and promoting better practice. The IAEA continues to work directly with individual states to address specific issues, but it is also expanding its set of public guidance materials (such as the safeguards implementation practices described on page 73 for states and doing outreach and awareness-raising through international workshops and meetings.

To the extent possible within budget constraints, ASNO continues to support these important efforts by working with the IAEA and with regional and international counterparts, principally the Asia-Pacific Safeguards Network (APSN). ASNO also contributes to these efforts through Director General ASNO's chairmanship of SAGSI, the involvement of other ASNO staff in technical review committees for detailed guidelines on safeguards implementation practices, and giving papers on safeguards implementation at international conferences and workshops.

Australia is a participant country of the International Framework for Nuclear Energy Cooperation (IFNEC). IFNEC is a forum for cooperation on the use of nuclear energy for peaceful purposes that is efficient, safe and secure and does not aid proliferation. IFNEC currently has 34 participant countries, 31 observer countries and four observer organisations (IAEA, the Generation IV International Forum, Euratom, and the OECD's Nuclear Energy Agency). IFNEC was formed in June 2010 as a successor to the Global Nuclear Energy Partnership (GNEP). The evolution from GNEP to IFNEC has put greater focus on promoting non-proliferation and nuclear security and safety objectives.

Since 2007, Australia has been represented at IFNEC by Director General ASNO or Assistant Secretary ASNO. Australia was represented by Director General ASNO at the Executive Committee Meeting in Sinaia, Romania, October 2015, and by Assistant Secretary ASNO at the joint IFNEC/NEA (Nuclear Energy Agency) Nuclear Finance Conference, Paris, France, May 2016. ASNO works closely with participant countries to ensure that IFNEC serves Australia's policy objectives of ensuring that countries that choose to pursue nuclear energy do so with the highest standards of safety, security and non-proliferation.

Contribution to DFAT policy development

ASNO has provided key contributions to policy developments and diplomatic activities by providing analysis and advice on safeguards and non-proliferation issues. ASNO works closely with the Australian Mission in Vienna, particularly with the Ambassador in the role of Australian Governor on the IAEA Board of Governors. ASNO plays an important role in providing the Mission with specialist advice on multilateral and country-specific issues, equipping it to advance Australia's interests in maintaining strong non-proliferation and safeguards architecture. ASNO also provides advice on IAEA reports and current safeguards issues such as Iran and the DPRK.

IAEA Standing Advisory Group on Safeguards Implementation

DG ASNO chairs the IAEA Director General's Standing Advisory Group on Safeguards Implementation (SAGSI). Dr Floyd's appointment started with the 77th series of SAGSI meetings in 2013 and has been reappointed till the end of 2018. SAGSI provides recommendations to the IAEA Director General on vital safeguards implementation issues. The Group currently comprises 18 international experts from several Member States [17]. The members serve on the group in a personal capacity and not as representatives of their government or organisation. Each expert is invited to serve a three-year term, with the possibility of renewal. The Secretariat of SAGSI includes the IAEA Deputy Director General for Safeguards, and the Director, Division of Concepts and Planning.

SAGSI has two series of meetings each year, with each series usually comprising a working group meeting and a plenary meeting. During each series of meetings, SAGSI examines and provides advice on a list of safeguards

17 Algeria, Argentina, Australia, Brazil, Canada, China, Cuba, France, Germany, India, Japan, Malaysia, Republic of Korea, Russia, South Africa, Ukraine, USA and UK

implementation topics set by the IAEA Director General. One of the core topics examined over 2015-16 was the State Level Concept (SLC) including safeguards implementation aspects, designing safeguards approaches and acquisition path analysis. Core topics also examined included safeguards strategic planning and management, safeguards evaluation and reporting and safeguards infrastructure.

Dr Floyd was saddened by the passing of his friend and colleague Mr Bill McCarthy, Safeguards Officer at the UK's Office for Nuclear Regulation, and formerly Head, Nuclear Non-Proliferation at the Department of Energy and Climate Change. Mr McCarthy was a much respected and distinguished member of SAGSI for several years who worked tirelessly on enhancing the efficiency and effectiveness of international safeguards. He was one of the UK's leading and most prominent nuclear safeguards experts and made significant contributions to the field over many years.

Australian Safeguards Support Program

2015 marked 35 years of Australia's participation in the Member State Support Programmes for IAEA Safeguards. The program was established in 1977 to assist the IAEA in developing the concepts, equipment and procedures needed to meet evolving safeguards challenges in a cost-effective way. There are currently 21 member state support programs, covering some 270 projects that assist the IAEA in safeguards research and development. In Australia, work is formally undertaken through the Australian Safeguards Support Program (ASSP), which is managed by ASNO. The Australian program comprises collaborative work with ASNO, ASNO's counterparts and expert groups on a number of safeguards projects agreed with the IAEA. Active projects are outlined below.

Dr Everton accepting the 35 year IAEA acknowledgement certificate for the Australian Safeguards Support Program.

Member State Support Programme Coordinators' Meeting March 2016 in Vienna.

Safeguards Approaches

Topical Guidance on Safeguards Implementation: the IAEA assists member states by publishing guidance aimed at enhancing understanding of the safeguards obligations of both States and the IAEA and at improving their cooperation in safeguards implementation. A variety of safeguards approaches are implemented globally, owing to differences in size and complexity of States' nuclear programmes and their regulatory framework. For that reason the IAEA have developed four Safeguards Implementation Practices (SIP) Guides to assist developing States by sharing experiences and good practices as well as the lessons learned by both States and the IAEA, acquired over the many decades of safeguards implementation. The SIP Guides provide information which States may find useful in implementing their safeguards agreements with the IAEA.

ASNO has contributed to the drafting and reviewing of SIP guides as a member of the group tasked by the IAEA with completing the documents. Dr Craig Everton and Dr Martin Lyons are the Australian representatives on the IAEA SIP team. Both Guides they contributed to have now been published, 'Establishing and

Maintaining a State System of Accounting and Control' and Provision of Information to the IAEA. The two other SIP Guides are 'Facilitating IAEA Verification Activities' and 'Collaborative Approaches to Safeguards Implementation'.

The SIP project has now reached the second stage with the development of outreach material and planning workshops. ASNO is contributing to resource material in the form of presentations, exercises and training modules to be used in a series of training events. The workshops will gather together safeguard practitioners to work through exercises and share expertise to solve safeguards problems. They also provide important opportunities for interaction between IAEA experts and state safeguards practitioners from nations with various sized nuclear industries. The result is the creation of a lasting network of peers for future reference and assistance.

The IAEA hosted the first ever Safeguards Implementation Practices Workshop for Practitioners in Vienna, 16-18 February 2016. The 26 participants were safeguards practitioners from countries where IAEA verification was expected to pick up in the near future as more nuclear facilities and material come under IAEA safeguards. Several regional partners participated as well as nations receiving, or planning to receive, Australian uranium under Australia's network of bilateral nuclear cooperation agreements. The workshop focused on the activities undertaken by States to establish and maintain the administrative infrastructure needed to implement IAEA safeguards effectively, including sound legal and regulatory framework and an independent and sufficiently resourced State safeguards authority.

ASNO contributed learning material in the form of presentations and exercises. Along with colleagues from the Czech Republic, Finland, Sweden and the United States, Dr Lyons served as a facilitator during the workshop. He delivered a presentation on establishing and maintaining a quality management system suitable for nuclear regulators.

ASNO participated in the first ever Safeguards Implementation Practices Workshop for Practitioners in Vienna 16-18 February 2016.

Information Management Tasks

ANSTO's support to the IAEA in the area of elemental impurity analysis for safeguards purposes is ongoing. ANSTO's expertise in this area lies in analysing and understanding trace element behaviour of uranium products during processing. Such forensic analysis of trace element behaviour allows the unique signature of uranium samples to be exploited and consequently, their origins identified.

Over the past year, ANSTO has collaborated with Flinders University on a neutron activation analysis (NAA) research project. The project assessed NAA for the measurement of trace elements, particularly the rare earth elements, in uranium ore and uranium ore concentrate samples.

Analytical Services Tasks

As part of the IAEA safeguards system for verifying that nuclear material remains used solely for peaceful purposes, samples are taken by IAEA inspectors during site inspections. Samples can be nuclear material samples taken from various points of the nuclear fuel cycle or they can be environmental samples taken by swiping various surfaces with cloth swipes. Sample analysis is a powerful part of the IAEA safeguards toolkit enabling it to determine details about the history of nuclear material use in a location.

The IAEA laboratories work with a wider Network of Analytical Laboratories (NWAL) to screen and analyse samples. The IAEA's Environmental Sample Laboratory located at Seibersdorf, Austria receives and screens all swipe samples but then shares the analytical workload with its NWAL partners—an additional 20 laboratories located in nine different IAEA Member States. In 2015, the Agency collected 644 nuclear material samples and five heavy water samples. It also collected 323 environmental samples, including 274 swipe samples and 49 other samples.

UWA's Centre for Microscopy participated at the IAEA Technical Meeting for Particle Analysis of Environmental samples for Safeguards purposes, November 2015 in Vienna.

Since joining the IAEA's analysis network in 2012, the University of Western Australia's Centre for Microscopy, Characterisation and Analysis has now surpassed analysis of 70 samples, which equates to 5 percent of the environmental samples analysed globally. The Centre provides an extensive range of microscopy and microanalysis instrumentation, and offers a wide variety of sample preparation techniques. The Centre participated in the biennial IAEA Technical Meeting for Particle Analysis of Environmental samples for Safeguards purposes, November 2015 in Vienna. Additionally, the Centre is one of only 5 laboratories around the world that is accredited by the IAEA to use large geometry secondary ion mass spectrometry (LG-SIMS) for quantifying trace amounts of radioisotopes. In 2015–16, the Centre analysed 20 LG-SIMS samples, or 5 per cent of the global share requested by the IAEA during the year.

ANSTO continued to build experience in 2015–16 operating their new analysis facilities. These facilities were commissioned in the previous two years and comprise a Vega one megavolt accelerator mass spectrometry system and a new clean laboratory. Compared to the earlier system based on the Antares accelerator, the Vega system consistently delivers a factor of 100 improvement in sensitivity for minor actinides, a factor of 5 improvement in efficiency, and fully automated operation. The clean laboratory is used for sample processing and is co-located with the accelerator laboratories.

ANSTO analysed five samples for the IAEA during the 2015–16 year. However, since January 2016, ANSTO has not accepted any IAEA samples for analysis due to a small amount of contamination entering the analysis system and procedural issues. During the year, ANSTO continued outreach activities regarding their analytical services capability. At the MSSP Coordinators' Meeting held 8-11 March 2016 in Vienna, Ms Elizabeth Keegan from ANSTO delivered a presentation on Australia's 14 years of contributions to the NWAL.

Equipment Development Tasks

Over the last few years, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) has worked with the IAEA to further develop CSIRO's Zebedee 3D handheld mapping tool for use in safeguards verification activities. The work was part of the IAEA's broader 'Future Horizon' program to identify and develop cutting-edge techniques and methods that could be of direct benefit to the work of safeguards, or readily adapted for safeguards implantation. It was determined that the Zebedee was sufficiently mature to be directly procured by the IAEA and deployed without specific customisations. Through support of the ASSP, the CSIRO-IAEA partnership has proven the Zebedee tool as a breakthrough technology in the area of 3D scanning by the IAEA.

Use of the Zebedee tool to construct an image of a mine elevator and engine room. Images courtesy of the Czech Republic State Office for Nuclear Safety.

During 2015-16, Zebedee was used by IAEA inspectors in several countries in support of design information verification (DIV) inspections, physical inventory verification (PIV) inspections, and training activities. Applications of the 3D handheld laser mapping tool include the development of facility floor plans and calculating material volumes. The IAEA is interested in testing and customizing Zebedee for several new applications.

Proliferation Analysis Workshop

The ninth Proliferation Analysis Workshop was conducted in May-June 2016 in Vienna. The workshop participants were drawn from various divisions of the IAEA Safeguards Department. An analyst from the Office of National Assessments and an analyst from Project Alpha at King's College London led the workshop. ASNO funded the Project Alpha analyst's travel and accommodation. The focus of the workshop was proliferation analysis in a safeguards environment. Participants explored not just analytical tools, but also the techniques for combining information form disparate sources to provide an overall picture of proliferation risk. The IAEA considers that these workshops enhance the participants' analytical knowledge and skills so they can obtain a comprehensive perspective on safeguards-related issues.

Cooperation with other States Parties

ASNO has close and long-standing relationships with nuclear safeguards and security agencies and practitioners in several countries with current or planned nuclear fuel cycle activities in and outside the region. During the reporting period ASNO actively worked to maintain and reinforce these relationships through both high-level and operational-level discussions and also through projects under the Asia-Pacific Safeguards Network.

ASNO staff presented papers at the 8th INMM/ESARDA Joint Workshop October 2015 (Institute of Nuclear Materials Management and European Safeguards Research and Development Association) held at Wyoming, USA. ASNO's papers were aimed at contributing to and influencing the concepts underpinning accountability and transparency which are essential elements of public confidence.

8th INMM/ESARDA Joint Workshop October 2015 in Wyoming, USA. (Image: INMM/ESARDA).

International Outreach

ASNO maintains its international outreach activities to assist countries in the region with the fulfilment of their non-proliferation safeguards and physical protection obligations. A key initiative was cooperating with IAEA staff and specialists from Euratom and the United States to support a practitioners' workshop on safeguards implementation practices in February 2016 (see description of the Australian Safeguards Support Programme project above). The workshop focused on establishing and maintaining State safeguards infrastructure, and targeted IAEA member States developing their regulatory structure. The workshop was supported by a recently published Safeguards Implementation Practices (SIP) Guide on the same topic. The IAEA's SIP program will continue in FY2016/17 with the publication of another Guide and additional practitioners' workshops. ASNO will continue its close cooperation with the IAEA on this programme and participate in the upcoming workshops.

ASNO continued to contribute to ongoing efforts to improve and strengthen the non-proliferation regime in the Asia-Pacific region by its participation in the Asia-Pacific Safeguards Network (APSN). The objective of APSN, established in 2009, is to improve the quality, effectiveness and efficiency of safeguards implementation in the Asia-Pacific region, which has provided ASNO with an opportunity to enhance its cooperation and build regulatory relationships in areas such as training, professional development and the sharing of experiences.

The 6th annual meeting of APSN was held 9-13 November 2015 in Tokyo, Japan. The meeting was hosted by the Japanese Ministry of Foreign Affairs and sponsored by Nuclear Regulation Authority (NRA). The meeting was attended by 42 representatives from 13 countries, including representatives from the IAEA and the UK-based organisation, VERTIC (Verification Research, Training and Information Centre) as observers. Australia coordinates the safeguards infrastructure, implementation and awareness-raising working group (Working Group 1 of APSN) where experiences were collected from regulators in the region for use in a Safeguards Implementation Practices Guide. Australia facilitated the involvement of a representative of VERTIC as an observer to promote their safeguards implementation database for potential cooperation with member states.

Asia-Pacific Safeguards Network 6th Annual Meeting 9-13 November 2015 in Tokyo, Japan. (Images: APSN)

Output 1.5: CWC Implementation

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

Performance Measures

- Australia's obligations under the CWC are met.
- Effective regulation of CWC-related activities in Australia, involving the chemical industry, research and trade.
- Contribute to strengthening CWC verification and implementation, including through cooperation with the Organisation for the Prohibition of Chemical Weapons (OPCW) and with CWC States Parties.
- Contribute to enhancing regional CWC implementation through targeted outreach.

Performance Assessment

Meeting CWC Obligations

ASNO maintained Australia's strong record of performance in meeting its CWC obligations. Comprehensive and timely annual declarations and notifications were provided to the OPCW as follows:

- Article VI declaration of imports and exports of CWC-Scheduled chemicals and of past activities at 39 facilities with CWC-relevant chemical production, processing or consumption activities during 2015 (declared in March 2016 and amended in June 2016);
- Article VI declaration of anticipated activities at nine CWC-Scheduled chemical facilities during 2016 (declared in September and October 2015);
- Article X, paragraph 4, declaration of Australia's national programs for protection against chemical weapons (declared in April 2016);
- responses to OPCW Third Person Notes including routine clarification of the operational status of chemical plants; and
- routine responses to OPCW notifications and amendments/corrections to inspector details and deletions or additions to the OPCW inspectorate.

Since 1997, the OPCW has conducted 49 Article VI routine inspections at declared chemical plants and a defence protective purposes laboratory in Australia in accordance with the provisions of the CWC. In the current reporting period, ASNO has facilitated two routine OPCW inspections, conducted sequentially, at declared 'Other Chemical Production Facilities' (OCPFs) located in Queensland. Both inspections proceeded smoothly and received excellent support and cooperation from government and industry, respectively. The OPCW inspection team verified Australia's declarations as well as the absence of undeclared CWC-Schedule 1 chemical production, in accordance with the inspection mandates.

ASNO and OPCW inspectors with industry site representatives during routine OPCW inspections in April 2016 at declared chemical plant sites in Queensland.

Reporting by facility and import permit holders in accordance with their statutory obligations using ASNO's secure online portal was critical in assisting ASNO in preparing Australia's declaration of past and anticipated chemical activities to the OPCW. There were several upgrades to the SharePoint database and online portal during the reporting period which incorporated a range of enhancements to improve the user experience.

ASNO continued to provide substantial technical support and guidance to stakeholders in using the online reporting system. Over the coming year ASNO will work constructively with the Information Management and Technology Division to address any issues with the current SharePoint system, as well as to redevelop the database and online portal in a new platform which aims to deliver substantial enhancements.

Legislation and Regulation

The permit systems under the *Chemical Weapons (Prohibition) Act 1994* (CWP Act) and Regulation 5J of the Customs (Prohibited Imports) Regulations 1956, continued to operate well. Of the 61 permits issued in 2015-16 for importers of Schedule 2 and 3 chemicals, two of these were issued to new importers. Table 14 provides statistics for facility permits issued during the reporting period (1 July 2015 to 30 June 2016).

Table 14: Permits for CWC-Scheduled Chemical Facilities

CWC-Scheduled Chemicals	CWP Act 1994	Permit Type	Permits at 30 June 2016(1)	New Permits 2015-16	Re-Issued Permits 2015-16	Permits Cancelled(2) 2014-15
Schedule 1	s19(4)	Production (Protective)	1	1	0	1
	s19(5)	Production (Research)	8	0	3	1
	s19(6)	Consumption	11	1	5	0
Schedule 2	s18(1)	Processing	9	1	3	2
Schedule 3	s18(1)	Production	3	0	0	0

(1) Permit numbers include new, existing and renewed permits.

(2) Permits were cancelled due to company mergers and site relocations.

Cooperation with the OPCW and CWC States Parties

ASNO continued to provide technical advice and contributed to policy development in preparation for OPCW Executive Council (EC) meetings, industry cluster meetings and informal consultations in The Hague. ASNO provided briefing on the following issues:

- guidance for declaring mixtures of discrete organic chemicals (DOCs);
- production of DOCs by synthesis – biochemical and biologically mediated processes;
- possible exemptions of DOC facilities from declaration requirements; and
- clarification of the scope of the term unscheduled DOCs.

ASNO participated in the 17th Annual Meeting of National Authorities of CWC States Parties held in The Hague from 27-29 November 2015. More than 200 participants from 123 States Parties attended. The meeting covered a range of topics including declarations and inspections, national implementation of CWC Articles VII, X and XI and education and outreach.

ASNO coordinated a practical agenda for the break-out session of the Western Europe and Other States (WEOG) group. At the Plenary session, the Chair presented possible approaches to addressing the recommendations of the SAB Temporary Working Group's Report on Verification relating to the "The Impact of Developments in Science and Technology in the Context of the CWC". The Chair highlighted the importance of enabling robust discussions within the industry cluster meetings with as many capital-based experts as possible to assist in the development of workable decisions in response to the recommendations of the Verification Report, an outcome that Australia strongly supported.

ASNO attended the 20th Conference of the States Parties (CSP20) held in The Hague from 30 November – 4 December 2015 as part of Australia's delegation, headed by HE Ambassador Brett Mason. CSP20 adopted a number of decisions, including its Programme and Budget for 2017, establishment of an "OPCW Day" on 29 April each year to commemorate the foundation of the OPCW (as at the date of entry into force of the CWC), establishment of an Advisory Board on Education and Outreach, guidelines for designated laboratories (and assignment of designated laboratories for biomedical samples), and a Conference Report with recommendations that will serve to guide OPCW's future work. CSP20 discussions included the status of progress on the destruction of remaining declared chemical weapons stockpiles, including those removed from Syria.

Australia submitted a joint-paper at CSP20 entitled 'Aerosolisation of Central Nervous System Acting Chemicals (CNSACs) for Law Enforcement Purposes' and co-chaired with Switzerland a very well-attended side-event in the margins of the CSP20 on 1 December 2015. Twenty-two countries co-sponsored the joint-paper and 14 States Parties made supportive remarks in their national statements during the general debate. Australia also made two substantive statements during CSP20 on CNSACs.

Australian Border Force (ABF) attended an OPCW Seminar on "Chemical Trade: Current Practices and Challenges" held in Rizhao City, Shandong Province, China, on 16-17 June 2016. With input from ASNO, ABF presented on Australia's systems to regulate and monitor trade in CWC-scheduled chemicals and to share experiences and lessons learned. Copies of ASNO guidance for importers and exporters were also distributed to participants to assist them in conducting their own outreach to traders. Attendance by Australia was appreciated by the OPCW and participants.

Domestic Outreach

To assist ASNO in meeting its CWC reporting obligations and to ensure compliance with CWC-relevant legislation, ASNO continued to strengthen engagement with its constituency. To that end, ASNO conducted on-site outreach visits in November 2015 and May and June 2016 to chemical facilities processing Schedule 2 chemicals or importing and exporting CWC-Scheduled chemicals and to chemical facilities producing discrete organic chemicals in Victoria. Discussions focussed on promoting greater awareness of the CWC, regulatory obligations and preparing declared sites for OPCW inspections. ASNO took the opportunity to demonstrate how to best use the secure online portal for reporting purposes and to update them on new developments.

Dr Josy Meyer, Director, CWC Implementation Section presenting to DST Group as part of an outreach activity, Melbourne, November 2015.

ASNO continued its close cooperation on CWC implementation and chemical security issues with the Plastics and Chemical Industries Association, the Royal Australian Chemical Institute, as well as other Government agencies including Defence Export Controls (DEC), the Australian Border Force and the Attorney General's Department.

In an exchange of letters with DEC, it was agreed that permits issued by DEC for exports of CWC-Scheduled chemicals would include a condition of annual reporting to ASNO via its online portal in lieu of reporting twice-yearly to DEC. This has reduced the regulatory burden on industry and enables Australia to more efficiently meet its reporting obligations under the CWC.

Output 1.6: CTBT Implementation

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

Performance Measures

- Australia's obligations under the Comprehensive Nuclear-Test-Ban Treaty (CTBT) are met.
- Legal and administrative mechanisms which support Australia's commitments related to the CTBT are effective.
- Contribute to the development of CTBT verification, including through the work of the CTBT Organization (CTBTO) Preparatory Commission.
- Contribute to Australia's CTBT outreach efforts.

Performance Assessment

International Obligations

Of the 21 facilities that Australia will host for the CTBT International Monitoring System (IMS), 20 are in place and certified as operating to CTBTO technical specifications.

The final facility to be established, an infrasound monitoring station at Davis Station, Australian Antarctic Territory, is being installed. Procurement of infrastructure requirements has been completed and equipment has been pre-deployed at site. The major civil works program for the station is scheduled for the summer of 2016/17. Final installation work is scheduled for the summer of 2017/18 and with commissioning planned for 2018.

Legal and Administrative Measures

ASNO administers funding for Geoscience Australia to carry out nuclear test monitoring through its network of seismic stations. This arrangement, set out in a Letter of Understanding between Geoscience Australia and ASNO, is reviewed each year. ASNO has assessed that Geoscience Australia has met its requirements under the Letter of Understanding during the reporting period. ASNO and Geoscience Australia again reviewed the arrangement in 2016, concluding that current arrangements remain adequate for Australia's requirements.

The operation of a National Data Centre (NDC) to verify an in-force CTBT will require additional activities. ASNO, ARPANSA and Geoscience Australia, together with the Department of Defence, will in future evaluate Australia's ongoing NDC requirements.

Nuclear-Test-Ban Verification

On 6 January 2016, the DPRK announced that it had conducted a nuclear test. Seismic waves from the test were detected by the CTBT's nuclear test monitoring infrastructure, including in Australia. Even before the DPRK made its public announcement, analysis of the seismic event was underway, offering a strong demonstration of the ability of the CTBT's IMS to detect nuclear explosions without difficulty. In all, the event was detected by over a 100 CTBT IMS stations.

Geoscience Australia identified and promptly notified ASNO of an explosive event occurring at approximately 1230 AEDT on 6 January in the vicinity of the P'unggye nuclear test site in north-eastern DPRK, the site of the declared 2006, 2009 and 2013 tests. Previously, the DPRK announced in 2006, 2009 and 2013 that it had conducted nuclear tests. Analysis by GA of the seismic event over the following 3 hours confirmed characteristics

very similar to the 2013 test. Using seismic data from 3 Australian and 31 other International Monitoring System (IMS) stations, complemented by data from other non-IMS networks, GA derived an explosive yield estimated at 3.5 kT and a location estimated at some 700 m NNW of the 2013 test.

The estimated yield for the 2016 test is comparable to the 2013 test, or slightly smaller. This event was almost certainly an underground nuclear test given its explosive–like characteristics, proximity to the P'unggye test site and relatively shallow depth (shallower than most earthquakes). However, firm confirmation of a nuclear test would need detection of radioactive particulates or gases from the explosion, which had not occurred since the test as was the case for the 2009 test.

Of significance, is the DPRK's Permanent Mission to the UN's press release of 6 January stating "it was confirmed that the H-bomb test conducted in a safe and perfect manner had no adverse impact on the ecological environment. The test means a higher stage of the DPRK's development of nuclear force….".

The yield of this test differed drastically from that of the typical hydrogen bomb. When the United States detonated the world's first such weapon in 1952, its yield was 10,000 kTs or a full three orders of magnitude larger than that of the DPRK's recent test. The first staged H-bomb tests by other countries also had yields measuring thousands of kilotons.

While around 90 per cent of CTBT IMS stations are now in place worldwide, detailed preparatory work is continuing to bring the IMS and International Data Centre to a good level of readiness. ASNO coordinates Australia's contribution to the CTBTO's work in this area, working with technical specialists from Geoscience Australia and ARPANSA.

When the CTBT enters into force, it will provide for on-site inspections (OSI) to determine whether a nuclear explosion has taken place in a particular area. ASNO's Malcolm Coxhead, as Task Leader for the elaboration of an Operational Manual on the conduct of OSI, continued to chair discussions on this subject at the CTBTO Preparatory Commission's technical working group.

CTBT Ministerial Meetings to promote entry into force

In the years between the Article XIV Conferences, Foreign Ministers of CTBT Member States particularly dedicated to entry into force of the CTBT meet in the margins of the UN General Assembly in New York in September. The aim of these meetings is to sustain and generate further political momentum as well as public attention for the entry into force of the Treaty. On 13 June 2016, some 120 delegations comprising States Signatories, non-Signatory States and Observers, heads of international organizations, and members of civil society attended the opening of the 20 Years CTBT Ministerial Meeting in Vienna, Austria. First Assistant Secretary of DFAT's International Security Division Richard Sadleir delivered Australia's national statement and participated in the ministerial roundtable with DG ASNO also participating.

Consistent with principles set out in the CTBT, activities associated with the development of CTBT verification are funded primarily from the contributions of States Signatories. This includes training of people involved with the work of the Treaty, and participation in CTBTO workshops. During the reporting period, six Australians participated in these activities. At the end of the reporting period, another individual has been identified to participate in the next cycle of training activities for surrogate OSI inspectors. ASNO coordinates the involvement of Australians in this training.

Outreach

A fundamental requirement for an effective CTBT will be the ability of States Parties to form sound technical judgements about the nature of events detected by the IMS. Australia continues to work with and alongside the CTBTO to promote relevant technical capacity in the National Data Centres of signatory states.

Australia was invited to participate in the East Asia Regional National Data Centre Workshop (EARNDC) held in Beijing between 16 and 18 May, 2016, with Geoscience Australia officer Dr Spiro Spiliopoulos attending. The purpose of the meeting was to build-up the capacity of regional State Signatories of

the CTBT through the exchange of technical experience and expertise. This Workshop was attended by participants from Australia, China, Indonesia, Japan, Republic of Korea, Mongolia, Philippines, Russian Federation, Thailand, United States of America, and Vietnam.

Output 1.7: Other Non-Proliferation Regimes

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

Performance Measures

- Provide support and assistance to Australia's Permanent Mission to the Conference on Disarmament (CD) in Geneva in their efforts to advance Australia's non-proliferation and disarmament objectives, in particular, on seeking to commence the negotiation of an internationally verifiable Fissile Material Cut-off Treaty (FMCT).
- Support other developments in the field of non-proliferation and disarmament that are relevant to Australia's interests.

Performance Assessment

ASNO contributes routinely to Australia's efforts to strengthen international non-proliferation efforts by participating in a range of forums or by providing advice and input for briefing and papers prepared by DFAT, such as papers Australia co-authors with likeminded countries to help shape the NPT PrepCom process.

Malcolm Coxhead at a meeting of the International Partnership for Nuclear Disarmament Verification, February 2016, Geneva.

Fissile Material Cut-off Treaty

ASNO continued during the year to provide expert advice in support of Australia's efforts to build confidence and momentum in the Conference on Disarmament towards the commencement of negotiations on a treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices (a Fissile Material Cut-Off Treaty – FMCT). An FMCT is one of the key building blocks towards a world free of nuclear weapons, and Australia is an active contributor to efforts to achieve such a treaty. ASNO's expertise in verification of non-proliferation instruments is central to Australia's effort.

International Partnership for Nuclear Disarmament Verifications

Future steps in nuclear disarmament will pose significant verification challenges. Success in addressing these future challenges will require the development and application of new technologies or concepts, and all states have an interest in the success of these efforts.

The practical work of the International Partnership for Nuclear Disarmament Verification (IPNDV) got underway in November 2015 in Oslo with the formation of three working groups. Australia is participating in each of the working groups and, together with a representative from Poland, DG ASNO chairs Working Group 2, which is addressing procedures for the conduct of on-site inspection to monitor the dismantlement of nuclear warheads. ASNO's Malcolm Coxhead participates also in the working groups which met three times during the year. The article at page 31 of this report provides further information on the IPNDV and its objectives.

Because developing new monitoring and verification technologies and mechanisms will require sustained resources and commitment, the work initiated by the International Partnership will be a long-term effort. The next IPNDV plenary and working group meetings are scheduled in November 2016, in Abu Dhabi, UAE.

Output 1.8 – Advice to Government

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

Performance Measures

- Provide policy advice, analysis and briefings which meet the needs of Ministers and other key stakeholders.
- Contribute to the development of Australia's policies by DFAT in the area of WMD arms control, disarmament and non-proliferation.
- Cooperate on technical issues of common interest with departments and agencies such as ANSTO, ARPANSA, Department of Defence, Department of Industry, and the Australian Intelligence Community.

Performance Assessment

ASNO's role in providing independent expert advice

The Australian Safeguards and Non-proliferation Office is the independent regulator of nuclear security and safeguards in Australia. ASNO's nuclear regulatory responsibility covers all nuclear material and facilities in Australia. This includes material and facilities under the control of Commonwealth, State and Territory organisations.

ASNO has a broad remit when it comes to providing independent expert advice. If requested, ASNO can provide targeted advice to Government stakeholders and the public on the issues of nuclear security and safeguards. ASNO's responsibility in this area is supported by s43(d) of the Nuclear Non-proliferation (Safeguards) Act 1987, which states that one of the functions of the Director-General is "to undertake, co-ordinate and facilitate research and development in relation to nuclear safeguards." Under the principles of safeguards-by-design, ASNO is able to advise on technical solutions that are capable of meeting permit requirements.

The concept of safeguards-by-design[18] is very important for ensuring nuclear fuel cycle facilities and other locations holding nuclear material are designed in a way that effectively and efficiently supports the IAEA's inspection and related measurement activities. It also includes considering international best practice for regulating nuclear fuel cycle facilities to maintain international confidence that non-proliferation commitments are being upheld. All of this necessarily involves close cooperation between the facility operator or design team, regulator (in Australia's case, ASNO) and the IAEA in the design of the facility. In this regard, ASNO is able to advise on technical solutions, during the design phase of a facility, that are capable of meeting IAEA safeguards requirements, which in turn would be incorporated by ASNO as permit conditions once the facility is operational.

18 Safeguards by design is defined in the IAEA's publication, *International Safeguards in Nuclear Facility Design and Construction* (Nuclear Energy Series No. NP-T-2.8) an approach whereby international safeguards requirements and objectives are fully integrated into the design process of a nuclear facility. This extends from initial planning through design, construction, operation, and decommissioning. By including awareness of all regulatory issues, including international agreements that concern international safeguards project management can schedule consideration at the appropriate time and level of detail and subsequently reduce the project risk. The SBD process is a multidisciplinary interactive process of optimizing the design features and process parameters of the facility to ensure that safeguards obligations can be reasonably met.

ASNO's role in providing expert advice has seen the office contribute to the Nuclear Fuel Cycle Royal Commission of South Australia in 2015–16, and working with ANSTO and the IAEA on developing a measurement solution for solid waste from the ANSTO Nuclear Medicine (ANM) radiopharmaceutical production plant.

ASNO has engaged with the Department of Industry, Innovation and Science (DoIIS) on Australian Government plans to build a National Radioactive Waste Management Facility (NRWMF) to hold low and intermediate level waste. Along with the safety regulator, ARPANSA, ASNO is an observer to the Waste Acceptance Criteria Working Group. Through this forum, ASNO is able to provide advice on the safeguards and security measures that must be applied to nuclear material held within the NRWMF.

The following publications are the primary references for safeguarding and securing nuclear material in Australia:

- IAEA Nuclear Security Series No 13 – Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/ Revision 5);
- IAEA INFCIRC/153 (Corrected) The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons; and
- IAEA INFCIRC/540 (Corrected) Model Protocol Additional to the Agreement(s) between States and the International Atomic Energy Agency for the Application of Safeguards.

The *Safeguards Act* and ASNO's system of permits for facilities and operators provide the broad conditions for the establishment and operation of the NRWMF. The NRWMF must operate within Australia's State System of Accounting and Control. Based on the evidence to be provided, Director General ASNO must be confident that the facility operators can apply appropriate nuclear accounting and control, and apply security suitable to the material planned to be held.

After the examination of the applications, a Permit to Establish a Facility and Permit to Possess Nuclear Material may be issued.

Information about the NRWMF project must be supplied to the International Atomic Energy Agency periodically. ASNO has a responsibility to engage with the DoIIS project team and, when in place, the facility operator to support their safeguards and security planning. Using the expertise that ASNO gathers from regular engagement with the IAEA, ASNO can provide leadership on the application of the most up-to-date waste management guidance, including the principles of safeguards by design. ASNO also adds value to the process by analysing the information provided by the DoIIS project team and then preparing suitably formatted and secured reports for the IAEA.

ASNO will verify information provided and compliance with ASNO requirements, as well as coordinate IAEA inspections at the NRWMF.

Output 2.1: Public Information

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

Performance Measures

- Effective public education and outreach.

Performance Assessment

ASNO works to ensure Australia's WMD non-proliferation objectives are widely understood. This involves liaison with industry, universities and research organisations, plus think tanks and practitioners, including presentations at various national and international fora. Activities during the year through which ASNO pursued public information objectives included:

- A pilot outreach program at the Australian National University to demonstrate safeguards principles, nuclear measurement techniques and what to expect during an IAEA inspection;
- Attendance at the Australasian Radiation Protection Society conference to reach out to current and potential permit holders on safeguards issues and permit requirements. In addition to the talks given by ASNO, Assistant Secretary ASNO gave a keynote address titled "The History and Evolution of IAEA Safeguards – An Australian Perspective";
- ASNO attended the Australasian Institute of Mining and Metallurgy (AusIMM) International Uranium conference which was addressed by Director General ASNO in his keynote presentation titled "Nuclear Non-Proliferation System - Implications for Nuclear Fuel Cycle Activities in Australia". ASNO also delivered a presentation titled "Safeguards and Security of Uranium Products in Australia". The AusIMM International Uranium conference is the leading technical conference in Australia bringing together international uranium industry professionals; and
- ASNO delivered a presentation at the University of New South Wales on the use of force and international law.

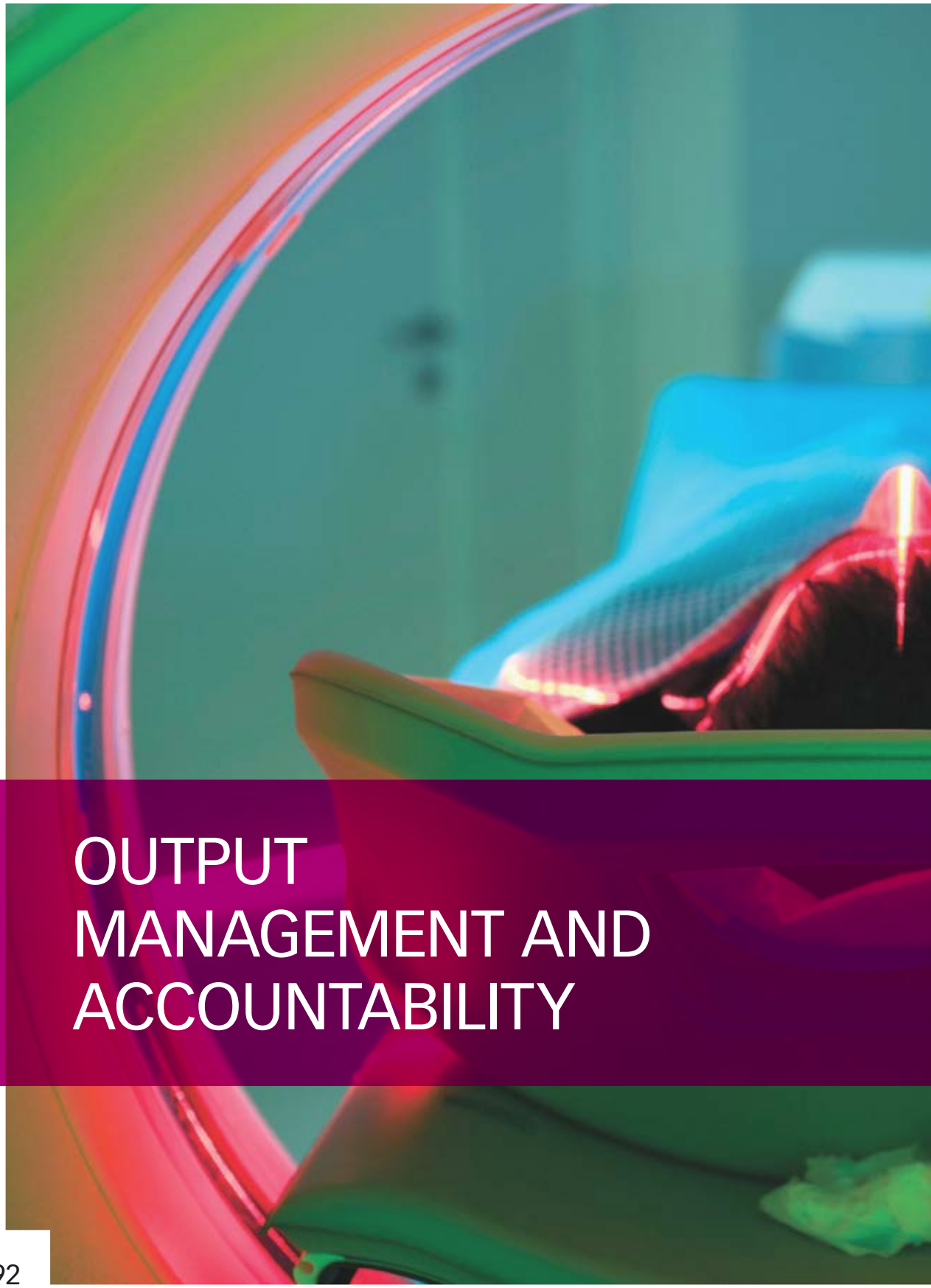
ASNO conducted on-site outreach visits to chemical facilities processing Schedule 2 chemicals or importing and exporting CWC-scheduled chemicals and to those producing discrete organic chemicals in Victoria. Discussions focussed on promoting greater awareness of the CWC, regulatory obligations and preparing declared sites for OPCW inspections. ASNO took the opportunity to demonstrate how to best use the secure online portal for reporting purposes and to foreshadow new developments.

Consistent with the Department's Public Diplomacy Strategy, Director General ASNO has established a Twitter handle @DG_ASNO. This social media platform was used to report on important non-proliferation developments, attendance at major conferences and the conduct of ASNO's regulatory activities. DG ASNO's tweets can also be found on ASNO's web site.

ASNO's website, http://www.dfat.gov.au/asno/, contains detailed information on Australia's non-proliferation policies, treaty and statutory obligations, and safeguards agreements as well as notification and permit application forms. The Current Topics section of this, and previous, ASNO annual reports are also included as a public information source.

Dr John Kalish, Assistant Secretary ASNO, giving keynote address at the Australasian Radiation Protection Society Conference 6-9 October 2015, Canberra.

Drs Everton and Lyons were part of an ASNO team conducting an outreach workshop at the Australian National University in 2015.



OUTPUT MANAGEMENT AND ACCOUNTABILITY

5

SECTION

Output Management and Accountability

Corporate Governance

Portfolio Minister

Responsibility for administration of the legislation under which ASNO operates – *the Nuclear Non-Proliferation (Safeguards) Act 1987*, *Chemical Weapons (Prohibition) Act 1994* and *Comprehensive Nuclear-Test-Ban Treaty Act 1998* – rests with the Minister for Foreign Affairs, the Hon Julie Bishop.

Director General ASNO

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

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

The Director General ASNO is a statutory position, appointed by the Governor-General. Remuneration for this position is determined by the Remuneration Tribunal.

Dr Robert Floyd was reappointed as the Director General ASNO on 6 December 2015 for a period of five years.

Assistant Secretary ASNO

The Assistant Secretary ASNO deputises for the Director General and is responsible for the day-to-day operations of the office. Dr John Kalish has held this position since 21 April 2010.

ASNO Staff

ASNO has a small core of staff whose day-to-day activities are overseen by the Director General. ASNO staff are employed under the *Public Service Act 1999* as a division within the Department of Foreign Affairs and Trade (DFAT). ASNO staff, other than the Director General, are also employed under the DFAT Enterprise Agreement. Further details can be found in Table 15 and the DFAT Annual Report 2015–16.

In 2015–16 ASNO had an allocated staff level of 18 FTE.

ASNO's organisational structure is closely aligned with the outputs and can be found in Figure 5.

Figure 5: ASNO's Organisational Structure At 30 June 2016

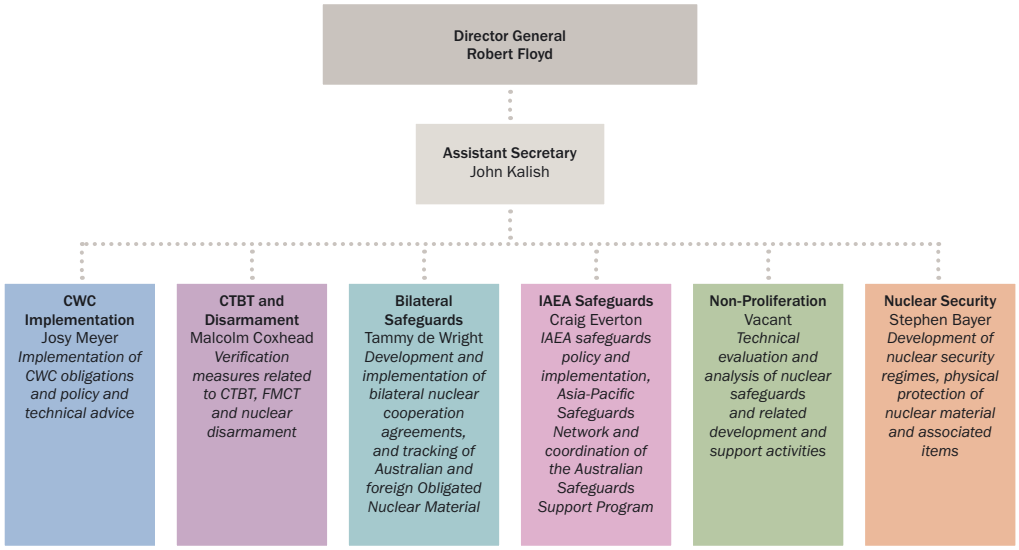


Table 15: ASNO Staff at 30 June 2016

	Male	Female	Total
SES B2	1	0	1
SES B1	1	0	1
Executive Level 2	3	2	5
Executive Level 1	3	0	3
APS Level 6	2	3	5
APS Level 5		2	2
APS Level 4			0
TOTAL	**10**	**7**	**17**

Training and Development

ASNO's primary training requirements are professional development of specialist skills. ASNO is proactive in managing this training, in part through participation in IAEA and OPCW led training courses and participation in international conferences and negotiations. Further details are in Table 16.

Table 16: Training and Development Activities During 2015–16

Training and Development Activity	Person Days
Formal DFAT courses	24
Structured work unit and on-the-job training, including planning days	25
Seminars, workshops, conferences, overseas negotiations and IDCs	59
External formal courses	70
Academic study	9
Other (IAEA Consultancy)	0
TOTAL	**187**

Financial Management

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

Administrative Budget

Table 17: ASNO Administrative Costs

		2014–15	2015-16
Salaries		2 163 994	1 901 285
Running Costs	General	709 583	711 796
	Seismic monitoring(1)	584 650	578 804
	Sub-Total	1 294 233	1 290 600
TOTAL		**$3 458 227**	**$3 191 885**

(1) Undertaken by Geoscience Australia

Regulatory performance and risk management

The Government released its Regulator Performance Framework (RPF) as part of 2014 Spring Repeal Day. The Framework is an important part of its commitment to reduce the cost of unnecessary or inefficient regulation imposed on individuals, business and community organisations by at least $1 billion a year.

The Framework has been developed following consultation with a range of stakeholders and consists of six outcomes-based key performance indicators covering reducing regulatory burden, communications, risk-based and proportionate approaches, efficient and coordinated monitoring, transparency, and continuous improvement.

As a Commonwealth regulator that administers monitors and enforces regulation, ASNO was required to implement the Framework from 1 July 2015 — with the first assessment period being the 2015-16 financial year.

ASNO took the opportunity presented by the regulatory reform program to reflect on the Government's goals and complement our own effectiveness measures. Within the Framework and outcomes-based KPIs, ASNO devised a set of metrics (see table below) that focused our staff on how we engage with industry, and streamlining opportunities. We are mindful of RPF evidence collection perversely increasing the burden on our regulated businesses. This report summarises and analyses the information we were able to readily collect and describes the 2015/16 regulatory environment.

ASNO is moving forward with its risk management strategy including systematising its processes. The relevant plans and arrangements will continue to mature over time. During the reporting year ASNO produced a new suite of permits that categorised permit holder requirements according to the risk posed by the type and quantity of nuclear material held. The new permits were developed using feedback from regulated businesses.

ASNO's inspection activities are consistent with the risk categories within the new permits and cascades from the ASNO Risk Management Plan (in development). This plan is based on the elements of the Commonwealth Risk Management Policy released in 2014. It uses the tools provided by the DFAT Guide to Better Risk management (2015).

Table 18: ASNO Regulatory Performance Framework Metrics 2015-16

Percentage of permit applications where options to eliminate the regulated material or equipment is discussed.
Time to process permit applications.
Number of compliance/performance reviews not involving a site visit.
Communication with regulated entities is clear, targeted and effective.
Establish risk-based inspection program.
External review of ASNO's risk-based inspection program.
Establish streamlined inspection processes.
External review of inspection method.
Quality of regulatory information provided on ASNO website and in the ASNO Annual Report.
Outreach activities conducted to communicate regulatory requirements to stakeholders.
Number of meetings attended to influence international policy.
Engagement with other regulators to explore opportunities for regulatory efficiencies.

Uranium Producers Charge

ASNO is responsible for the Uranium Producers Charge. This charge is payable to Consolidated Revenue on each kilogram of uranium ore concentrate production (set on 30 November 2015 at 14.1775 cents per kilogram). The total charge levied on 14 December 2015 for uranium production in 2014–15 was $735,521.

APPENDICES

6

SECTION

Appendices

Appendix A: World Nuclear Energy, 30 June 2016

Table 19: World Nuclear Energy, 30 June 2016[1]

	Operating Reactors		% of Total Electricity in 2015	Reactors under Construction	
	Total	Capacity (GWe)		Total	Capacity (GWe)
United States*	100	100.4	19.5	4	5
France*	58	63.1	76.3	1	1.6
Japan*	43	40.3	0.5	2	2.8
Russian Federation*	35	26.0	18.6	8	7.1
China*	33	29.6	3.0	21	24.0
Republic of Korea*	25	23.1	31.7	3	4.2
India*	21	5.3	3.5	6	4.3
Canada*	19	13.5	16.6	0	0
United Kingdom*	15	8.9	18.9	0	0
Ukraine	15	13.1	56.5	2	2.0
Sweden*	10	9.7	34.3	0	0
Germany*	8	10.8	14.1	0	0
Spain*	7	7.1	20.3	0	0
Belgium*	7	5.9	37.5	0	0
Czech Republic*	6	3.9	32.5	0	0
Taiwan* [2]	6	5.0	16.3	2	2.7
Switzerland*	5	3.3	34.5	0	0
Finland*	4	2.8	33.7	1	1.7
Hungary*	4	1.9	52.7	0	0
Slovak Republic*	4	1.8	55.9	2	0.9
Pakistan	3	0.7	4.4	3	1.8
Argentina*	3	1.6	4.8	1	0.0
Brazil	2	1.9	2.8	1	1.2
Bulgaria*	2	1.9	31.3	0	0
Mexico*	2	1.3	6.8	0	0
Romania*	2	1.3	17.3	0	0
South Africa	2	1.9	4.7	0	0
Armenia	1	0.4	34.5	0	0
Iran	1	0.9	1.3	0	0
Netherlands*	1	0.5	3.7	0	0
Slovenia*	1	0.7	38.0	0	0
United Arab Emirates*	0	0	0	4	5.4
Republic of Belarus	0	0	0	2	2.2
TOTAL	**445**	**388.6**	**N/A**	**63**	**66.9**

Source: IAEA Power Reactor Information System (PRIS), Reactor Status Reports, as at 30 June 2016, http://www.iaea.org/pris.

(1) Countries having in force bilateral agreements with Australia covering use of AONM are marked with an asterisk. These countries operate 421 power reactors, which produce around 10 per cent of total world electricity and about 94 per cent of world nuclear energy.

(2) Supply of AONM to Taiwan is covered by an agreement between Australia and the United States

Appendix B: Australia's Bilateral Safeguards Agreements

Table 20: Australia's Bilateral Nuclear Cooperation Agreements at 30 June 2016

Country	Entry into Force
Republic of Korea	2 May 1979
United Kingdom	24 July 1979
Finland	9 February 1980
Canada	9 March 1981
Sweden	22 May 1981
France	12 September 1981
Philippines	11 May 1982
Japan	17 August 1982
Switzerland	27 July 1988
Egypt	2 June 1989
Mexico	17 July 1992
New Zealand	1 May 2000
United States (covering cooperation on Silex technology)	24 May 2000
Czech Republic	17 May 2002
United States (covering supply to Taiwan)	17 May 2002
Hungary	15 June 2002
Argentina	12 January 2005
People's Republic of China(1)	3 February 2007
Russian Federation	11 November 2010
United States	22 December 2010
Euratom(2)	1 January 2012
United Arab Emirates	14 April 2014
India	13 November 2015

(1) Australia has two agreements with China, one covering nuclear material transfers and one covering nuclear cooperation.

(2) Euratom is the atomic energy agency of the European Union. The Euratom agreement covers all 28 member states of the European Union.

Note: The above list does not include Australia's NPT safeguards Agreement with the IAEA, concluded on 10 July 1974, it also does not include the Nuclear Cooperation Agreement between Australia and Ukraine signed on 31 March 2016 which is not yet in force. In addition to the above, 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.

Appendix C: Status of Additional Protocols

At 30 June 2016, there were a total of 128 states, plus Taiwan, with an Additional Protocol in force, an increase of two over the same time last year.

Table 21: States with Additional Protocols in force at 30 June 2016

State			
Afghanistan	Denmark	Kuwait	Peru
Albania	Djibouti	Kyrgyzstan	Philippines
Andorra	Dominican Republic	Latvia	Poland
Angola	DR Congo	Lesotho	Portugal
Antigua and Barbuda	Ecuador	Libya	Republic of Korea
Armenia	El Salvador	Liechtenstein	Romania
Australia	Estonia	Lithuania	Russia
Austria	Fiji	Luxembourg	Rwanda
Azerbaijan	Finland	Madagascar	Saint Kitts and Nevis
Bahrain	France	Malawi	Seychelles
Bangladesh	FYROM	Mali	Singapore
Belgium	Gabon	Malta	Slovakia
Bosnia and Herzegovina	Gambia	Marshall Islands	Slovenia
Botswana	Georgia	Mauritania	South Africa
Bulgaria	Germany	Mauritius	Spain
Burkina Faso	Ghana	Mexico	Swaziland
Burundi	Greece	Moldova Republic of	Sweden
Cambodia	Guatemala	Monaco	Switzerland
Canada	Haiti	Mongolia	Tajikistan
Central African Republic	Holy See	Montenegro	Tanzania, United Republic of
Chad	Hungary	Morocco	Togo
Chile	Iceland	Mozambique	Turkey
China	India	Namibia	Turkmenistan
Colombia	Indonesia	Netherlands	Uganda
Comoros	Iraq	New Zealand	Ukraine
Congo, Republic of the	Ireland	Nicaragua	United Arab Emirates
Costa Rica	Italy	Niger	United Kingdom
C¬¬ôte d'Ivoire	Jamaica	Nigeria	United States of America
Croatia	Japan	Norway	Uruguay
Cuba	Jordan	Palau	Uzbekistan
Cyprus	Kazakhstan	Panama	Vanuatu
Czech Republic	Kenya	Paraguay	Vietnam
TOTAL: 128 States			

Source: International Atomic Energy Agency, https://www.iaea.org/sites/default/files/16/07/sg_agreements_comprehensive_status_list.pdf

At 30 June 2016, 20 states did not have an Additional Protocol (AP) in force but had signed an AP or had an AP approved by the IAEA Board of Governors. Of these, **six** states have one or more nuclear facilities under IAEA Safeguards (Table 22).

Table 22: States with an Additional Protocol signed (or otherwise approved by the IAEA Board of Governors) but not in force at 30 June 2016

State			
Algeria	Guinea	Lao PDR	**Serbia**
Belarus	Guinea-Bissau	Liberia	**Thailand**
Benin	Honduras	**Malaysia**	Timor-Leste
Cameroon	**Iran**(1)	Myanmar	Tunisia
Cape Verde	Kiribati	Senegal	Zambia
TOTAL: 20 states (including 6 States (in bold) that have 1 or more nuclear facilities under IAEA Safeguards)			

Source: International Atomic Energy Agency, https://www.iaea.org/sites/default/files/16/07/sg_agreements_comprehensive_status_list.pdf

(1) The Joint Comprehensive Plan of Action (JCPOA) between Iran and China, France, Germany, Russia, United Kingdom and United States was adopted on 18 October 2015. As a part of the JCPOA, Iran agreed to provisionally implement the AP on Implementation day. Iran commenced provisional implementation of the AP to its safeguards agreement with the IAEA on 16 January 2016.

At 30 June 2016, 45 States, plus the Palestinian Territories(1), had not yet signed the Additional Protocol. Of these, eight states (in bold) have one or more nuclear facilities under IAEA Safeguards (Table 23).

Table 23: States with no Additional Protocol at 30 June 2016

States with one or more facilities under IAEA safeguards			
Argentina	**DPRK**(2)	**Israel (non-NPT)**	**Syria**
Brazil	**Egypt**	**Pakistan (non-NPT)**	**Venezuela**
States without any facilities under IAEA safeguards			
Bahamas	Grenada	Saint Lucia	Sudan
Barbados	Guyana	St Vincent and the Grenadines	Suriname
Belize	Lebanon	Samoa	Tonga
Bhutan	Maldives	San Marino	Trinidad and Tobago
Bolivia	Micronesia, Federated States of	Sào Tomé and Principe	Tuvalu
Brunei Darussalam	Nauru	Saudi Arabia	Yemen
Djibouti	Nepal	Sierra Leone	Zimbabwe
Dominica	Oman	Solomon Islands	
Equatorial Guinea Eritrea	Papua New Guinea	Somalia	
Ethiopia	Qatar	Sri Lanka	
TOTAL: 45 states (including eight States had one or more nuclear facilities under IAEA Safeguards)			

Source: International Atomic Energy Agency, https://www.iaea.org/sites/default/files/16/07/sg_agreements_comprehensive_status_list.pdf

(1) The Palestinian Territories deposited instruments of accession to the NPT in Moscow on 10 February 2015 and London on 12 February 2015 and as such is obliged under the NPT to conclude a safeguards agreement with the IAEA. This action and the designations employed do not imply the expression of any opinion on the part of the IAEA or its Member States concerning the legal status of statehood of 'Palestine' but has led to the Palestinian Territories being on the IAEA's status list for the Additional Protocol. (Reference: https://www.iaea.org/About/Policy/GC/GC60/GC60Documents/English/gc60-13_en.pdf)

(2) Nuclear facilities in DPRK are not currently under IAEA safeguards as DPRK gave notice (on 10 January 2003) of withdrawal from the NPT. Pending clarification of its status, DPRK is counted as an NPT Party, and the United Nations Security Council under Resolution 2094 (2013) "decides that DPRK shall abandon all nuclear weapons and existing nuclear programmes, in a complete, verifiable and irreversible manner and immediately cease all related activities and shall act strictly in accordance with the obligations applicable to parties under the NPT and the terms and conditions of the IAEA Safeguards Agreement (INFCIRC/403)".

Appendix D: IAEA Statements of Conclusions for Australia 2015

IAEA inspection regime in Australia

The IAEA conducts verification activities in Australia under the Comprehensive Safeguards Agreement [19] and under the Additional Protocol[20].

Under the Comprehensive Safeguards Agreement the IAEA conducts inspections to verify nuclear material inventory and facility design features. There are three types of inspections conducted in Australia each year under the Comprehensive Safeguards Agreement:

- **Physical inventory verification (PIV):** a scheduled inspection in a selected material balance area (MBA)[21] to verify the stocktake of physical inventory (known as a physical inventory taking) from that MBA. PIVs involve a more complete verification of nuclear material inventory in the MBA than short notice random inspections. The frequency of PIVs depends on the types and quantities of nuclear material held in each MBA. PIVs are scheduled annually for the OPAL reactor (AS F) and ANSTO's R&D laboratories (AS-C) and approximately once every two years for ANSTO's storage areas (AS-D). PIVs for each MBA are scheduled together each year so the IAEA can complete all with one visit to Australia. In total these take about four to five days to complete. For locations outside of ANSTO (AS-E and ASE1), the IAEA schedules a PIV approximately once every four or five years at one location (usually a university) taken as representative of all locations outside of ANSTO. These PIVs are usually conducted in one day.
- **Short notice random inspection (SNRI):** an inspection called by the IAEA at a random time with limited notice. The IAEA calls an SNRI once or twice each year at the OPAL reactor with three hours' notice to ASNO and ANSTO. These inspections usually last for one, sometimes two days.
- **Design Information Verification (DIV):** inspection to verify the correctness and completeness of the design features of a facility relevant to the application of safeguards. The IAEA typically conducts one or two DIVs during a PIV.

Under the Additional Protocol the IAEA has the right to conduct verification activities known as complementary access. A complementary access can be for the purpose of: assuring the absence of undeclared nuclear material or activities in Australia (Article 4.a.i); resolving any questions or inconsistencies related to the correctness and completeness of Australia's declarations under the Additional Protocol (Article 4.a.ii); or, to confirm the decommissioned status of a facility (Article 4.a.iii). Complementary Access activities called while inspectors are on the ANSTO site for other inspections can be conducted at any selected building at ANSTO with two hours' notice. Complementary Access activities for locations outside ANSTO (e.g. universities, uranium mines) require a minimum of 24 hours' notice but given the considerable distances in Australia are typically issued with a few days' notice or more. The IAEA typically conducts one or two complementary access activities in Australia each year.

19 See Schedule 3 of the *Nuclear Non-Proliferation (Safeguards) Act 1987*.

20 Published in IAEA document INFCIRC/540 (corrected)

21 Australia's material balance areas for IAEA safeguards purposes are described in table 2.

IAEA conclusions on Australia's compliance

The IAEA's conclusions for Australia are provided at two levels: a component of the overarching findings and conclusions published in the IAEA's Safeguards Statement for 2015 (see Appendix E); and the statements of conclusions of inspections in Australia.

The highest level conclusion the IAEA draws in the Safeguards Statement, known as the 'broader conclusion', is in paragraph 1(a) of the Statement:

'the Secretariat found no indication of the diversion of declared nuclear material from peaceful nuclear activities and no indication of undeclared nuclear material or activities. On this basis, the Secretariat concluded that, for these States, all nuclear material remained in peaceful activities.'

Australia is on the list of countries covered by the IAEA's broader conclusion in the Safeguards Statement for 2015. Australia was the first country to receive the 'broader conclusion' in 2000 and has received it every year since.

The IAEA's statements of conclusions related to inspections in Australia are provided in several ways:

- Article 91(a)[22] of Australia's NPT Safeguards Agreement: the results of inspections at individual material balance areas (MBAs)
- Article 91(b)[22] of Australia's NPT Safeguards Agreement: the conclusions the IAEA has drawn from all its verification activities (headquarters analysis and inspections) in Australia for each individual MBA.
- Statement of results of design information verification activities (DIVs)
- Article 10.a of the Additional Protocol: Statement on complementary access activities undertaken
- Article 10.c of the Additional Protocol: Statement on the conclusions the IAEA has drawn from complementary access activities

Material balance area: AS-C (research and development laboratories) Material balance period: 12 March 2014–19 April 2015[23]

Inspection Activity	Date(s) of inspection	Inspection location	Statement of Results	Date statement provided
Physical Inventory Verification (PIV)	20–21 April 2015	ANSTO	91(a) Statement not available at time of publication of this Annual Report[23]	
Design Information Verification (DIV)	21 April 2015	ANSTO	DIV Statement not available at time of publication of this Annual Report	
91(b) Statement of Conclusions		Not available at time of publication of this Annual Report		

22 Note: under the standard NPT safeguards agreement printed in IAEA document INFCIRC/153(Corrected) these provisions are in paragraphs 90(a) and 90(b). Australia's NPT Safeguards Agreement has an additional paragraph that is not in INFCIRC/153.

23 Statements will be published, when available, on ASNO's website: http://www.dfat.gov.au/asno.

Material balance area: AS-C (research and development laboratories)
Material balance period: 20 April 2015–31 May 2016[23]

Inspection Activity	Date(s) of inspection	Inspection location	Statement of Results	Date statement provided
Physical Inventory Verification	1–2 June 2016	ANSTO	91(a) Statement not available at time of publication of this Annual Report	
Design Information Verification	1–2 June 2016	ANSTO	DIV Statement not available at time of publication of this Annual Report	
91(b) Statement of Conclusions		Not available at time of publication of this Annual Report		

Material balance area: AS-D (Vault storage)
Material balance period: 18 May 2012–21 April 2015

Inspection Activity	Date(s) of inspection	Inspection location	Statement of Results	Date statement provided
Physical Inventory Verification	22 April 2015	ANSTO	91(a): "Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	30 September 2015
Design Information Verification	22 April 2015	ANSTO	"Based on the activities conducted and information available, the results of the DIV were satisfactory."	30 September 2015
91(b) Statement of Conclusions (20 November 2015)		"The IAEA has concluded from its verification activities carried out at AS-D during the material balance period 18 May 2012 to 21 April 2015, and based on the information available to date in connection with such activities, that all declared nuclear material has been accounted for and that there were no indications of the undeclared presence, production or processing of nuclear material. However, the reports did not satisfy the IAEA requirements, because the State report (ICR No. 164) was not dispatched to the IAEA within the timing specified by the Facility Attachment."		

Material balance area: AS-F (OPAL reactor)
Material balance period: 14 March 2014–22 April 2015

Inspection Activity	Date(s) of inspection	Inspection location	Statement of Results	Date statement provided
Short Notice Random Inspection	21 November 2014	ANSTO	91(a): "Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	6 February 2015
Physical Inventory Verification	23 April 2015	ANSTO	91(a): "Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	7 September 2015
Design Information Verification	23 April 2015	ANSTO	"Based on the activities conducted and information available, the results of the DIV were satisfactory."	7 September 2015
91(b) Statement of Conclusions (17 December 2015)			"The IAEA has concluded from its verification activities carried out at AS-F during the material balance period 14 march to 22 April 2015, and based on the information available to date in connection with such activities, that all declared nuclear material has been accounted for and that there were no indications of the undeclared presence, production or processing of nuclear material"	

Material balance area: AS-F (OPAL reactor)
Material balance period: 23 April 2015–30 May 2016[23]

Inspection Activity	Date(s) of inspection	Inspection location	Statement of Results	Date statement provided
Short notice random inspection	24 November 2015	ANSTO	91(a): "Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	31 March 2016
Short notice random inspection	10 March 2016	ANSTO	91(a) Statement not available at time of publication of this Annual Report	
Physical Inventory Verification	31 May 2016	ANSTO	91(a) Statement not available at time of publication of this Annual Report	
Design Information Verification	31 May 2016	ANSTO	DIV Statement not available at time of publication of this Annual Report	
91(b) Statement of Conclusions			Not available at time of publication of this Annual Report	

Material balance area: AS-H (Synroc Waste Immobilisation Plant) **Material balance period:** N/A (under construction, no nuclear material held)

Inspection Activity	Date(s) of inspection	Inspection location	Statement of Results	Date statement provided
Design Information Verification	15 April 2015	ANSTO	"Based on the activities conducted and information available, the results of the DIV were satisfactory."	6 January 2016

Additional Protocol Assessment Period: 1 January 2015–31 December 2015

Date of Complementary Access (CA)	Location	10(a) Statement of activities
28 April 2015	Four Mile Mine	"The Agency was able to carry out all planned activities during the CA"
24–25 November 2015	Lucas Heights Science and Technology Centre: Buildings 19, 23, 29, 53, 54, 80 and 88	"The Agency was able to carry out all planned activities during the CA"
10(c) Statement of Conclusions (14 March 2016)	"The Agency has concluded from its activities carried out during this period, and based on the information available to date in connection with such activities that: Access pursuant to Article 4.a.(i) did not indicate the presence of undeclared nuclear material or activities at: Four Mile Mine, South Australia, or LHSTC—Lucas Heights Science and Technology Centre, Lucas Hts. NSW."	

Additional Protocol Assessment Period: 1 January 2016–31 December 2016[23]

Date of Complementary Access (CA)	Location	10(a) Statement of activities
10 March 2016	Lucas Heights Science and Technology Centre: Buildings 23, 41, 54 and 80	Not available at time of publication of this Annual Report
30 May 2016	Lucas Heights Science and Technology Centre: Building 64 – Silex Systems Ltd lease	"The Agency was able to carry out all planned activities during the CA. However, the Agency noted that managed access is still applied at this facility with regard to photo taking and questions related to laser capabilities "
6 June 2016	Olympic Dam Mine	"The Agency was able to carry out all planned activities during the CA"
10(c) Statement of Conclusions	10(c) statements of conclusions are provided early in the year following the assessment period.	

Appendix E: IAEA Safeguards Statement for 2015

In 2015, safeguards were applied for 181 States[24, 25] with safeguards agreements in force with the Agency. The Secretariat's findings and conclusions for 2015 are reported below with regard to each type of safeguards agreement. These findings and conclusions are based upon an evaluation of all safeguards relevant information available to the Agency in exercising its rights and fulfilling its safeguards obligations for that year.

1. One hundred and twenty-one States had both comprehensive safeguards agreements and additional protocols in force:

a) For 67 of these States, the Secretariat found no indication of the diversion of declared nuclear material from peaceful nuclear activities and no indication of undeclared nuclear material or activities. On this basis, the Secretariat concluded that, for these States, all nuclear material remained in peaceful activities; and

b) For 54 of these States, the Secretariat found no indication of the diversion of declared nuclear material from peaceful nuclear activities. Evaluations regarding the absence of undeclared nuclear material and activities for each of these States remained ongoing. On this basis, the Secretariat concluded that, for these States, declared nuclear material remained in peaceful activities.

2. Safeguards activities were implemented for 52 States with comprehensive safeguards agreements in force, but without additional protocols in force. For these States, the Secretariat found no indication of the diversion of declared nuclear material from peaceful nuclear activities. On this basis, the Secretariat concluded that, for these States, declared nuclear material remained in peaceful activities.

While the Secretariat concluded that, for 2015, declared nuclear material in Iran remained in peaceful activities, it was unable to conclude that all nuclear material in Iran was in peaceful activities.

3. As of the end of 2015, 12 States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) had yet to bring into force comprehensive safeguards agreements with the Agency as required by Article III of that Treaty. For these States Parties, the Secretariat could not draw any safeguards conclusions.

4. Three States had safeguards agreements based on INFCIRC/66/Rev.2 in force, requiring the application of safeguards to nuclear material, facilities and other items specified in the relevant safeguards agreement. One of these States, India, had an additional protocol in force. For these States, the Secretariat found no indication of the diversion of nuclear material or of the misuse of the facilities or other items to which safeguards had been applied. On this basis, the Secretariat concluded that, for these States, nuclear material, facilities or other items to which safeguards had been applied remained in peaceful activities.

5. Five nuclear-weapon States had voluntary offer agreements and additional protocols in force. Safeguards were implemented with regard to declared nuclear material in selected facilities in all five States. For these States, the Secretariat found no indication of the diversion of nuclear material to which safeguards had been applied. On this basis, the Secretariat concluded that, for these States, nuclear material in selected facilities to which safeguards had been applied remained in peaceful activities or had been withdrawn from safeguards as provided for in the agreements.

24 These States do not include the Democratic People's Republic of Korea (DPRK), where the Agency did not implement safeguards and, therefore, could not draw any conclusion.

25 And Taiwan, China

Appendix F: Status of CTBT International Monitoring System Facilities in Australia

Table 24: Status of Australian CTBT IMS facilities at 30 June 2016

Facility	Status	Operator
Primary Seismic Stations		
Warramunga, NT	Operational and certified against CTBTO standards	ANU
Alice Springs, NT	Operational and certified against CTBTO standards	GA/USA
Stephens Creek, NSW	Operational and certified against CTBTO standards	GA
Mawson, Australian Antarctic Territory	Operational and certified against CTBTO standards	GA
Auxiliary Seismic Stations		
Charters Towers, QLD	Operational and certified against CTBTO standards	GA
Fitzroy Crossing, WA	Operational and certified against CTBTO standards	GA
Narrogin, WA	Operational and certified against CTBTO standards	GA
Infrasound Stations		
Warramunga, NT	Operational and certified against CTBTO standards	ANU
Hobart, TAS	Operational and certified against CTBTO standards	GA
Shannon, WA	Operational and certified against CTBTO standards	GA
Cocos Islands	Operational and certified against CTBTO standards	GA
Davis Station, Australian Antarctic Territory	Procurement of infrastructure components completed and pre-deployed at site	GA
Radionuclide Stations		
Melbourne[1], VIC		
Noble Gas	Operational and certified against CTBTO standards	ARPANSA
Perth, WA	Operational and certified against CTBTO standards	ARPANSA
Townsville, QLD	Operational and certified against CTBTO standards	ARPANSA
Darwin[2], NT		
Noble Gas	Operational and certified against CTBTO standards	ARPANSA
Cocos Islands	Operational and certified against CTBTO standards	ARPANSA

Facility	Status	Operator
Macquarie Island, TAS	Operational and certified against CTBTO standards	ARPANSA
Mawson, Australian Antarctic Territory	Operational and certified against CTBTO standards	ARPANSA
Radionuclide Laboratory		
Melbourne, VIC	Operational and certified against CTBTO standards	ARPANSA
Hydroacoustic Stations		
Cape Leeuwin, WA	Operational and certified against CTBTO standards	GA

(1) In addition to the IMS particulate monitoring station at Melbourne, an IMS Phase III noble gas monitoring system was certified on 30 November 2015.

(2) In addition to the IMS particulate monitoring station at Darwin, an IMS Phase III noble gas monitoring system was certified on 23 December 2015.

Appendix G: Australian Nuclear Security Profile

1. International Legal Framework

Instrument	Status	Date
Convention on the Physical Protection of Nuclear Material	Ratified	22/09/1987
+ 2005 Amendment	Ratified	17/07/2008
+ Information pursuant to Article 14.1	Submitted	27/09/1991
	Updated	04/03/2014
International Convention for the Suppression of Acts of Nuclear Terrorism	Ratified	16/03/2012
UNSCR 1540 Committee Approved Matrix	Report submitted	30/12/2010
UNSCR 1540 (S/AC.44/2004/(02)/53)	Report submitted	28/10/2004
UNSCR 1540 (S/AC.44/2004/(02)/53/Add.1)	Report approved	09/11/2005
UNSCR 1540 (S/AC.44/2004/(02)/53/Add.2)	Report approved	23/12/2015

2. Nuclear Security related Initiatives, Partnerships and Groups

Initiative, Partnership or Group	Status	Year Joined
Global Initiative to Combat Nuclear Terrorism (GICNT)	Founding Member	2006
Global Partnership	Participant	2004
Proliferation Security Initiative	Participant	2003
INTERPOL	Member	1948

3. Domestic Nuclear Security

Nuclear Regulatory Authorities	Web-site
Australian Safeguards and Non-Proliferation Office (Nuclear material and nuclear facility security)	www.dfat.gov.au/asno
Australian Radiation Protection and Nuclear Safety Agency (Radioactive sources security and emergency response for the Commonwealth)	www.arpansa.gov.au
Key Legislation (available on www.comlaw.gov.au)	
Nuclear Non-Proliferation (Safeguards) Act 1987	
Australian Radiation Protection and Nuclear Safety Act 1998	
Weapons of Mass Destruction Act 1995	
Customs Act 1901	
Customs (Prohibited Imports) Regulations 1956 & Customs (Prohibited Exports) Regulations 1958	
IAEA Recommendations	Australia is a co-sponsor of INFCIRC/869. Implementation of INFCIRC/225/Rev.5 (NSS-13) is a licence requirement for all nuclear facilities.
Design Basis Threat	Year of revisions: 2012, 2002, 1990.

4. Radioactive Sources

Item	Status
Support for Code of Conduct on the Safety and Security of Radioactive Sources	Australian support confirmed through political commitment pursuant to GC(47)/RES/7
Supplementary Guidance on the Import and Export of Radioactive Sources	Australian support confirmed through political commitment pursuant to GC(48)/RES/10
National Register	National sealed sources register: Category 1 and 2

5. Peer Review

Type	Years
International Physical Protection Advisory Service (IPPAS)	November 2013
US Bilateral Security Visits pursuant to Australia-US Nuclear Cooperation Agreement	1976, 1987, 1991, 1997, 2003, 2005, 2013
Integrated Regulatory Review Service (IRRS)	2007, 2011

6. Nuclear Forensics and Detection:

Type	Status	Years
GICNT Nuclear Forensics Working Group	Chair	2010 – present
GICNT Response and Mitigation Working Group	Participant	2011 – present
GICNT Nuclear Detection Working Group	Participant	2010 – present
Nuclear Forensics International Technical Working Group (ITWG)	Participant	2003 – present

7. Major Support and Involvement with the IAEA

Activity	Detail	Year(s)
Advisory Group on Nuclear Security (AdSec)	Member	2013 – present
Nuclear Security Guidance Committee (NSGC)	Member	2012 – present
Emergency Preparedness and Response Expert Group	Member	2012 – present
IAEA Coordinated Research Project on the Identification of High Confidence Nuclear Forensic Signatures for the Development of Nuclear Forensics Libraries	Project agreement	2012 – 2016
IAEA Radioactive Source Security Working Group	Member	2012 – present
Code of Conduct on the Safety and Security of Radioactive Sources	Chairs experts group on information exchange	2007 – 2013
Development and review of Nuclear Security Series documents	Expert consultant	2003 – present
Incident and Trafficking Database	Member	1995 – present
Analytical Laboratories for the Measurement of Environmental RadioActivity (ALMERA)	Member	1995 – present
Nuclear Security Fund	Contributor	2002, 2006, 2007, 2009, 2013, 2014
International Physical Protection Advisory Service (IPPAS) Missions	Team members	2002, 2003, 2005(2), 2013(2), 2014(2), 2015(3), 2016(1)
IAEA Nuclear Security Training Courses and other courses led by the IAEA Division of Nuclear Security	Expert consultants and presenters	Ongoing

Activity	Detail	Year(s)
Major Past Activities		
IAEA International Conference on Advances in Nuclear Forensics	Presenter	2014
IAEA Coordinated Research Project on the Application of Nuclear Forensics in Combating Illicit Trafficking of Nuclear and Other Radioactive Material	Project agreement	2008 – 2012
Amendment to the Convention on Physical Protection of Nuclear Material	Chaired Committee of the Whole at the Diplomatic Conference	2005

8. Contributions to Outreach and Capacity Building

Activity/Event	Date
Events	
ANSTO-BATAN Knowledge exchange on nuclear forensics	November 2016
GICNT Nuclear Forensics Working Group Experts Meeting, Italy	November 2016
GICNT 10th Anniversary Meeting, the Netherlands	June 2016
GICNT "Kangaroo Harbour" workshop and exercise, Sydney	May 2016
Sponsored the Nuclear Security Summit Gift Basket Joint Statement on Forensics in Nuclear Security	March 2016
IAEA Regional Training Course on Threat Assessment and a Risk Informed Approach for Nuclear Security Measures for Nuclear and Other Radioactive Material Out of Regulatory Control	December 2015
GICNT 'Blue Raven' workshop and exercise, UK	November 2015
GICNT Nuclear Forensics Working Group Experts Meeting, USA	October 2015
National Workshop on IPPAS Missions – Kuala Lumpur, Malaysia	June 2015
GICNT "Sugong Bagani: Envoy Warrior" workshop and exercise, Manila	April 2015
Nuclear Security Summit Drafting Group Meeting on Action Plan for IAEA, Canberra	April 2015
AISC Program: Nuclear Forensics: Enhancing nuclear security in Indonesia through knowledge sharing	December 2014
15th Ministerial Level Meeting of the Forum for Nuclear Cooperation in Asia (FNCA), Sydney	November 2014
4th Workshop on Nuclear Security and Safeguards Project, Forum for Nuclear Cooperation in Asia (FNCA), Daejeon, Korea	November 2014
Regional Workshop on Integrated Nuclear Security Support Plans, Yogyakarta, Indonesia	August 2014
National Workshop on IPPAS Missions – Jakarta, Indonesia	July 2014
ANSTO/BATAN Information exchange on nuclear forensics	June 2014
Fourth Regional Review Meeting on Radioactive Source Security, Thailand	February 2014
GICNT Joint Working Group Activity "Tiger Reef" on Radiological Crime Scene Management, Malaysia	February 2014
IAEA training course on Nuclear Forensics Methodologies	October 2013
IAEA ANSN training course on *Preparation, Conduct and Evaluation* of exercises for nuclear safety and security events at nuclear facilities, Indonesia	September 2013
2nd ASEAN Regional Forum Workshop on Nuclear Forensics	September 2013
Technical Visit to Australia on the Implementation of Nuclear Security for the Uranium Industry	June 2013
IAEA Regional Workshop on nuclear security for Pacific Island States, Fiji	April 2013

Activity/Event	Date
Programs	
Working group on nuclear security (Asia-Pacific Safeguards Network)	2011 – present
Regional Security of Radioactive Sources Project	2004-2013

Appendix H: Information Publication Scheme Statement

Agencies subject to the *Freedom of Information Act 1982* (FOI Act) are required to publish information for the public as part of the Information Publication Scheme (IPS). This requirement is in Part II of the FOI Act and has replaced the former requirement to publish a section 8 statement in an annual report. Each agency must display on its website a plan showing what information it publishes in accordance with the IPs requirements.

An agency plan showing what information is published in accordance with IPS requirements is accessible from http://www.dfat.gov.au/foi/ips.html.

Agencies subject to the *Freedom of Information Act 1982* (FOI Act) are required to publish information to the public as part of the Information Publication Scheme (IPS). This requirement is in Part II of the FOPI Act and has replaced the former requirement to publish a section 8 statement in an annual report. Each agency must display on its website a plan showing what information it publishes In accordance with the IPs requirements.

An agency plan showing what information is published in accordance with IPS requirements is accessible from http://www.dfat.gov.au/foi/ips.html.

Presentations and Submissions

ASNO produced a range of publications and conducted various presentations to increase community awareness and understanding of ASNO responsibilities and issues for which it has expertise. ASNO also made a number of submissions to Parliamentary and other inquiries. These include:

Stephan Bayer, Australia and the Nuclear Security Summits, presentation at the 40th Annual Conference of the Australasian Radiation Protection Society, Canberra, 7 October 2015

Malcolm Coxhead, Use of force and International Law. Presentation at the University Diplomacy Conference, UNSW, Kensington, Australia, 19 July, 2015

Malcolm Coxhead, WMD Proliferation and Australia's National Security. Presentation at the National Security College, EL2 Development Program, Canberra, May 2016

Craig Everton, "In Defence of the Evolution of IAEA Safeguards", Chapter 3 of Verification & Implementation, a Biennial Collection of Analysis on International Agreements for Security and Development, VERTIC publication, Jakarta, Indonesia, December 2015

Craig Everton, "Safeguarding Uranium Production and Export - Conventional and Non-Conventional Resources", Journal of Nuclear Material Management, 2015, Vol. XLIII, No. 4

Craig Everton, "Civil/Peaceful Uses of Nuclear Energy and Australia's Role: Uranium Exports & Safeguards", presentation at National Security College, Nuclear Policy and National Security course, 16 February 2016

Craig Everton, Martin Lyons, "ASNO Permit Basics - IAEA Safeguards and Physical Protection", presentation at permit holder workshop, ANU, Canberra 25 February 2016

Rob Floyd, Submission to the South Australia Nuclear Fuel Cycle Royal Commission, Adelaide, 25 November 2015

Rob Floyd, Australian Safeguards and Non-Proliferation Office (ASNO). Presentation at Joint Committee Meeting, Mumbai, 17 June 2016

Rob Floyd, Global Nuclear Non-Proliferation System, Implications for Nuclear Fuel Cycle Activities in Australia. Presentation at AusIMM International Uranium Conference 2016, Adelaide, 7-8 June 2016

John Kalish, A Nuclear Iran: Implications of the Joint Comprehensive Plan of Action. Presentation to the Joint Standing Committee on Foreign Affairs, Defence and Trade, Parliament House, Canberra, 15 September 2015

John Kalish, The History and Evolution of IAEA Safeguards: An Australian Perspective. Keynote presentation at the 40th Annual Conference of the Australasian Radiation Protection Society, Canberra, 6-9 October 2015

John Kalish, Radioactive waste management: Current Status in Australia. Presentation at the Reliable Nuclear Fuel Services Working Group, International Framework for Nuclear Energy Cooperation, Paris, France, 9 May 2016

Martin Lyons, Safeguards and Security of Uranium Products in Australia. Presentation at the Australasian Institute of Mining and Metallurgy (AusIMM) International Uranium conference, Adelaide, 8 June, 2016

Josy Meyer, Australia's Experience Implementing the CWC. Presentation to Department of Defence representatives, DFAT, Canberra, 14 September 2015

Josy Meyer, Australia's Experience Implementing the CWC. Presentation to the Drug Control Section at Therapeutic Goods Administration, Department of Health, Canberra, 11 November 2015

Josy Meyer, The CWC and Regulatory Requirements for Importers and Exporters of Schedule 2 and Schedule 3 Chemicals. Presentation to a chemical trader during an on-site visit, Melbourne, 18 November 2015

Josy Meyer, The CWC and Regulatory Requirements for Schedule 1 Facilities. Presentation to a CWC-Schedule 1 chemical facility during an on-site visit, Melbourne, 18 November 2015

Josy Meyer, The CWC and Regulatory Requirements for Schedule 2 Facilities. Presentations to facilities processing Schedule 2 chemicals during on-site visits, Melbourne, 18-19 May 2016

Josy Meyer and Ian D'Souza, The CWC and Regulatory Requirements for Discrete Organic Chemical Production Facilities. Presentations to facilities producing discrete organic chemicals during on-site visits, Melbourne, 18-19 May 2016 and 22 June 2016

Vanessa Robertson, Australia: Nuclear Cooperation Agreements. Presentation at the US Nuclear Materials Management and Safeguards System (NMMSS) Annual Conference, New Orleans, USA 9-12 May 2016

Craig Schenk (with written contribution from Josy Meyer), Australia's Chemical Trade Controls, Presentation at an OPCW Seminar on Chemical Trade: Current Practices and Challenges, Rizhao City, Shandong Province, China 16-17 June 2016

List of Requirements

PGPA Rule Reference	Part of Report	Description	Requirement
17AD(g)	**Letter of transmittal**		
17AI	p3	A copy of the letter of transmittal signed and dated by accountable authority on date final text approved, with statement that the report has been prepared in accordance with section 46 of the Act and any enabling legislation that specifies additional requirements in relation to the annual report.	Mandatory
17AD(h)	**Aids to access**		
17AJ(a)	p5	Table of contents.	Mandatory
17AJ(b)	pX	Alphabetical index.	Mandatory
17AJ(c)	pX	Glossary of abbreviations and acronyms.	Mandatory
17AJ(d)	pX	List of requirements.	Mandatory
17AJ(e)	Back Page	Details of contact officer.	Mandatory
17AJ(f)	Back Page	Entity's website address.	Mandatory
17AJ(g)	Back Page	Electronic address of report.	Mandatory
17AD(a)	**Review by accountable authority**		
17AD(a)	p3	A review by the accountable authority of the entity.	Mandatory
17AD(b)	**Overview of the entity**		
17AE(1)(a)(i)	Section 3	A description of the role and functions of the entity.	Mandatory
17AE(1)(a)(ii)	Section 5	A description of the organisational structure of the entity.	Mandatory
17AE(1)(a)(iii)	Section 3	A description of the outcomes and programmes administered by the entity.	Mandatory
17AE(1)(a)(iv)	Section 3	A description of the purposes of the entity as included in corporate plan.	Mandatory
17AE(1)(b)	DFAT	An outline of the structure of the portfolio of the entity.	Portfolio departments mandatory
17AE(2)	DFAT	Where the outcomes and programmes administered by the entity differ from any Portfolio Budget Statement, Portfolio Additional Estimates Statement or other portfolio estimates statement that was prepared for the entity for the period, include details of variation and reasons for change.	If applicable, Mandatory
17AD(c)	**Report on the Performance of the entity**		
	Annual performance Statements		
17AD(c)(i); 16F	DFAT	Annual performance statement in accordance with paragraph 39(1)(b) of the Act and section 16F of the Rule.	Mandatory
17AD(c)(ii)	***Report on Financial Performance***		
17AF(1)(a)	DFAT	A discussion and analysis of the entity's financial performance.	Mandatory
17AF(1)(b)	DFAT	A table summarising the total resources and total payments of the entity.	Mandatory

PGPA Rule Reference	Part of Report	Description	Requirement
17AF(2)	DFAT	If there may be significant changes in the financial results during or after the previous or current reporting period, information on those changes, including: the cause of any operating loss of the entity; how the entity has responded to the loss and the actions that have been taken in relation to the loss; and any matter or circumstances that it can reasonably be anticipated will have a significant impact on the entity's future operation or financial results.	If applicable, Mandatory.
17AD(d)	**Management and Accountability**		
	Corporate Governance		
17AG(2)(a)	DFAT	Information on compliance with section 10 (fraud systems)	Mandatory
17AG(2)(b)(i)	DFAT	A certification by accountable authority that fraud risk assessments and fraud control plans have been prepared.	Mandatory
17AG(2)(b)(ii)	DFAT	A certification by accountable authority that appropriate mechanisms for preventing, detecting incidents of, investigating or otherwise dealing with, and recording or reporting fraud that meet the specific needs of the entity are in place.	Mandatory
17AG(2)(b)(iii)	DFAT	A certification by accountable authority that all reasonable measures have been taken to deal appropriately with fraud relating to the entity.	Mandatory
17AG(2)(c)	DFAT	An outline of structures and processes in place for the entity to implement principles and objectives of corporate governance.	Mandatory
17AG(2)(d) – (e)	DFAT	A statement of significant issues reported to Minister under paragraph 19(1)(e) of the Act that relates to non compliance with Finance law and action taken to remedy non compliance.	If applicable, Mandatory
	External Scrutiny		
17AG(3)	DFAT	Information on the most significant developments in external scrutiny and the entity's response to the scrutiny.	Mandatory
17AG(3)(a)	n/a	Information on judicial decisions and decisions of administrative tribunals and by the Australian Information Commissioner that may have a significant effect on the operations of the entity.	If applicable, Mandatory
17AG(3)(b)	n/a	Information on any reports on operations of the entity by the Auditor General (other than report under section 43 of the Act), a Parliamentary Committee, or the Commonwealth Ombudsman.	If applicable, Mandatory
17AG(3)(c)	n/a	Information on any capability reviews on the entity that were released during the period.	If applicable, Mandatory
	Management of Human Resources		
17AG(4)(a)	DFAT	An assessment of the entity's effectiveness in managing and developing employees to achieve entity objectives.	Mandatory

PGPA Rule Reference	Part of Report	Description	Requirement
17AG(4)(b)	DFAT	Statistics on the entity's APS employees on an ongoing and non ongoing basis; including the following: • Statistics on staffing classification level; • Statistics on full-time employees; • Statistics on part-time employees; • Statistics on gender; • Statistics on staff location; • Statistics on employees who identify as Indigenous.	Mandatory
17AG(4)(c)	DFAT	Information on any enterprise agreements, individual flexibility arrangements, Australian workplace agreements, common law contracts and determinations under subsection 24(1) of the *Public Service Act 1999*.	Mandatory
17AG(4)(c)(i)	DFAT	Information on the number of SES and non SES employees covered by agreements etc identified in paragraph 17AD(4)(c).	Mandatory
17AG(4)(c)(ii)	DFAT	The salary ranges available for APS employees by classification level.	Mandatory
17AG(4)(c)(iii)	DFAT	A description of non salary benefits provided to employees.	Mandatory
17AG(4)(d)(i)	DFAT	Information on the number of employees at each classification level who received performance pay.	If applicable, Mandatory
17AG(4)(d)(ii)	DFAT	Information on aggregate amounts of performance pay at each classification level.	If applicable, Mandatory
17AG(4)(d)(iii)	DFAT	Information on the average amount of performance payment, and range of such payments, at each classification level.	If applicable, Mandatory
17AG(4)(d)(iv)	DFAT	Information on aggregate amount of performance payments.	If applicable, Mandatory
	Assets Management		
17AG(5)	DFAT	An assessment of effectiveness of assets management where asset management is a significant part of the entity's activities.	If applicable, mandatory
	Purchasing		
17AG(6)	DFAT	An assessment of entity performance against the *Commonwealth Procurement Rules*.	Mandatory
	Consultants		
17AG(7)(a)	DFAT	A summary statement detailing the number of new contracts engaging consultants entered into during the period; the total actual expenditure on all new consultancy contracts entered into during the period (inclusive of GST); the number of ongoing consultancy contracts that were entered into during a previous reporting period; and the total actual expenditure in the reporting year on the ongoing consultancy contracts (inclusive of GST).	Mandatory

PGPA Rule Reference	Part of Report	Description	Requirement
17AG(7)(b)	DFAT	A statement that "*During [reporting period], [specified number] new consultancy contracts were entered into involving total actual expenditure of $[specified million]. In addition, [specified number] ongoing consultancy contracts were active during the period, involving total actual expenditure of $[specified million]*".	Mandatory
17AG(7)(c)	DFAT	A summary of the policies and procedures for selecting and engaging consultants and the main categories of purposes for which consultants were selected and engaged.	Mandatory
17AG(7)(d)	DFAT	A statement that "*Annual reports contain information about actual expenditure on contracts for consultancies. Information on the value of contracts and consultancies is available on the AusTender website.*"	Mandatory
	Australian National Audit Office Access Clauses		
17AG(8)	DFAT	If an entity entered into a contract with a value of more than $100 000 (inclusive of GST) and the contract did not provide the Auditor General with access to the contractor's premises, the report must include the name of the contractor, purpose and value of the contract, and the reason why a clause allowing access was not included in the contract.	If applicable, Mandatory
	Exempt contracts		
17AG(9)	DFAT	If an entity entered into a contract or there is a standing offer with a value greater than $10 000 (inclusive of GST) which has been exempted from being published in AusTender because it would disclose exempt matters under the FOI Act, the annual report must include a statement that the contract or standing offer has been exempted, and the value of the contract or standing offer, to the extent that doing so does not disclose the exempt matters.	If applicable, Mandatory
	Small business		
17AG(10)(a)	DFAT	A statement that "[Name of entity] supports small business participation in the Commonwealth Government procurement market. Small and Medium Enterprises (SME) and Small Enterprise participation statistics are available on the Department of Finance's website."	Mandatory
17AG(10)(b)	DFAT	An outline of the ways in which the procurement practices of the entity support small and medium enterprises.	Mandatory
17AG(10)(c)	DFAT	If the entity is considered by the Department administered by the Finance Minister as material in nature—a statement that "[Name of entity] recognises the importance of ensuring that small businesses are paid on time. The results of the Survey of Australian Government Payments to Small Business are available on the Treasury's website."	If applicable, Mandatory
	Financial Statements		

PGPA Rule Reference	Part of Report	Description	Requirement
17AD(e)	DFAT	Inclusion of the annual financial statements in accordance with subsection 43(4) of the Act.	Mandatory
17AD(f)	**Other Mandatory Information**		
17AH(1)(a)(i)	DFAT	If the entity conducted advertising campaigns, a statement that "*During [reporting period], the [name of entity] conducted the following advertising campaigns: [name of advertising campaigns undertaken]. Further information on those advertising campaigns is available at [address of entity's website] and in the reports on Australian Government advertising prepared by the Department of Finance. Those reports are available on the Department of Finance's website.*"	If applicable, Mandatory
17AH(1)(a)(ii)	DFAT	If the entity did not conduct advertising campaigns, a statement to that effect.	If applicable, Mandatory
17AH(1)(b)	DFAT	A statement that "*Information on grants awarded to [name of entity] during [reporting period] is available at [address of entity's website].*"	If applicable, Mandatory
17AH(1)(c)	DFAT	Outline of mechanisms of disability reporting, including reference to website for further information.	Mandatory
17AH(1)(d)	DFAT	Website reference to where the entity's Information Publication Scheme statement pursuant to Part II of FOI Act can be found.	Mandatory
17AH(1)(e)	NA	Correction of material errors in previous annual report	If applicable, mandatory
17AH(2)	Section 4	Information required by other legislation	Mandatory

Glossary

Additional Protocol (AP)	An agreement designed to complement a state's safeguards agreement with the IAEA in order to strengthen the effectiveness and improve the efficiency of the safeguards system. The model text of the Additional Protocol is set out in IAEA document INFCIRC/540.
ANSTO	Australian Nuclear Science and Technology Organisation
APSN	Asia-Pacific Safeguards Network
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASSP	Australian Safeguards Support Program
Australian Obligated Nuclear Material (AONM)	Australian uranium and nuclear material derived therefrom, which is subject to obligations pursuant to Australia's bilateral safeguards agreements.
BAPETEN	Indonesian Nuclear Energy Regulatory Agency (Badan Pengawas Tenaga Nuklir)
BWC	Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction. Also known as the Biological Weapons Convention.
Challenge Inspection	(For CWC purposes) an inspection, requested by a CWC State Party, of any facility or location in the territory or in any other place under the jurisdiction or control of another State Party.
Complementary Access	The right of the IAEA, pursuant to the Additional Protocol, for access to a site or location to carry out verification activities.
Comprehensive Safeguards Agreement (CSA)	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 IAEA document INFCIRC/153 (corrected).
Concise Note	Supplementary explanatory notes on formal reports from a national safeguards authority to the IAEA.
Conversion	Purification of uranium ore concentrates or recycled nuclear material and conversion to a chemical form suitable for isotopic enrichment or fuel fabrication.
CPPNM	Convention on the Physical Protection of Nuclear Material
CTBT	Comprehensive Nuclear-Test-Ban Treaty
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization. The Vienna-based international organisation established at entry into force of the CTBT to ensure the implementation of its provisions.
Customs	Australian Customs & Border Protection Service
CWC	Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction. Also known as the Chemical Weapons Convention.
CWC-Scheduled Chemicals	Chemicals listed in the three Schedules to the Chemical Weapons Convention. Some are chemical warfare agents and others are dual-use chemicals (that can be used in industry or in the manufacture of chemical warfare agents).
Department of Defence	Australian Department of Defence
Depleted Uranium (DU)	Uranium with a ^{235}U content less than that found in nature (e.g. as a result of uranium enrichment processes).
DFAT	Department of Foreign Affairs and Trade
Direct-Use Material	Nuclear material defined for safeguards purposes as being usable for nuclear explosives without transmutation or further enrichment, e.g. plutonium, HEU and ^{233}U.

Discrete Organic Chemical (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 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, also known as North Korea.
DSTO	Defence Science and Technology Organisation
Enrichment	A physical or chemical process for increasing the proportion of a particular isotope. Uranium enrichment involves increasing the proportion of ^{235}U from its level in natural uranium, 0.711%. For LEU fuel the proportion of ^{235}U (the enrichment level) is typically increased to between 3% and 5%.
Euratom	Atomic Energy Agency of the European Union. Euratom's safeguards office, called the Directorate-General of Energy E – Nuclear Safeguards, is responsible for the application of safeguards to all nuclear material in Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden; and to all nuclear material in civil facilities in France and the United Kingdom.
Facility	(For CWC purposes) a plant, plant site or production/processing unit. (For safeguards purposes) a reactor, critical facility, conversion plant, fabrication plant, reprocessing plant, isotope separation plant, separate storage location, or any location where safeguards-significant amounts of nuclear material are customarily used.
Fissile	Referring to a nuclide capable of undergoing fission by neutrons of any energy, including 'thermal' neutrons (e.g. ^{233}U, ^{235}U, ^{239}Pu and ^{241}Pu).
Fissile Material Cut-off Treaty (FMCT)	A proposed international treaty to prohibit production of fissile material for nuclear weapons.
Fission	The splitting of an atomic nucleus into roughly equal parts, often by a neutron. In a fission reaction, a neutron collides with a fissile nuclide (e.g. ^{235}U) that then splits, releasing energy and further neutrons. Some of these neutrons may go on to collide with other fissile nuclei, setting up a nuclear chain reaction.
Fissionable	Referring to a nuclide capable of undergoing fission by 'fast' neutrons (e.g. ^{233}U, ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{241}Pu and ^{242}Pu).
Full-Scope Safeguards	The application of IAEA safeguards to all of a state's present and future nuclear activities. Now more commonly referred to as comprehensive safeguards.
GA	Geoscience Australia
GW	Gigawatt (Giga = billion, 10^9)
GWe	Gigawatts of electrical power
GWt	Gigawatts of thermal power
Heavy Water (D_2O)	Water enriched in the 'heavy' hydrogen isotope deuterium (^2H) which consists of a proton and a neutron. D_2O occurs naturally as about one part in 6000 of ordinary water. D_2O is a very efficient moderator, enabling the use of natural uranium in a nuclear reactor.
HIFAR	High Flux Australian Reactor. The 10 MWt research reactor located at ANSTO, Lucas Heights. Undergoing decommissioning.
High enriched uranium (HEU)	Uranium enriched to 20% or more in ^{235}U. Weapons-grade HEU is enriched to over 90% ^{235}U.

Hydroacoustic	Term referring to underwater propagation of pressure waves (sounds). One category of CTBT IMS station monitoring changes in water pressure generated by sound waves in the water.
IAEA	International Atomic Energy Agency
Indirect-Use Material	Nuclear material that cannot be used for a nuclear explosive without transmutation or further enrichment (e.g. depleted uranium, natural uranium, LEU and thorium).
INFCIRC	IAEA Information Circular. A series of documents published by the IAEA setting out, inter alia, safeguards, physical protection and export control arrangements.
INFCIRC/153 (Corrected)	The model agreement used by the IAEA as a basis for comprehensive safeguards agreements with non-nuclear-weapon states party to the NPT.
INFCIRC/225 Rev.5 (Corrected)	IAEA document entitled 'Nuclear Security Recommendations on Physical Protection of Nuclear Materials and Nuclear Facilities'. Its recommendations reflect a consensus of views among IAEA Member States on desirable requirements for physical protection measures on nuclear material and facilities, that is, measures taken for their physical security.
INFCIRC/540 (Corrected)	The model text of the Additional Protocol.
INFCIRC/66 Rev.2	The model safeguards agreement used by the IAEA since 1965. Essentially, this agreement is facility-specific. For NNWS party to the NPT it has been replaced by INFCIRC/153.
Infrasound	Sound in the frequency range of about 0.02 to 4 Hertz. One category of CTBT IMS stations will monitor sound at these frequencies with the aim of detecting explosive events such as a nuclear test explosion at a range up to 5000 km.
Integrated safeguards	The optimum combination of all safeguards measures under comprehensive safeguards agreements and the Additional Protocol to achieve maximum effectiveness and efficiency.
International Data Centre (IDC)	Data gathered by monitoring stations in the CTBT IMS network are compiled, analysed to identify events and archived by the Vienna-based IDC. IDC products giving the data about events are made available to CTBT signatories.
International Framework for Nuclear Energy Cooperation (IFNEC)	An international forum for cooperation on the use of nuclear energy for peaceful purposes that is efficient, safe and secure and does not aid proliferation.
International Monitoring System (IMS)	A network of 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 nuclear explosion.
Inventory Change Report (ICR)	A formal report from a national safeguards authority to the IAEA on changes to nuclear materials inventories in a given period.
Isotopes	Nuclides with the same number of protons, but different numbers of neutrons, e.g. ^{235}U (92 protons and 143 neutrons) and ^{238}U (92 protons and 146 neutrons). The number of neutrons in an atomic nucleus, while not significantly altering its chemistry, does alter its properties in nuclear reactions. As the number of protons is the same, isotopes are different forms of the same chemical element.
Light water	H_2O. Ordinary water.
Light water reactor (LWR)	A power reactor which is both moderated and cooled by ordinary (light) water. In this type of reactor, the uranium fuel must be slightly enriched (that is, LEU).
Low Enriched Uranium (LEU)	Low Enriched Uranium. Uranium enriched to less than 20% ^{235}U. Commonly, LEU used as fuel in light water reactors is enriched to between 3% and 5% ^{235}U.

Material Balance Area (MBA)	A delineation for nuclear accounting purposes as required under comprehensive safeguards agreements. It is a defined and delineated area in or outside of a facility such that: (a) the quantity of nuclear material in each transfer into or out of the material balance area can be determined; and (b) The physical inventory of nuclear material in the material balance area can be determined, in order that the nuclear material balance can be established for IAEA safeguards purposes.
Material Balance Report (MBR)	A formal report from a national safeguards authority to the IAEA comparing consolidated inventory changes in a given period with the verified inventories at the start and end of that period.
Mixed oxide fuel (MOX)	Mixed oxide reactor fuel, consisting of a mixture of uranium and plutonium oxides. The plutonium content of fresh MOX fuel for an LWR is typically around 5–7%.
Moata	Small training reactor previously located at Lucas Heights.
Moderator	A material used to slow fast neutrons to thermal speeds where they can readily be absorbed by ^{235}U or plutonium nuclei and initiate a fission reaction. The most commonly used moderator materials are light water, heavy water or graphite.
MUF	Material Unaccounted For. A term used in nuclear materials accountancy to mean the difference between operator records and the verified physical inventory. A certain level of MUF is expected due to measurement processes. MUF does not usually indicate 'missing' material – because it is a difference due to measurement, MUF can have either a negative or a positive value.
MWe	Megawatts of electrical power
MWt	Megawatts of thermal power
Natural uranium	In nature, uranium consists predominantly of the isotope ^{238}U (approx. 99.3%), with the fissile isotope ^{235}U comprising only 0.711%.
Non-nuclear-weapon state(s) (NNWS)	States not recognised by the NPT as having nuclear weapons at 1 January 1967 when the Treaty was negotiated.
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
Nuclear material	Any source material or special fissionable material as defined in Article XX of the IAEA Statute (in practice, this means uranium, thorium and plutonium).
Nuclear-weapon state(s) (NWS)	States recognised by the NPT as having nuclear weapons at 1 January 1967 when the Treaty was negotiated, namely the United States, Russia, the United Kingdom, France and China.
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.
Old Chemical Weapons (OCW)	Defined under the Chemical Weapons Convention as: a. chemical weapons produced before 1925; or b. chemical weapons produced between 1925 and 1946 that have deteriorated to such extent that they can no longer be used as chemical weapons.
On-Site Inspection (OSI)	A short-notice, challenge-type inspection provided for in the CTBT as a means for investigating concerns about non-compliance with the prohibition on nuclear explosions.
OPAL	Open Pool Australian Light-Water reactor. The 20 MWt research reactor located at ANSTO, Lucas Heights, reached full power on 3 November 2006 and was officially opened on 20 April 2007.
OPCW	Organisation for the Prohibition of Chemical Weapons

Other Chemical Production Facility (OCPF)	Defined under the Chemical Weapons Convention as all plant sites that: a. produced by synthesis during the previous calendar year more than 200 tonnes of unscheduled discrete organic chemicals; or b. comprised one or more plants which produced by synthesis during the previous calendar year more than 30 tonnes of an unscheduled discrete organic chemical containing the elements phosphorus, sulphur or fluorine.
Physical Inventory Listing (PIL)	A formal report from a national safeguards authority to the IAEA on nuclear materials inventories at a given time (generally the end of a Material Balance Report period).
PrepCom	Preparatory Commission. In this report the term is used for the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization.
Production	(For CWC purposes) the formation of a chemical through chemical reaction. Production of chemicals specified by the CWC is declarable, even if produced as intermediates and irrespective of whether or not they are isolated.
PTS	Provisional Technical Secretariat for the CTBTO Preparatory Commission
^{239}Pu	An isotope of plutonium with atomic mass 239 (94 protons and 145 neutrons). The fissile isotope of plutonium most suitable for nuclear weapons.
R&D	Research and Development
Radionuclide	An isotope with an unstable nucleus that disintegrates and emits energy in the process. Radionuclides may occur naturally, but they can also be artificially produced, and are often called radioisotopes. One category of CTBT IMS stations will detect radionuclide particles in the air. Other IMS stations are equipped with radionuclide noble gas technology to detect the abundance of the noble gas xenon in the air.
Reprocessing	Processing of spent nuclear fuel to separate uranium and plutonium from highly radioactive fission products.
Safeguards Inspector	For domestic purposes, person declared under section 57 of the Safeguards Act to undertake inspections to ensure compliance with provisions of the Act and to assist IAEA Inspectors in the conduct of Agency inspections and complementary access in Australia.
Schedule 2A/2A*	These are toxic Part A Schedule 2 chemicals (2A: Amiton and PFIB, 2A*: BZ) listed under the CWC.
Seismic	Referring to the movements of the ground that can be generated by earthquakes, explosions etc. The seismic element of the CTBT monitoring system is a network of 50 primary stations and 120 auxiliary stations. Analysis of seismic waves can be used to distinguish between earthquakes and explosive events.
SLC	State-level concept
Small Quantities Protocol (SQP)	A protocol to a state's safeguards agreement with the IAEA, for states with small quantities of nuclear material and no nuclear facilities. The protocol holds in abeyance most of the provisions of the state's safeguards agreement.
Source Material	Uranium containing the mixture of isotopes occurring in nature; uranium depleted In the isotope uranium-235; thorium; or any of the foregoing in the form of metal, alloy, chemical compound, or concentrates.
Special Fissionable Material	Plutonium-239; uranium-233; uranium enriched in the isotopes 235 or 233; any material containing one or more of the foregoing. The term special fissionable material does not include source material.
Standing Advisory Group on Safeguard Implementation (SAGSI)	An international group of experts appointed by, and advising, the IAEA Director General on safeguards implementation matters.
^{232}Th	The only naturally occurring isotope of thorium, having an atomic mass of 232 (90 protons and 142 neutrons).

^{233}U	An isotope of uranium containing 233 nucleons, usually produced through neutron irradiation of ^{232}Th.
^{235}U	An isotope of uranium containing 235 nucleons (92 protons and 143 neutrons) which occurs as 0.711% of natural uranium.
^{238}U	An isotope of uranium containing 238 nucleons (92 protons and 146 neutrons) which occurs as about 99.3% of natural uranium.
UNSCR	United Nations Security Council Resolution
Uranium ore concentrate (UOC)	A commercial product of a uranium mill usually containing a high proportion (greater than 90%) of uranium oxide.
Weapons of Mass Destruction (WMD)	Refers to nuclear, chemical, biological and occasionally radiological weapons.

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