



Australian Government

Australian Safeguards and Non-Proliferation Office

# ANNUAL REPORT

2016–2017







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#### **Cover**

Photo 1: Nuclear fuel rod assembly

Photo 2: Medical imaging

Photo 3: Uranium ore concentrate

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**Australian Government**

**Australian Safeguards and Non-Proliferation Office**

6 October 2017

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 2017. 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

A handwritten signature in black ink that reads "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 2016–17 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 2016–17
- 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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A close-up photograph of a metal mesh with a grid of circular holes. A diagonal rod or pipe runs across the mesh from the top-left towards the bottom-right. The lighting is dramatic, with strong highlights and deep shadows, giving it an industrial and technical appearance. The mesh is dark, and the rod is a lighter, metallic blue-grey color.

# DIRECTOR GENERAL'S REPORT

# 1

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## SECTION

# Director General's Report

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# 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 2016–17 reporting period included the detonation of a fifth nuclear device by the Democratic People's (Republic of Korea DPRK – or North Korea) and the continued development of missile delivery systems. The use of chemical weapons in the Syria conflict is an ongoing source of concern with evidence of use by both the Syrian regime and non-state actors. The Iranian nuclear program remains a concern, however, the requirements of the Joint Comprehensive Plan of Action (JCPOA) continue to restrict the programs activities, most notably to increase the breakout time of the Iranian nuclear program.

On 9 September 2016 the DPRK announced that it had conducted its fifth nuclear test. Analysis of seismic data collected by the International Monitoring System of the Comprehensive Nuclear-Test-Ban Treaty

Organization estimated that this was the DPRK's largest test to date with an explosive yield estimated at 6.4 kT. The international community has been unable to detect any fission products from the test at the P'unggye nuclear test site, but the majority of analysts have concluded that this was a test of a simple fission device.

Shortly after the 9 September test the Korean Central News Agency (KCNA) stated the DPRK now had the ability to produce nuclear weapons small enough to fit onto a missile and that they can retaliate against any attack. These claims are particularly troubling, particularly when considered along with the frequent testing and rapid development of North Korea's missile systems. Although there is no definitive evidence regarding production by North Korea of a miniaturised nuclear weapon many experts have come to the conclusion that this is becoming more likely. The March 2016 photograph of North Korean leader Kim Jong-un posing with a mock-up of a nuclear weapon, what experts have called the disco ball, provides further evidence of a missile deliverable weapon.

The ongoing use of chemical weapons in the Syrian conflict is of grave concern and highlights the need for continued vigilance and efforts to eliminate these illegal and abhorrent weapons. The Organisation for the Prohibition of Chemical Weapons (OPCW) – United Nations (UN) Joint Investigative Mechanism (JIM), established in 2015 by United Nations Security Council Resolution (UNSCR) 2235, continues its important work to identify those responsible for the use of chemical weapons in Syria.

### International Atomic Energy Agency Safeguards

ASNO assesses that the IAEA safeguards system continues to effectively fulfil its objective of verifying that states uphold their respective non-proliferation commitments. It does this through its combination of boots-on-the-ground inspections of nuclear material inventory, facility design features, and R&D activities; as well as analysis of

information in headquarters. The environment the IAEA operates in is one of ever-increasing quantities of nuclear material under safeguards, as well as an increasing number and complexity of nuclear facilities; as well as its specific demands in verifying and monitoring safeguards in the Islamic Republic of Iran under the Joint Comprehensive Plan of Action (JCPOA). In this environment, the ongoing work of the IAEA to improve the efficiency of its processes and approaches, while not compromising effectiveness, is commendable. In this regard, the IAEA's efforts over 2016 to complete all of the revised State-level approaches for some 64 States as well as its efforts to improve the performance of its safeguards information system under the MOSAIC<sup>1</sup> project, deserve particular mention. The development of State-level approaches for the remaining States is very important and we look forward to seeing the outcomes of this work in the coming few years.

Australia's new State-level approach has been completed by the IAEA. There are minimal changes given the small nuclear footprint in Australia and the fact that the IAEA has many years of experience in implementing State-level approaches in Australia. The key change is the physical inventory verification (PIV) inspections that were held about once every two-three years at ANSTO's storage locations, will now be held annually, in conjunction with the PIV at the OPAL reactor and ANSTO's R&D laboratories.

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 and doing outreach and awareness-raising through international workshops and

meetings. Australia plays a role in this through participating in reviews of safeguards approaches and training courses, such as through DG ASNO's chairing of the Standing Advisory Group on Safeguards Implementation (SAGSI), and through ASNO's membership of the Asia-Pacific Safeguards Network (APSN). A highlight during the year for an APSN initiative was the IAEA regional workshop on safeguards and security for States with Small Quantities Protocol (SQP) safeguards agreements, hosted by ASNO and held in Melbourne in December. This was the first workshop the IAEA had conducted for SQP States, as part of its efforts to improve safeguards and security implementation standards. It was attended by representatives from eight States (Mongolia, Cambodia, Fiji, Laos, Myanmar, Papua New Guinea, Qatar and Tonga).

## Domestic Safeguards

In 2016, the IAEA again 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 in Australia. The IAEA therefore drew the "broader conclusion" that all nuclear material remained in peaceful use activities. The IAEA has drawn the broader conclusion for Australia since 2000, the first State to have a broader conclusion.

During the reporting period, the IAEA conducted three design information verification inspections, three routine inventory inspections and undertook three complementary access visits: Ranger uranium mine; NQX Freight System (a uranium shipping company); and R&D buildings at ANSTO.

The new molybdenum-99 production plant at ANSTO reached the final stages of construction and the IAEA has agreed to take its baseline environmental samples—to provide a benchmark for future assessments on uranium, thorium and plutonium levels—in October 2017, prior to full commissioning. During the 2016–17 year, the IAEA also developed a prototype detector for confirming the uranium content in the solid waste produced from on-site radiopharmaceutical production. ASNO is working with ANSTO and

the IAEA to receive the detector in Australia. Once deployed, the IAEA will be able to meet its inspection goals for this part of ANSTO.

In June 2017, ASNO transitioned its nuclear accounting database from one that generated fixed-format text reports for the IAEA, to one that generates labelled XML reports. This allows ASNO to provide detailed explanatory notes and transactions for large items to the IAEA, without needing to split the record over several separate reporting lines. The new database also provides ASNO with clearly defined links between permit holder inventories and nuclear transaction reports. As a result, transaction records are automatically generated for the IAEA when updates are made to inventory items, eliminating the need to enter data manually in multiple places.

ASNO recognises the excellent work from the Information Management and Technology

Division in the Department of Foreign Affairs and Trade over the last year in designing and delivering a new database to meet a complex set of fixed requirements. Without their ongoing engagement and attention to detail, successful delivery would not have been possible.

The next phase of the database upgrade will see a move towards a secure, web-based portal for permit holders. This will give permit holders the ability to directly manage simple changes, such as updating contact details or receiving inventory from another permit holder. At present, permit holders are required to complete paper-based forms for all notifications and applications.

ASNO anticipates that the web-based portal will be available for permit holder testing late 2017.

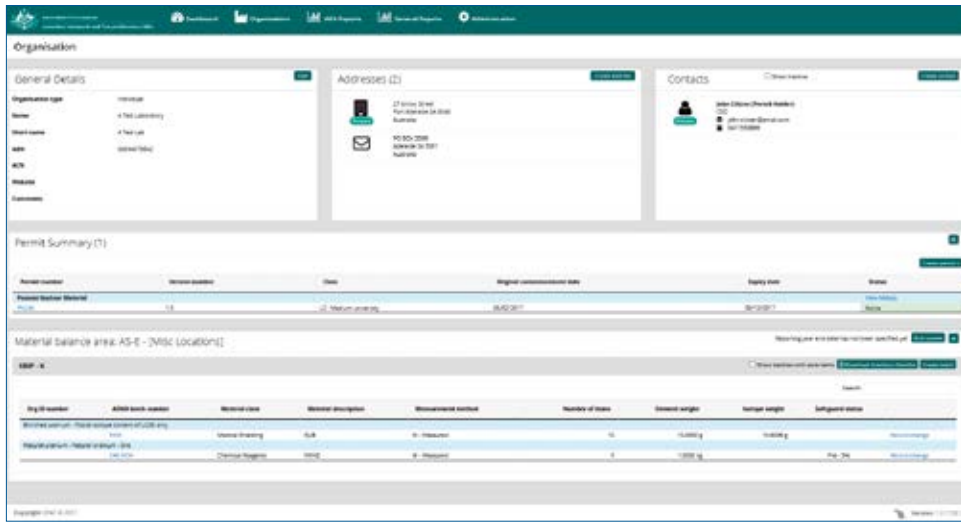


(a)

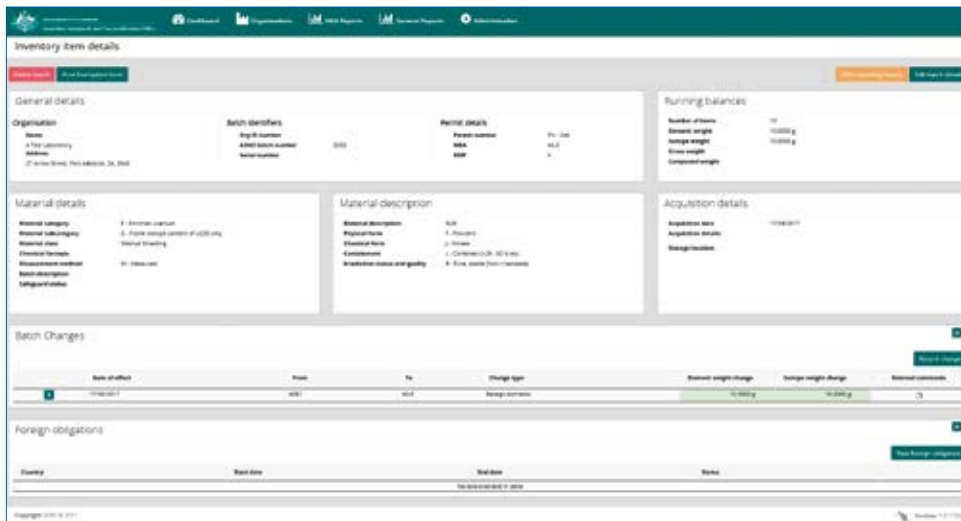


(b)

Developers of the ASNO nuclear database (a) track tasks on the scrum board and (b) test program logic.



(a)



(b)

Example view of the portal showing (a) permit holder dashboard and (b) history of an inventory item.

## Bilateral Safeguards

During 2016–17 all Australian Obligated Nuclear Material (AONM) was accounted for in accordance with the procedures and standards prescribed under relevant bilateral Nuclear Cooperation Agreements.

Over the past decade, Australia has successfully negotiated bilateral Nuclear Cooperation Agreements with a range of countries including China, Russia, United Arab Emirates, India and Ukraine. With the entry into force of the Australia-Ukraine Nuclear Cooperation Agreement on 15 June 2017, Australia’s network of 25 Nuclear Cooperation

Agreements now covers 43 countries. These countries operate about 98 % of the world’s nuclear power generation capacity.

ASNO continues to work closely with its counterparts in Ukraine to finalise the Administrative Arrangement and Facilities List required before commercial transfers of Australian obligated nuclear material to Ukraine can commence pursuant to the Australia-Ukraine Nuclear Cooperation Agreement.

With the passage of the *Civil Nuclear Transfers to India Act 2016* in December 2016, the Government framework to implement the Nuclear Cooperation agreement and to allow



uranium exports to India is now in place. Commercial negotiations between Australian uranium producers and India's Department of Atomic Energy are progressing.

The implications of Brexit on the United Kingdom's continued membership of the

European Atomic Energy Community (Euratom) became clearer in January 2017. As a result ASNO has been actively engaging with bilateral counterparts to ensure appropriate arrangements are in place for continued peaceful nuclear cooperation after the UK formally leaves the European Union (EU).

## Nuclear Security Developments

As part of its regular inspection program, ASNO conducted nine security inspections covering facilities at ANSTO, CSIRO, Silex Systems Limited, three uranium mines and associated UOC transport facilities. These are further described in Section 4.

ASNO completed a major review of permits issued for the transport of nuclear material and for Silex Systems Limited. ASNO also revised the Design Basis Threat used to set the performance level of security for the OPAL research reactor.

Australia has been active in post-nuclear security summits activities including a Nuclear Security Contact Group and track 1.5 dialogues.

Australia contributed strongly to the second International Conference on Nuclear Security, themed "Commitments and Actions", which was convened at the IAEA's Headquarters in Vienna on 5–9 December 2016. In one of the high level sessions, Director General Floyd presented on the IAEA's nuclear security role in a changing risk environment.

## Chemical Weapons Convention Developments

### Domestic Developments

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 CWC-related chemical trade and other relevant chemical activities within industry and Defence laboratories, as well as Australia's national programs for assistance and protection against chemical weapons.

ASNO facilitated routine OPCW inspections at a declared Schedule 3 Facility and at three 'Other Chemical Production Facilities' in NSW and Victoria bringing the total number of inspections in Australia to 53 since entry into force of the CWC in 1997. All inspection reports have confirmed Australia's declared information, including the absence of any 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. One example is the discussions at the OPCW on the development of common understandings as to whether declarations of discrete organic chemicals produced by synthesis (in accordance with Part IX of the CWC's Verification Annex) includes 'biochemical' and 'biological' synthesis processes in addition to 'chemical' synthesis processes.

### International Developments

This year marks the 20th Anniversary of the entry into force of the CWC and the foundation of the OPCW. With a larger number of States Parties (192) than any other disarmament treaty and only four per cent of all declared stockpiles of chemical weapons remaining to be destroyed under international verification, there is little doubt that the CWC counts among the world's most successful disarmament treaties. Only four countries (Democratic People's Republic of Korea, Egypt, Israel and South Sudan) remain outside the Convention.

The OPCW continued to assist and encourage the 74 States Parties that have yet to enact all the necessary laws and regulations required under Article VII of the CWC in order to fully implement the Convention. Such measures ensure a level playing field for States Parties under obligation to host OPCW industry inspections and raise barriers against the diversion of toxic chemicals by non-State actors.

The OPCW has undertaken nearly 3 500 routine inspections at industrial sites in the territories of 86 States Parties since April 1997 to monitor legitimate chemical activities declared to the OPCW in accordance with the CWC. One hundred of these included sampling and analysis (since September 2006) the majority of which occurred at Schedule 2 facilities and more recently at Schedule 3 and Other Chemical Production Facilities.

Most concerning was that toxic chemicals were again used as weapons in Syria and in Iraq. The OPCW-United Nations Joint Investigative Mechanism (JIM), whose mandate is to identify the perpetrators of chemical weapons attacks in Syria, concluded that the Syrian Regime's military was responsible for toxic chemical attacks in Talmenes, on 21 April 2014; Qmenas, on 16 March 2015; and Sarmin, on 16 March 2015. The JIM also identified the so-called "Islamic State of Iraq and the Levant" (ISIL) as being responsible for a sulphur mustard attack in Marea on 21 August 2015. These disturbing findings were built on work undertaken by the OPCW's Fact Finding Missions that took place in Syria under difficult and dangerous circumstances.

In the reporting period, the security situation affecting access to the three remaining declared chemical weapons production facilities eased. The last aircraft hangar was verified by the OPCW as destroyed on 6 June 2017 and arrangements were being made to carry out verification inspections of the last two above-ground facilities.

The on-going use of chemical weapons in Syria further exacerbated concerns about the accuracy and completeness of Syria's declaration to the OPCW since its accession to the CWC on 14 September 2013. The OPCW's Declaration and Assessment Team has made minimal progress to date but continues to work with Syrian officials to clarify and resolve any gaps, inconsistencies and discrepancies.

On 22 July 2016, the UN Security Council adopted Resolution 2298 (2016) authorising Member States to acquire, control, transport, transfer and destroy Category 2 chemical weapons declared by Libya. This is only the second example of chemical weapons being removed from a State Party (Syria being the first) for destruction for the purposes of expediency, security and safety. The OPCW verified the removal of all remaining Category 2 chemical weapons from Libya to the designated destruction facility at Munster, Germany. At the end of the reporting period only 19.3 per cent of these stocks were remaining to be destroyed under OPCW verification.

The OPCW has been working to ensure that it addresses new and emerging challenges. This includes the establishment of a Temporary Working Group on Investigative Science and Technology under the auspices of the OPCW's Scientific Advisory Board. Chaired by an Australian Dr Veronica Borrett (formerly from the Defence Science and Technology Group or DSTG), the Temporary Working Group is tasked to identify capabilities, methodologies, skill sets and equipment that would augment and strengthen the Technical Secretariat's capabilities in investigations of alleged use of chemical weapons, and is expected to run for a period of two years.



Members of the OPCW Scientific Advisory Board, January 2017. Photo courtesy of the OPCW.

In the context of preventing the re-emergence of chemical weapons, Australia continued to seek co-sponsors for its joint working paper with Switzerland to increase awareness about the dangers of the use of aerosolised central nervous system-acting chemicals (CNSACs) for

law enforcement purposes and to encourage other States Parties to articulate their national positions. By 2 March 2017 the paper had achieved cross regional support from 39 co-sponsors (EC-84/NAT.7).



Dr Robert Floyd (far left) and HE The Hon Dr Brett Mason, Australian Ambassador to the Netherlands (3rd from left), attending an Australian-Swiss hosted side event on CNSACs held in the margins of the Conference of the States Parties on 29 November 2016.

Australia and Switzerland co-sponsored a side-event (attended by 115 delegates) in the margins of the 21st Session of the Conference of the States Parties (CSP21). Held for the third year in a row, this meeting provided a good opportunity to broaden discussions to include other government (US Deputy Assistant Secretary of State for Emerging Security Challenges) and non-government perspectives

(i.e., University of Bradford and ICRC) to raise awareness about the CNSAC issue among capital-based representatives attending the Conference.

Whilst in The Hague to attend CSP21, Dr Robert Floyd signed an revised Arrangement between the Government of Australia and the OPCW for the conduct of OPCW routine inspections at DSTG (see photo).



*Dr Robert Floyd (DG ASNO) and Mr Ahmet Üzümcü (DG OPCW) signing an Arrangement on Inspections at Australia's Schedule 1 Facility at Defence Science and Technology Group, 29 November 2017 at the OPCW. Photo courtesy of the OPCW.*

## Comprehensive Nuclear-Test-Ban Treaty

Although the entry into force of Comprehensive Nuclear-Test-Ban Treaty (CTBT) remains elusive, the support of the great majority of states for the aims of the treaty remains strong. States that have signed the treaty continue to provide active support to development of all aspects of its verification regime, including the provisional operation of the International Monitoring System (IMS). Around 90 per cent of IMS 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.

In July 2016, Australia cosponsored with the CTBTO to help Myanmar officials prepare for their country's ratification of the CTBT. ASNO's

Malcolm Coxhead worked with CTBTO experts to present information and advice on the legal and practical requirements for implementing the treaty, as well as on its benefits. Myanmar ratified the CTBT on 21 September 2016.

On 9 September 2016, the DPRK announced that it had conducted its sixth nuclear test explosion. The test was readily detected by the CTBT's IMS and analysis suggests a slightly larger nuclear yield than past tests. More importantly, each additional test adds to the risk that the DPRK is able to develop more sophisticated weapons that it could deliver with a long-range ballistic missile. Any further nuclear tests by the DPRK should be readily detected by the IMS.

## Other Non-Proliferation and Disarmament Activities

### International Partnership for Nuclear Disarmament Verification (IPNDV)

Practical steps toward nuclear disarmament will need to be underpinned by effective verification. The International Partnership for Nuclear Disarmament Verification (IPNDV) brings 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 practical work of IPNDV got underway in late 2015 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. Good progress was made during the reporting period towards finalising IPNDV's first two-year work phase. The article at page 25 of this report provides further information on IPNDV.

### Fissile Material Cut-Off Treaty (FMCT)

A verifiable ban on production of fissile material for use in nuclear weapons is widely seen as one of the practical steps that could be taken toward nuclear disarmament. However, impasse in the Conference on Disarmament (CD) has prevented negotiations on a fissile material cut-off treaty (FMCT). Australia has actively supported a number of initiatives to advance international discussions on the shape of an FMCT, both to promote the commencement of negotiations, and to develop proposals that could assist negotiators.

The 71st session of the UN General Assembly agreed in late 2016 on a proposal to form a High Level Expert Preparatory Group (EPG) to consider and make recommendations on substantial elements of a future FMCT. Australia is represented on the EPG by DG ASNO Rob Floyd. The EPG began its work in early 2017 and is building on results from a 2014–15 Group of Governmental Experts (GGE), in which Australia also participated. Discussions in the EPG so far have demonstrated strong support for the central elements of a future FMCT. The EPG will meet further in 2017–18. Working with DFAT officers, ASNO's Malcolm Coxhead provides expert technical support during the EPG process, as he did for the GGE.

# 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.

A major focus of ASNO's regulatory areas over the year ahead will be supporting the development of the next modules of the new nuclear and chemical databases, including the web portal for permit holders to access their permit details and manage nuclear inventory directly. The coming financial year will also see the completion of the ANSTO Nuclear Medicine (ANM) molybdenum-99 production plant which will require establishment of the systems for accounting for, controlling and measuring the nuclear material in the waste stream. This will be a time intensive task due to the novel nature of the safeguards systems that will be employed. On current schedule ASNO, ANSTO and the IAEA will test the IAEA's customised detector system in early 2018.

On the international safeguards front, ASNO will continue to actively promote the work of the Asia-Pacific Safeguards Network (APSN) and assist with training and development in the region to improve safeguards implementation capabilities.

Following on from the successful International Physical Protection Advisor Service (IPPAS) mission to ANSTO in November 2013, ASNO will host a follow-up mission from 30 October to 10 November 2017. The mission will review the recommendations and suggestions made in the 2013 mission and address any changes made to Australia's nuclear security regime.

ASNO will complete a review of safeguards and security requirements at Australian uranium mines. This work will involve consultation with stakeholders including state/territory regulators and industry.

Preparations have commenced in the lead up to the Amended CPPNM Review Conference in 2021. ASNO will be engaging with CPPNM states parties and the IAEA from the onset to prepare for a successful review conference

with the first preparatory meeting taking place in November 2017.

As part of Brexit, the United Kingdom will also be leaving Euratom with the result that the UK will cease to be party to the Australia – Euratom nuclear cooperation agreement. Although Australia has an existing nuclear cooperation agreement with the UK which entered into force in 1979, changes are required to satisfy the safeguards requirements for nuclear trade with a post Brexit UK. ASNO's Bilateral Safeguards Section will focus on ensuring that, post Brexit, appropriate arrangements are in place to allow for continued nuclear cooperation and uranium exports to the UK.

Work is ongoing to finalise the Administrative Arrangement under Australia's nuclear cooperation agreement with Ukraine. It is anticipated the Administrative Arrangement will be finalised in the coming financial year paving the way for future uranium sales to support the Ukrainian nuclear power industry.

Managing Australia's network of bilateral nuclear cooperation agreements is central to the work of the Bilateral Safeguards Section, including the detailed scrutiny of the transfer and use of Australian Obligated Nuclear Material (AONM) around the world.

ASNO will continue to provide technical advice and support in the development of Australian Government policy positions, including in the lead-up to the CWC 4th Review Conference to be held 19–30 November 2018, with a particular focus on preventing the re-emergence of chemical weapons.

Under Article XI of the CWC (cooperation on the peaceful uses of chemistry and the promotion of economic and technological development), ASNO will provide appropriate support to Defence Science and Technology Group to deliver an OPCW Analytical Skills Development Programme for ASEAN and SAARC<sup>2</sup> countries from 4–15 December 2017.

ASNO will continue to monitor international developments, including the next report

of the OPCW-UN JIM aimed to identify the perpetrators of the chemical weapons attacks in Khan Sheikhoun on 4 April 2017 and Um Hawsh on 16 September 2016.

The second four-year term of the Director-General of the OPCW, Mr Ahmet Uzumcu, will come to an end in mid-2018. Australia, as a member of the OPCW Executive Council, will participate in the selection process to appoint his successor. This commenced with nominations of candidates by 23 June 2017. The Council's decision on a preferred candidate will be referred to CSP22 for adoption.

For some years, ASNO has played a major role in support of Australia's efforts to commence negotiations on a fissile material cut-off treaty (FMCT), and to shape international thinking on how a treaty could be verified. As Australia's designated expert in the current High Level Expert Preparatory Group (EPG) on an FMCT, DG ASNO will have a valuable opportunity in the coming year to influence a report that aims to make recommendations on substantial elements of a future treaty. The EPG is meeting for two two-week sessions in 2017–18 to develop its recommendations, as well as engaging with a UN member states on their views on a treaty.

The key diplomatic initiative to promote entry into force of the CTBT during 2017–18 will be the biennial Article XIV conference in September 2017 in New York. Australia has also been pleased to support a conference hosted by Japan in July 2017 in Tokyo to promote additional signatures and ratifications by States in the South East Asia, the Pacific and the Far East Region. ASNO's Malcolm Coxhead chaired one of two conference sessions, focusing on treaty verification.

Testing to certify that IMS infrasound station at Davis Base in Antarctica meets CTBT requirements is scheduled for the summer of 2017/18. The station should come fully into operation during 2018, and will mark the completion of all IMS facilities that Australia hosts.

The CTBT Organization's ability to conduct an on-site inspection will be supported by the construction in the coming year of a permanent technical facility to test, maintain and store

the many tonnes of equipment needed to conduct an inspection. Australia's technical support to the CTBTO Preparatory Commission in establishing the verification regime for the treaty will continue.

The Government's decision in October 2016 to upgrade Australia's sub-Antarctic research station at Macquarie Island will require relocation of a number of buildings away from locations that are increasingly at risk from ocean inundation. This includes buildings supporting the CTBT radionuclide monitoring station on the island. Together with ARPANSA, which operates the radionuclide station, ASNO is participating in discussions with the Australian Antarctic Division on the design of new facilities so that Australia continues to fulfil its CTBT commitments.

The first two-year phase of work by the International Partnership for Nuclear Disarmament Verification (IPNDV) will conclude in late 2017. IPNDV will publish results from the first phase at that time and should make a valuable contribution to future discourse on how to measures such as verified dismantlement of a nuclear warhead can work. A second phase of IPNDV's work is expected to get underway in 2018.



# CURRENT TOPICS



# 2

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## Nuclear Disarmament: Technical Foundations for Practical Steps

Ensuring effective verification of nuclear non-proliferation commitments through International Atomic Energy Agency safeguards has long been ASNO's core focus. The advent of the Chemical Weapons Convention (CWC) and the Comprehensive Nuclear-Test-Ban Treaty (CTBT), as well as more recent practical initiatives toward nuclear disarmament, have allowed ASNO to build on its expert contributions in the field of verification over the last two decades.

### Comprehensive Nuclear-Test-Ban Treaty

Agreement on the CTBT in the 1990s was facilitated by some years of technical discussions by a Group of Scientific Experts to develop the parameters for an effective and scientifically credible International Monitoring System (IMS). Before that work was done, significant questions existed about whether a state could conduct an explosive nuclear test without detection. Nearly twenty years of experience with establishing and operating IMS stations has seen further enhancement of its capabilities and demonstrated the practical value of the CTBT, even before it has entered into force. The last twenty years has also seen significant work done to develop a capability for the CTBT Organization to conduct an effective on-site inspection to investigate any event on which there might be questions on whether it was a nuclear test. ASNO has been pleased to contribute actively in all aspects of CTBT verification over this time.

### Fissile Material Cut-off Treaty

The ban on nuclear testing embodied in the CTBT is a valuable tool for constraining the development of new and improved nuclear weapon designs. A ban on the production of fissile material for use in nuclear weapons has long been considered a companion to the CTBT in that it would work to impose a cap on the size of nuclear arsenals. An effectively verifiable treaty banning the production of

fissile material for nuclear weapons or other nuclear explosive devices, a Fissile Material Cut-Off Treaty (FMCT), has the potential to deliver substantial benefits for the security of all States, furthering the twin goals of nuclear disarmament and nuclear non-proliferation. The term "fissile material" refers to kinds of nuclear material that are capable of being used in a nuclear weapon. The practical effect of a treaty should be to cap the availability of fissile material for use in weapons and thus the size of arsenals.

The Conference on Disarmament (CD) remains unable to break the diplomatic impasse preventing agreement on a programme of work, including beginning negotiations on an FMCT. However, valuable work has been done in recent years by groups of experts to prepare the way for negotiations of an FMCT. In 2014–15 a Group of Governmental Experts (GGE), working under a United Nations mandate, explored many aspects of a future treaty and identified signposts that could guide future negotiators toward agreement. The GGE demonstrated that, given an appropriate level of political will, negotiation of an FMCT is a practical and achievable goal for the international community. To build on the work of the FMCT GGE, a High Level Expert Preparatory Group began work in 2017 to elaborate options for elements of a future treaty. While this group cannot negotiate a treaty, it is well placed to lay out options for negotiators and to assess the implications of the options.

The verification regime for an FMCT will incorporate elements taken from IAEA nuclear safeguards experience as well as from treaties such as the CTBT and the Chemical Weapons Convention. ASNO's considerable experience with each of these regimes enable Australia to make a strong contribution to development of an FMCT. DG ASNO Rob Floyd is Australia's nominated expert in the High Level Expert Preparatory Group.

## Disarmament Verification

Verified reductions in numbers of nuclear weapons are clearly a necessary step towards nuclear disarmament. The United States and Russia have done much to reduce the number of deployed nuclear weapons from the heights of the cold war, and have done so under bilateral verification arrangements. However, verifying the dismantlement of nuclear warheads and ensuring the contained fissile materials are not further used in weapons is yet to be implemented. Understanding better how practical steps such as verified and irreversible dismantlement of nuclear warheads could actually work, and how the international community can have appropriate confidence in them, has been a focus for the first phase of work by the International Partnership for Nuclear Disarmament Verification (IPNDV).

Australian experts participate in each of IPNDV’s working groups. 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.

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. Results from the first phase of IPNDV’s work will be made public at the end of 2017. 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.

## Conclusion

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 support progress in this area, effective measures need to be designed, established and maintained to verify the commitments that states make toward disarmament. The expertise in treaty verification that ASNO has developed over many years has been able, and can continue, to ensure that Australia’s disarmament diplomacy is effective.

## Australia and the Chemical Weapons Convention – 20 Years On



### Commemoration

The 20th anniversary of the entry into force of the Chemical Weapons Convention (the “Convention”) and the establishment of the Organisation for the Prohibition of Chemical Weapons (OPCW) was marked on 29 April 2017. Near universal membership of 192 States Parties, the verified destruction (so far) of 96 per cent of the world’s declared stockpiles of chemical weapons by possessor states (72 525 metric tonnes), and nearly 3,500 chemical industry inspections conducted, count among the

OPCW's achievements which have been aptly recognised by the awarding of the 2013 Nobel Peace Prize. The Convention's place as one of the most successful disarmament treaties against weapons of mass destruction (WMD) is the result of global endeavours involving cooperation between nations, the OPCW and other United Nations affiliated organisations, the chemical industry, scientists and civil society.

To commemorate this milestone, numerous events and seminars have taken place around the world during 2017, where the Director-General of the OPCW, HE Mr Ahmet Üzümcü, has delivered a range of keynote addresses. The King of the Netherlands hosted an official commemorative ceremony on the eve of the anniversary day at the Ridderzaal (Hall of Knights) in The Hague, the host city of the OPCW headquarters.



Mr Ahmet Üzümcü (DG OPCW) speaking at the Australian Institute of International Affairs (AIIA), Victoria, 25 July 2017. Photo courtesy of the AIIA.

Mr Üzümcü visited Australia 23–26 July 2017, where he briefed the Secretary of the Department of Foreign Affairs and Trade, and other senior Government officials on OPCW priority activities, including Syria chemical weapons issues. His address<sup>1</sup> to the 17th Asian Chemical Congress, incorporating the 19th General Assembly of Federation of Asian Chemical Societies and Centenary of the Royal Australian Chemical Institute,<sup>2</sup> helped promote the global benefits of responsible and ethical use of chemistry and chemical technology to practitioners.

While in Melbourne, Mr Üzümcü also visited the Defence Science and Technology Group (DSTG) laboratory and was briefed on a number of cutting-edge chemical analysis techniques of relevance to verification under the CWC. In his keynote address to the Australian Institute of International Affairs<sup>3</sup> he said his visit was an opportunity for the OPCW to express appreciation for Australia's strong commitment to the goals of the Convention, and support for the OPCW's work.

1 Refer to the OPCW website at <https://www.opcw.org/documents-reports/speeches-statements/speeches-statements-by-the-director-general/>.

2 For more information refer to <http://www.racicongress.com/17ACC/>.

3 The title of HE Mr Ahmet Üzümcü's presentation was "The Chemical Weapons Convention: the Power of a Universal Ideal". Refer to [www.internationalaffairs.org.au/vic](http://www.internationalaffairs.org.au/vic).



*Dr Mick Alderton demonstrating the technical capabilities of the Defence Science and Technology Laboratory to DG OPCW during his visit to Australia 25 July 2017. From left to right: Dr Veronica Borrett, Dr Bob Mathews, Bob Fairweather (OPCW Chef de Cabinet), Ahmet Üzümcü (DG OPCW) and Cameron Archer (DFAT).*

## Australia's role in the CWC – Historical and Current

Australia was active in negotiating the Convention in the Conference on Disarmament in Geneva and is well known for its key role in putting forward a complete text which reflected compromises on many outstanding issues and paved the way for the 'end-game' of the negotiations in Geneva in 1992. Australia was also among the first countries to ratify the CWC in May 1994.

At that time, the only states in Southeast Asia-Pacific that were members of the Conference on Disarmament were Australia, Indonesia and Myanmar. This led Australia to commence its 'Chemical Weapons Regional Initiative' in 1988 to promote broader regional support for the future Convention and assist ASEAN and Pacific Island Countries in their preparations to implement the Convention. This included several seminars and technical workshops and was recognised as playing a useful role in encouraging these regional states to promptly sign and ratify the Convention.

The Government-Industry Conference against Chemical Weapons (referred to as

the "Canberra Conference") held in 1989 with 375 delegates from 66 countries, under the leadership of the then Foreign Minister Gareth Evans, was the first time that representatives from the global chemical industry demonstrated their collective support for the Convention. 'Trial inspections' of several chemical industry facilities, as well as a 'practice challenge inspection' of a Defence site, were also conducted in Australia during that time which helped gain the confidence and support of the Australian chemical industry and Department of Defence.

Australian diplomat, the late Dr John Gee, helped in the establishment of the OPCW in his role as the Director of Verification in the Provisional Technical Secretariat of the OPCW in the lead up to its entry into force in 1997 and subsequently as the inaugural Deputy Director-General of the OPCW.

Such achievements span over three decades of work which have drawn on the scientific and technical support provided by DSTG. This was reflected in Defence scientist Dr Bob Mathews being awarded the inaugural OPCW-The Hague Award in 2014 in recognition of his contributions to chemical disarmament, including during his seven-year term on the

OPCW's Scientific Advisory Board (SAB) (2004-2011). Dr Veronica Borrett (a former DSTG scientist and currently serving on the SAB) as Chair of the Temporary Working Group on Investigative Science and Technology is working on procedures to enhance the OPCW's ability to conduct investigations of alleged use of chemical weapons. Recent missions in hostile environments have stretched its capabilities in this regard.



*OPCW inspectors together with ASNO and industry site representatives during a routine CWC inspection at a declared chemical facility in NSW, September 2016.*

Australia's commitment to the goals of the Convention remains undiminished. ASNO has facilitated 44 successful routine inspections by the OPCW at declared chemical facilities and nine at DSTG laboratories in Australia since 1997 demonstrating its compliance with the Convention. Australia also hosted an OPCW inspection of 144 WWII old chemical weapons (containing sulphur mustard), declared unusable, discovered at Columboola Queensland in June 2010 and which were subsequently destroyed in transportable detonation chamber in April/May 2011.



*OPCW inspectors preparing to verify declared old chemical weapon munitions in Queensland in September 2010. Photo courtesy of Defence.*

Australia is involved, at various levels, at the forefront of endeavours in the field of science and technology as it relates to the Convention. DSTG has one of the 17 laboratories in 14 countries that are certified as OPCW-Designated Laboratories for the analysis of biomedical samples associated with investigations of alleged use of chemical weapons, and worked with the OPCW in developing the methods for such analysis. DSTG is currently participating in OPCW Proficiency Tests to achieve Designated Laboratory status for environmental samples.

Australia engages with the OPCW and other States Parties to ensure that the goals and international norms established by the Convention to prevent the production, acquisition, retention, transfer and use of chemical weapons are upheld, including through its role as Chair of the Australia Group.

The formation of the Australia Group in 1985 was an Australian initiative following the confirmed use of chemical weapons in the Iran-Iraq War in 1984, together with the realisation that several companies located in some of the world's major chemical-producing countries had inadvertently supplied materials to Saddam Hussein's chemical weapons program. Australia Group members (41 countries and the European Union) aim to harmonise national export controls to prevent transfers of dual-use chemicals and biological equipment and material to end-users of concern. This is entirely consistent with, and fully supportive of, the objectives of the United Nations Security Council Resolution (UNSCR)

1540 (2004) to deny WMD capabilities to non-state actors.

An Australia Group statement issued on 30 June 2017 acknowledged the work of the OPCW, called for universal adherence to and effective implementation of the Convention and expressed grave concerns about chemical weapons attacks in Syria and Iraq and the reported use of nerve agent VX as a chemical weapon in the assassination of Kim Jong-nam at the Kuala Lumpur International Airport.

Together with Switzerland, Australia has championed the need for discussions within the OPCW on central nervous system-acting chemicals and the dangers of using them in an aerosolised form for law enforcement purposes. Continued efforts to raise awareness of this issue, in the context of preventing the possible re-emergence of chemical weapons, are especially relevant in the lead up to the Convention’s fourth Review Conference to be held 19–30 November 2018.

## Challenges – Current and Future

The use of chemical weapons in Syria since 2013, and by non-state actors in Syria and Iraq, continues to challenge the States Parties to the Convention. The prevention of any further chemical weapons use, as well as attribution of chemical weapons attacks and the prosecution and punishment of offenders, all remain at the forefront of efforts to address these challenges.

Utilising its independent technical expertise and resources, the OPCW has deployed numerous Fact Finding Missions (FFMs) in Syria since April 2014 to investigate reported chlorine and nerve agent attacks (including through sampling and analysis) and supported the OPCW-UN Joint Investigative Mechanism<sup>4</sup> (JIM) established by UNSCR 2235 (2015) in its work to identify the perpetrators of chemical weapons attacks in Syria. A key outcome in the JIM’s 3rd and 4th reports (released in late 2016) was confirmation that chemical weapons had been used by the Syrian Regime and by the so-called “Islamic State of Iraq

and the Levant” (ISIL). The JIM is currently working to apportion responsibility for the use of sulphur mustard in Um-Hawsh on 16 September 2016 and a sarin or a sarin-like substance in Khan Sheikhoun on 4 April 2017<sup>5</sup> as confirmed by the FFM. The OPCW’s Declaration Assessment Team continues to work to clarify gaps, inconsistencies and discrepancies in Syria’s declarations of its chemical weapons program – made following its accession to the Convention – which should have, but has not, facilitated the full destruction of its chemical weapons stockpiles and capabilities.

Key priorities to strengthen the OPCW and States Parties’ role in preventing and responding to chemical weapons use include: better monitoring and use of science and technology especially in relation to appropriate implementation of SAB recommendations; improved uptake of necessary legislative frameworks to enable full and effective CWC implementation and punitive action; investigative training for OPCW inspectors; knowledge management and maintenance of technical expertise within the OPCW; enhanced chemical security culture and effective implementation of UNSCR1540.

A coordinated response from the international community to instances of chemical weapons use is more critical than ever in protecting the integrity of the Convention. This 20th anniversary year has provided the opportunity for many States Parties, including Australia, to express publicly their support for the Convention and the OPCW, including through a congratulatory message from the Hon Julie Bishop MP, Australian Minister for Foreign Affairs.<sup>6</sup>

4 Further information about the OPCW-UN JIM can be found at <https://opcw.unmissions.org/>.

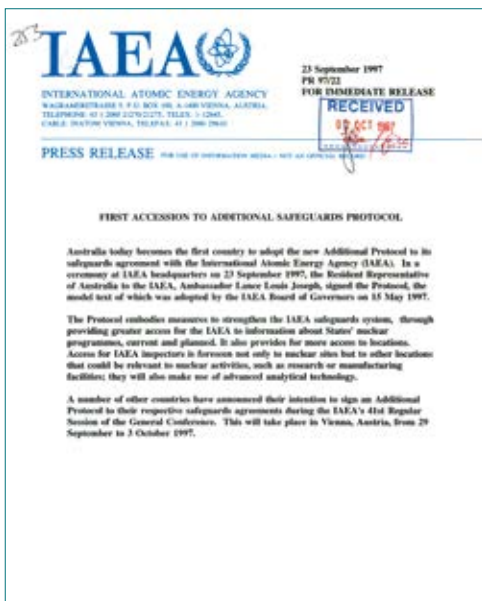
5 Notes by the Technical Secretariat: S/1491/2017 dated 1 May 2017 regarding an alleged incident in UmHawsh reported by Syria and S/1510/2017 dated 29 June 2017 regarding an alleged incident in Khan Sheikhoun.

6 Refer to OPCW website at <https://20years.opcw.org/resources/messages/>.



## 20 years of the Additional Protocol

The year 2017 marks the twentieth anniversary of a highly important agreement in the international non-proliferation architecture: the IAEA's Model Additional Protocol on strengthened safeguards. The IAEA Board of Governors approved the Additional Protocol on 15 May 1997. Australia was the first to sign the Additional Protocol on 23 September 1997 and the first to bring it into force on 12 December 1997. The Additional Protocol (AP) has been a quiet achiever by increasing international confidence in the compliance of more and more States with their nuclear non-proliferation commitments. The AP has had a low profile compared to treaties such as the NPT, CTBT and CWC, so the 20th anniversary is an opportune time to reflect on this important element of the global non-proliferation architecture.



IAEA press release on 23 September 1997 announcing the first accession to the Additional Protocol by Australia.

This relatively short agreement – just over 12 pages of conditions – empowers the IAEA to draw more comprehensive conclusions on the compliance of States with non-proliferation commitments. The adoption of the AP by the IAEA Board of Governors in 1997 is a testament to what the non-proliferation diplomatic community can achieve when States negotiate together in good faith to

address a clear and present problem. So what led to the AP and why is it so important?

The name “Additional Protocol” is short-hand for what is a protocol additional to a State's main nuclear safeguards agreement. For most States this main agreement is the Comprehensive Safeguards Agreement (CSA) – the agreement required to demonstrate that NPT non-proliferation commitments are being met. The text of the CSA was negotiated shortly after the NPT entered into force by a committee involving about fifty States over some 82 meetings from 1970 to 1971. A limitation with the CSA is while it contains many tools verifying that declared nuclear material is accounted for and that design features of declared facilities match what is reported, it contains limited tools for addressing undeclared or clandestine activities. In this respect, the CSA was a creature of the times. The prevailing assumption at that time was that the development of clandestine facilities was very unlikely. That a State might pursue clandestine plants for a weapons program might seem obvious in hindsight with several examples of such behaviour over the last 25 years (such as Iran, Iraq, Syria, Libya, DPRK) but in the early 1970s technological capabilities were not as widespread as they are today. This limitation does not mean the IAEA cannot consider undeclared nuclear material and activities – the opening commitments in the CSA negotiating record make it clear that this is squarely within the IAEA's mandate – but the CSA doesn't provide many tools to easily do this.

The watershed event that highlighted the shortcomings in the CSA was the discovery in 1991 that Iraq had a clandestine uranium enrichment program supporting its efforts to develop a nuclear weapons capability. Much of Iraq's clandestine program had been carried out in buildings on the same nuclear research centre site that the IAEA had been inspecting several times a year. The IAEA's regular access to the site had been carried out in accordance with routine inspection procedures under the CSA for verifying declared nuclear material. The IAEA's inspections had only been of the buildings declared as holding nuclear material,

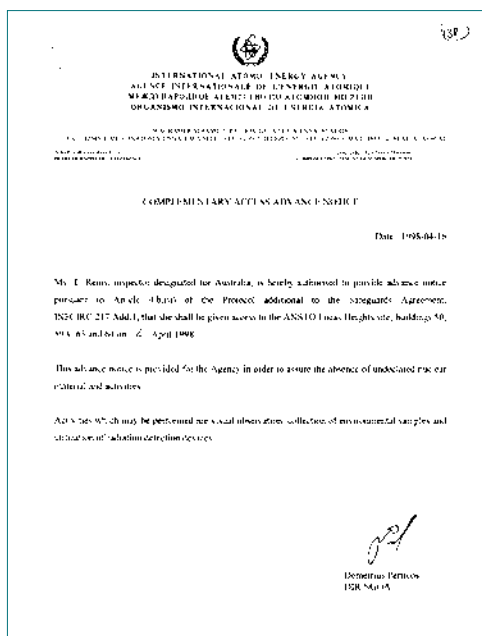
but not the buildings (some adjacent) that were later found to hold the clandestine program. The IAEA did have the power to inspect undeclared buildings, but it was not an automatic power. Invoking this power required the IAEA and the State to first consult and agree on access and, if agreement could not be reached, the IAEA’s Board of Governors would become involved. This convoluted process led to the practice evolving whereby inspections outside of declared buildings would only be called if there was strong evidence for believing that there was undeclared nuclear material or activities. Even if such a suspicion existed, the time taken to gain access could give the State time to remove any incriminating evidence of activities.

This event focussed the world’s attention on the need to strengthen IAEA safeguards, and several expert studies and projects were commissioned to look at this. The most extensive study, known as Programme 93+2, assessed mechanisms for strengthening the effectiveness and improving the efficiency of safeguards. Australia took an active role in Programme 93+2, hosting tests of inspection modalities. The strengthened safeguards regime that resulted from these studies had two components: decisions by the Board of Governors reaffirming the value of some under-utilised tools and authorities under the existing legal framework of the CSA; and, the recognition of the need to expand the IAEA’s verification toolkit through what became the model Additional Protocol.

The Additional Protocol fills gaps in the CSA. It contains several tools that strengthen the IAEA’s ability to verify the absence of undeclared nuclear material and activities. One way it does this is by providing the IAEA short-notice access to any building on a nuclear site, irrespective of whether the building is declared as holding nuclear material. For example, when the IAEA is doing an inspection at the OPAL nuclear research reactor, the inspector can hand over a complementary access notification at any time asking for access to another building on ANSTO’s site within two hours. For complementary access at other locations around Australia, such as universities conducting nuclear-related research, or

uranium mines, the notification timeframe is 24 hours.

The regulatory mechanisms Australia uses to uphold this access commitment are conditions in ASNO’s permits issued to holders of nuclear material. In the 20 years the Additional Protocol has been in force in Australia, the IAEA has conducted 71 complementary access inspections, mostly to buildings on ANSTO’s site, but also to uranium mines and a few universities. Below is a copy of the world’s first ever complementary access called by an IAEA inspector to buildings on ANSTO’s site on 16 April 1998.



*The world’s first ever complementary access notification under the Additional Protocol, for a complementary access conducted at a few buildings on ANSTO’s site on 16 April 1998.*

Another way in which the IAEA’s toolkit is strengthened under the Additional Protocol, is the expanded types of declarable information. States must report on information such as: nuclear fuel cycle related R&D (even if no nuclear material is involved); exports and imports of nuclear fuel cycle related equipment; uranium mining activities; future nuclear fuel cycle plans; and, several other technical details that aren’t covered by the CSA. The IAEA uses this information, plus information it has acquired through headquarters analysis (such as academic papers, and satellite imagery) to determine

what inspection activities it will conduct. The Additional Protocol also has administrative provisions that improve the efficiency of safeguards. States must provide multi-entry 12 month visas to inspectors (providing more flexibility for short-notice inspections) and allow unattended communication systems to transmit information from containment and surveillance systems directly to IAEA headquarters.

International confidence in the compliance of States with their NPT non-proliferation commitments is essential for international peace and security. If confidence is not maintained, there is a risk that some States may hedge against the perceived risk a neighbour is developing elements of a nuclear capability by expanding their own nuclear activities, potentially leading to cascading

reciprocal actions. The Additional Protocol plays a critically important role by enabling the IAEA to provide credible assurances to the international community not only that all declared nuclear material is accounted for, but that there is no undeclared nuclear material or activity. By extension, States such as Australia that adhere to the Additional Protocol enhance their national security by demonstrating their full compliance to neighbours and the international community. Adherence to the Additional Protocol has come a long way in twenty years, but there are still around sixty States yet to bring it into force, including 14 with at least one nuclear facility<sup>7</sup>. Achieving the universalisation of the Additional Protocol is in the national security interests of all States, so it is hoped that those that have not yet brought it into force will do so as soon as possible.

## 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 1 287 000 tonnes uranium.<sup>8</sup> This represents around 34% of world resources in this category. In addition, Australia has an Inferred Resource (IR) of uranium recoverable of 920 000 tonnes, giving a combined estimate of Australia's uranium reserves of 2 207 000 tonnes uranium, or 38.5% of the world's uranium reserves.<sup>9</sup>

In 2016, the Olympic Dam was the world's fourth largest (5% of world uranium production) uranium producer.<sup>10</sup> Overall, Australia is the third largest uranium producer after Kazakhstan and Canada. In the past decade, Kazakh uranium production has increased by over 370%, resulting in Kazakhstan being

responsible for almost 40% of global uranium production in 2016.<sup>11</sup>

Worldwide, in 2016 uranium mining provided the equivalent of 98 % of the global nuclear power industry's uranium requirements, the closest to parity it has been in almost 30 years.<sup>12</sup> The global installed and operating capacity of nuclear power continues to steadily grow, with a net increase capacity of 9 GWe in 2016, the majority of which was due to new reactors coming online in Asia. Despite 39 new reactors being connected to the grid since 2011, offsetting some of the drop in nuclear power due to continued shutdowns in Japan and phasing out of nuclear power in Germany, the uranium price remains near its lowest point in a decade. This is due to the high level of uranium production, coupled with improvements in reactor productivity and higher capacity factors, continuing to dampen the corresponding demand for uranium as less

7 Iran is in this list of 14 States, but it is provisionally implementing the Additional Protocol as a condition under the Joint Comprehensive Plan of Action (JCPOA).

8 From Geoscience Australia, Australia's Identified Mineral Resources 2016, July 2017, <https://ecat.ga.gov.au/geonetwork/srv/eng/search#e893e4ff-e366-4132-867e-e041044a9041>

9 From OECD Nuclear Energy Agency and International Atomic Energy Agency in 'Uranium 2016: Resources, Production and Demand', <https://www.oecd-neo.org/ndd/pubs/2016/7301-uranium-2016.pdf>

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

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

12 From World Nuclear Association's World Uranium Mining Production (June 2017) – <http://world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/world-uranium-mining-production.aspx>

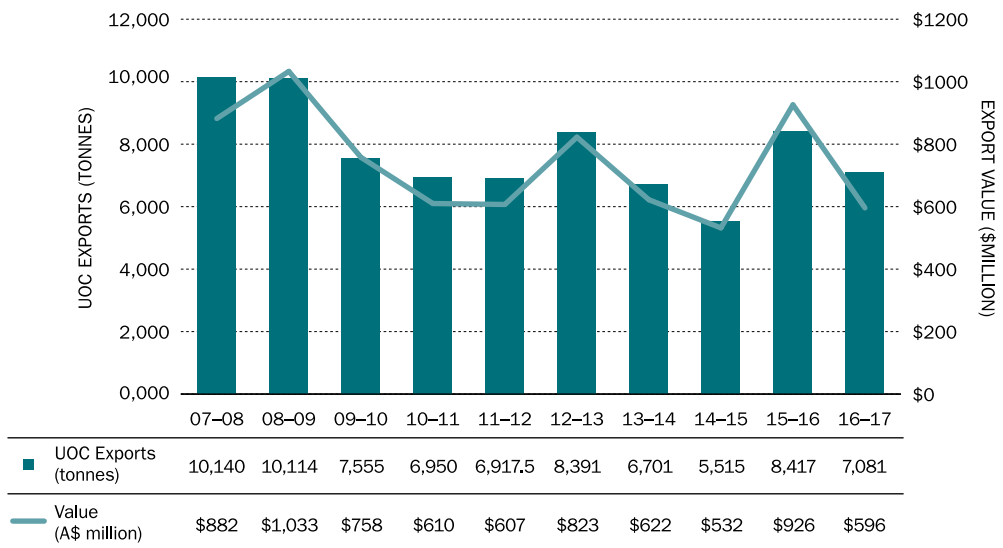
uranium is required per kWh output. Asian countries with plans to increase their reactor fleets are taking advantage of low uranium prices to ensure supply into the future. As

a result, future global demand of uranium will likely increase more slowly than the net capacity of the global nuclear power sector.

**Table 1: UOC Export and Nuclear Electricity Statistics**

Item	Data
<b>UOC Exports</b>	
Total Australian UOC exports 2016–17	7,081 tonnes
Value Australian UOC exports	A\$596 million
Australian exports as % world uranium requirements <sup>12</sup>	~9.5%
No. of reactors (GWe) these exports could power <sup>13</sup>	~37
Power generated by these exports	~239 TWh
Expressed as percentage of total Australian electricity production <sup>14</sup>	~95%

**Figure 1: Quantity and Value of Australian UOC Exports**



13 Based on August 2016 world requirements of 74 772 tonnes UOC from the World Nuclear Association’s World Nuclear Power Reactors & Uranium Requirements (1 July 2017) – <http://world-nuclear.org/information-library/facts-and-figures/world-nuclear-power-reactors-and-uranium-requireme.aspx>

14 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 July 2017) – <http://world-nuclear.org/information-library/facts-and-figures/world-nuclear-power-reactors-and-uranium-requireme.aspx>.

15 Based on Australia’s electricity generation in 2014–15 of 252 TWh from the Bureau of Resources and Energy Economics, 2016 Australian Energy Update (October 2016) – <https://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/aes/2016-australian-energy-statistics.pdf>

## 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),<sup>16</sup> 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, enrichment to 20 per cent or more in the isotope <sup>235</sup>U and reprocessing<sup>17</sup>
- 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
- provision is made for the removal of AONM in the event of a breach of the agreement.

Australia currently has 25 nuclear safeguards agreements in force, covering 43 countries plus Taiwan.<sup>18</sup>

<sup>16</sup> 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 that are Parties to the NPT.

<sup>17</sup> 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.

<sup>18</sup> Twenty-eight of the countries making up this total are European Union member states.

## 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 transshipment 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 transshipment. If the state is:

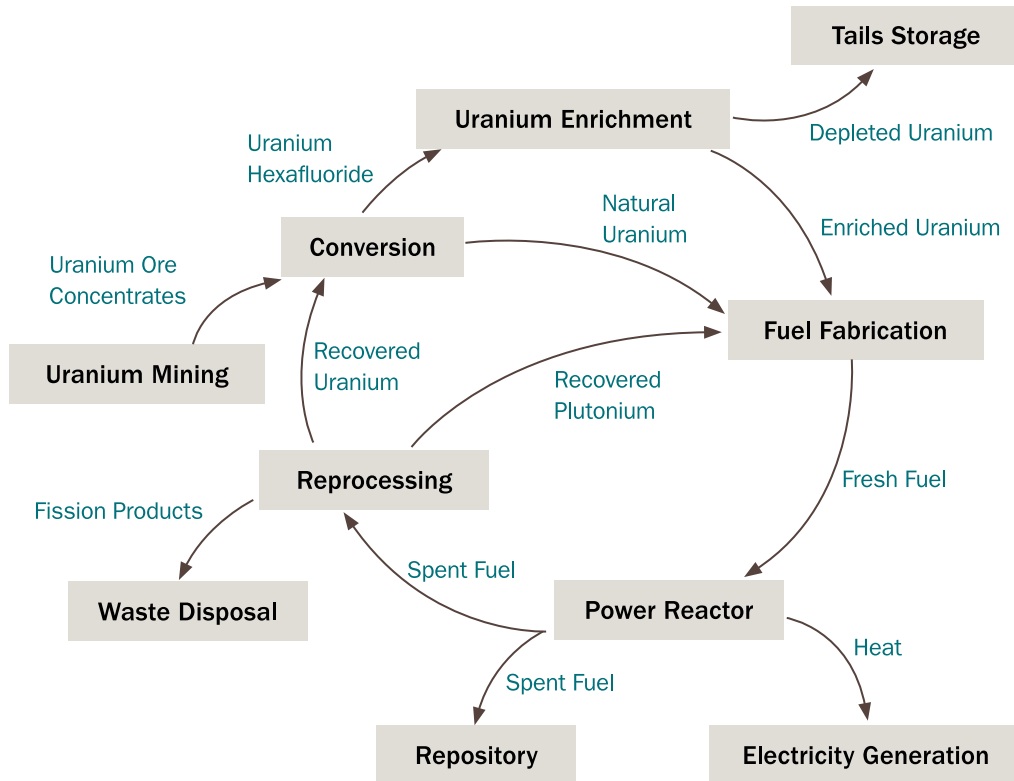
- a party to the Convention on the Physical Protection of Nuclear Material (CPPNM)
- has adopted the IAEA’s Additional Protocol on strengthened safeguards
- and acts in accordance with these agreements;

then arrangements on appropriate security can be set out in an instrument with less than treaty status.<sup>19</sup> 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.

<sup>19</sup> See page 26 of ASNO’s 2008–09 Annual Report for more details on the establishment of this policy.

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

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## SECTION

# Overview of ASNO

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# 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 has required 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 and provisional operation of an International Monitoring System (IMS) comprising 337 facilities around the world and an International Data Centre in Vienna. The PrepCom must also establish a capability to conduct an on-site inspection if 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
- 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
- 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 *Chemical 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 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

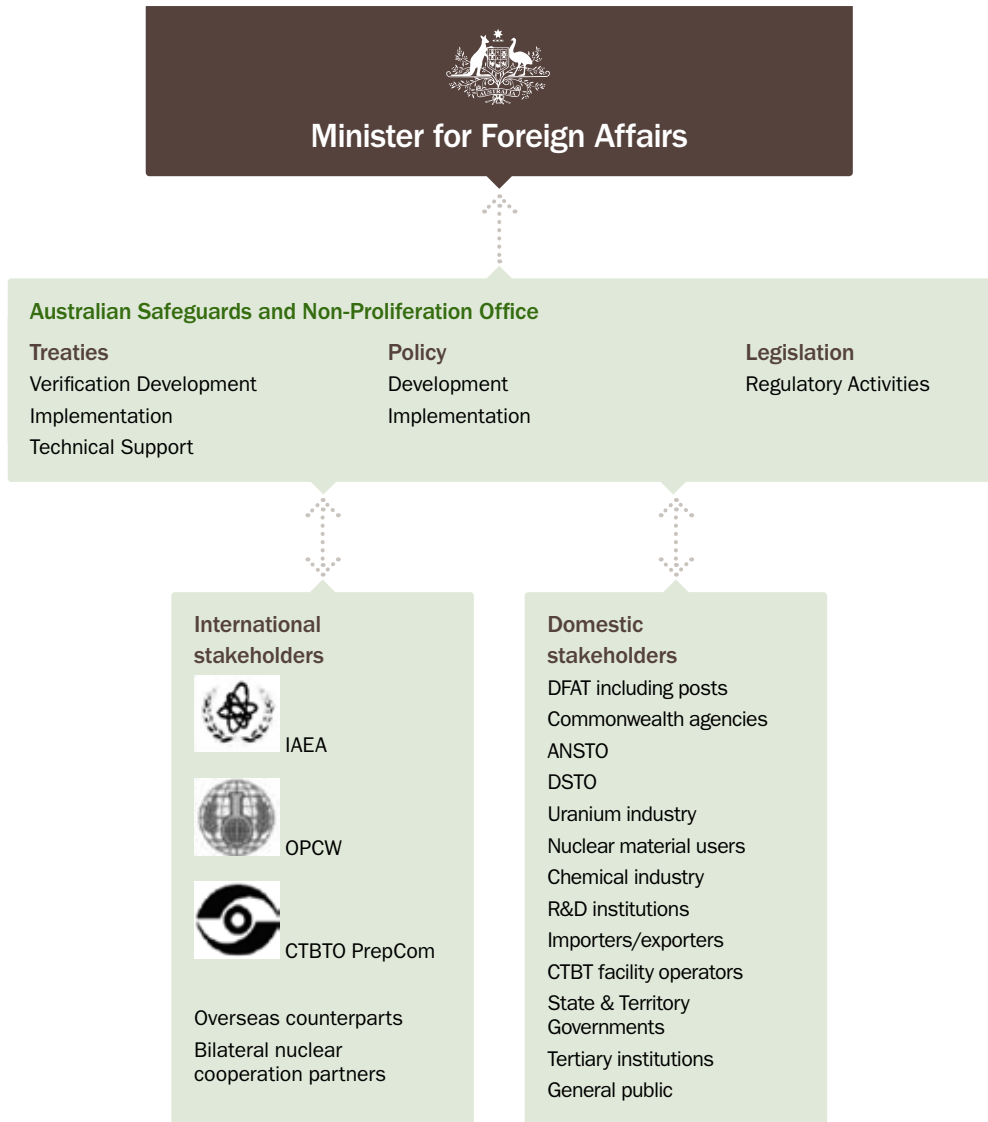
The *South Pacific Nuclear Free Zone Treaty Act 1986* (SPNFZ Act), which came into force in Australia on 11 December 1986, gives effect to Australia's obligations, responsibilities and rights under the South Pacific Nuclear Free Zone Treaty (SPNFZ Treaty). The SPNFZ Act also establishes the framework 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.

# Operating Environment

Figure 3: ASNO's Operating Environment

Section 3

Overview of ASNO





# Outcomes and Outputs Structure

Figure 4: ASNO's Outcomes and Outputs Structure

<b>Outcome 1: Australian and international security protected and advanced through activities which contribute to effective regimes against the proliferation of nuclear and chemical weapons</b>	
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
<b>Outcome 2: Knowledge about Australian's efforts to prevent the proliferation of weapons of mass destruction enhanced through public advocacy</b>	
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

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# 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 are summarised in Table 3 and 4 below.

The high number of reports in Table 3 attributed to ‘other locations’ relates mostly to holdings of small quantities of uranium and thorium chemical compounds held primarily by universities and research institutions, 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).

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

Location	Material Balance Area <sup>(1)</sup> (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 <sup>(2)</sup>

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

**Table 3: Number of line entries in inventory and inventory change reports submitted by ASNO to the IAEA**

Facility	2016–17
ANSTO research laboratories	853
HIFAR (de-fuelled 2007)	0
ANSTO vault storage	240
OPAL reactor	287
Other locations	2,523
<b>TOTAL</b>	<b>3,903</b>

**Table 4: Number of line entries (by report type) submit by ASNO to the IAEA across all facilities**

Type of Data	2016–17
Inventory Change Report (monthly)	1,526
Physical Inventory Listing (annual)	2,205
Material Balance Report (annual)	172

During 2016–17, ASNO migrated its nuclear material accounting management to a new database. In the new database, IAEA reports are created using a labelled XML format. Reports were previously created using fixed format text files which would sometimes require data (particularly concise notes) to be spread across several rows of report. As a result of the database upgrade, the criteria for counting line entries in reports to the IAEA has changed, resulting in significant differences in these tables compared to previous annual reports. All figures in Tables 3 and 4 are adjusted to the new criteria, and the count on numbers of entries of concise notes is no longer included, as concise notes are just one of many fields of data in each line entry.

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. Typical uses of this material include: research and development 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 chemistry work. The quantity comprises several items in various locations around Australia such as ANSTO and some universities.

Table 5: Nuclear Material in Australia at 30 June 2017

Category	Quantity	Intended End-use
<b>Source Material</b>		
Uranium Ore Concentrates (UOC)	773 tonnes	Export for energy use pursuant to bilateral agreements
	3.5 tonnes	Storage
Natural Uranium (other than UOC)	4,487 kg	Research and shielding
Depleted Uranium	26,721 kg	Research and shielding
Thorium Ore Residues	59 tonnes	Storage/disposal
Thorium (other than Thorium Ore Residues)	1,940 kg	Research, industry
<b>Special Fissionable Material</b>		
<sup>235</sup> U – low enriched	202,836 grams	Research, radioisotope production, storage
<sup>235</sup> U – high enriched	2,741 grams	Research, storage
<sup>233</sup> U	3.8 grams	Research
Plutonium (other than <sup>238</sup> Pu)	1,203 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 (as defined in the Safeguards Act) remained in exclusively peaceful use and did not contribute to any proliferation activity.

Table 6: Associated Items in Australia at 30 June 2017

Category	Quantity	Intended End-use
<b>Associated Material</b>		
Deuterium and heavy water	20.9 tonnes <sup>(1)</sup>	Research, reactors
Nuclear grade graphite	83.4 tonnes	R&D and storage
<b>Associated Equipment</b>		
HIFAR <sup>(2)</sup>	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 <sup>(3)</sup>	1	Reactor
OPAL control rods	13	Reactor components
OPAL control rod drives	6	Reactor components

(1) Deuterium and heavy water quantity reduced from last year's annual report due to an export of about 8 tonnes to USA.

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

(3) 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), which came into force for Australia on 12 December 1997. 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 not only that all declared nuclear material is

accounted for but also the absence of any 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. In 2017 ASNO used the IAEA’s new Protocol Reporter 3 software for the first time for compiling these reports. Table 7 lists the number of declarations 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	2012–13	2013–14	2014–15	2015–16	2016–17
2.a.i – Government funded, authorised or controlled nuclear fuel cycle-related research and development activities not involving nuclear material	2	2	2	3	8
2.a.ii – OPAL operational schedules	1	-	1	1	2
2.a.iii – General description of each building on each site, e.g. ANSTO, universities	189	175	154	156	289 <sup>(1)</sup>
2.a.iv – manufacturing or construction of specified nuclear related equipment	-	1	1	2	2
2.a.v – Location, operational status and production capacity of uranium or thorium mines or concentration plants	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.	6	7	7	8	7
2.a.vii – Information on nuclear material exempted from safeguards	-	6	6	4	4
2.a.viii – Information related to the further processing of intermediate or high-level waste containing plutonium	-	-	-	2	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	5	3	3	3	4
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	2	-

(1) The large increase in the number of the entries for Article 2.a.iii does not represent an increase in the number of reportable building descriptions, but rather is as a result of updated IAEA Software (Protocol Reporter 3). Under Protocol Reporter 3, descriptions are provided for all buildings on reportable sites; whereas previous software versions required reporting of updated building descriptions only.



## Safeguards Developments in Australia

The IAEA implements safeguards in Australia in accordance with the provisions in a range of instruments: the Comprehensive Safeguards Agreement; Additional Protocol; Subsidiary Arrangements; facility attachments for each material balance area described in Table 2; and internal IAEA documents such as the State-level approaches for Australia. As noted in the Year in Review section, the IAEA completed a major milestone in 2016 by completing revised State-level approaches for some 64 States. These revisions were conducted in line with the State-level concept, as described in IAEA document *The Conceptualization and Development of Safeguards Implementation at the State Level (GOV/2013/38)* and *Supplementary Document to the Report on the Conceptualization and Development of Safeguards Implementation at the State Level (GOV/2014/41)*. Australia's new State-level approach has also been completed. There are minimal changes given the small nuclear footprint in Australia and the fact that the IAEA has many years of experience in implementing State-level approaches in Australia. The key change is that the physical inventory verification (PIV) inspections that were held about once every two to three years at ANSTO's material balance area AS-D, will now be held annually, in conjunction with the PIV held at ANSTO's OPAL and R&D labs material balance areas.

The permit holder where the majority of ASNO's safeguards efforts apply is the Australian Nuclear Science and Technology Organisation (ANSTO), being an operating nuclear facility with a range of nuclear research and application interests, including the new ANSTO Nuclear Medicine (ANM) project.

The ANM project was at an advanced stage of completion as of 30 June 2017. 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. It will enable Australia to help meet world demand for the most common radionuclide used in nuclear medicine, molybdenum-99, using only low-enriched uranium (LEU).

A nuclear safeguards challenge that will apply to the ANM plant once operational is establishing a method for the IAEA to verify the uranium content in solid waste generated from the production of molybdenum-99. As of the end of the reporting period, the IAEA had designed an active well neutron coincidence counter detection system for measuring the uranium content, and it is expected to be trialled in the 2017–18 period (further details below).

Accompanying the ANM project is the Synroc waste immobilisation plant, which once built, will immobilise liquid waste from the ANM plant in a durable rock-like material. As construction has not commenced there was limited work on safeguards aspects during the reporting period. During the reporting period the IAEA convened an experts' consultancy meeting to provide advice into its review of the criteria used for determining when nuclear material in a waste form is of sufficient immobilization such that it meet the test of "practicably irrecoverable" for having safeguards terminated. ASNO and ANSTO sent a technical expert each to contribute to this review of the criteria.

ASNO is a key stakeholder in the project, managed by the Department of Industry, Innovation and Science (DIIS), to site and build a national radioactive waste management facility for near-surface disposal of low-level waste, and storage of intermediate-level waste. ASNO's interests are to ensure that the design of the facility accommodates IAEA safeguards requirements and that security systems and infrastructure would meet the IAEA's standards for any nuclear material held at the facility.

Nuclear material would comprise a small proportion of all radioactive material held at the facility. Most design features to meet radiation safety and security requirements, will likely meet requirements for nuclear safeguards and security, with limited modifications. The primary IAEA safeguards requirement is that any inventory of nuclear material is accounted for and accessible for IAEA inspection, unless otherwise rendered inaccessible in accordance with IAEA requirements. ASNO has worked closely with DIIS and the various stakeholders at this early stage of the project on developing the waste acceptance criteria to inform the

facility design. At the point where a decision is made by the Government to construct a facility on the chosen site, a permit for the establishment of a facility would be required under s16A of the Safeguards Act. A permit for possession of nuclear material under s13 of the Safeguards Act would be required once any nuclear material is introduced to the facility.

## 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 Permits and Authorities under the Safeguards Act as at 30 June 2017**

Permit or Authority	Current Total	Granted	Varied	Revoked	Expired
Possess nuclear material	112	4	6	1	1
Possess associated items	13	0	3	0	0
Transport nuclear material	17	3	14	0	4
Transport associated items	0	0	0	0	0
Establish a facility	2	0	0	0	0
Decommission a facility	1	0	0	0	0
Communicate information contained in associated technology	10	0	3	0	1
<b>TOTAL</b>	<b>155</b>	<b>7</b>	<b>26</b>	<b>1</b>	<b>6</b>

Notice of all permit changes were published in the Australia Government Gazette as required by subsection 20(1) of the Safeguards Act. Fourteen transport permits were varied as part of a bulk review of the permit system for transport of nuclear material (further details are in Output 1.2). One permit was revoked as the company in question no longer held any nuclear material.

## 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, the Ranger uranium mine, and a storage yard for uranium ore concentrates in Darwin operated by NQX Freight System. The IAEA conducted

its annual, scheduled physical inventory verification inspection at ANSTO, but it did not conduct a short notice random inspection during the reporting period (the last one was in June 2016). 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 inspectors during all of their activities. 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). The IAEA finding for this material balance area is in Annex D.



(a)



(b)

ASNO and IAEA inspectors at (a) Ranger Uranium Mine; and (b) taking a measurement at ANSTO.

As reported in ASNO's 2015–16 Annual Report, there is a technical challenge, outside of ASNO and ANSTO's control, regarding the IAEA measuring uranium content in solid and liquid waste from molybdenum-99 (Mo-99) radio-pharmaceutical production. ASNO and ANSTO have been working closely with the IAEA on a solution, and the IAEA has now constructed a prototype detection system for measuring the uranium content in the solid waste. The detector is an active well coincidence counter that measures uranium by counting multiple neutrons in coincidence through induced fission

from a small neutron source in the detection system. Planning is underway to test this device at ANSTO in early 2018, subject to safety approval by ARPANSA.

The uranium content in waste from Mo-99 production has been steadily accumulating for many years (and reported regularly to the IAEA) in the form of solid and liquid waste. The quantity of unverifiable uranium in material balance area AS-C is less than what the IAEA terms a "significant quantity", but nonetheless it is over a technical threshold, meaning that

the IAEA cannot meet its defined inspection goals until it has developed a suitable detection system. It is important to note that this relates only to material balance area AS-C covering Mo-99 production; there are no issues with the IAEA's regular verification of nuclear material in all of the other material balance areas, including the OPAL reactor and ANSTO storage areas.

The IAEA recognises that this is a technical challenge it needs to solve, and accordingly

this has not affected its overall conclusions for this material balance area or for Australia as a whole. The IAEA's 91a statement for material balance area AS-C (see Appendix D) concludes with "The IAEA did conclude that there were no indications of the undeclared presence, production or processing of nuclear material". Furthermore, the IAEA has maintained the broader conclusion for Australia that "all nuclear material remained in peaceful activities" (see Appendix D for further details).



(a)



(b)

Prototype detector for solid waste measurement: (a) external view; (b) during performance testing (Images courtesy IAEA)

**Table 9: IAEA Safeguards Inspections 2016–17**

Date	Facility	Material balance area <sup>(1)</sup>	Type <sup>(2)</sup>
30 March 2016	Ranger Uranium Mine	AS-E	Complementary Access (4.a.i)
31 March 2017	NQX Freight System	AS-E	Complementary Access (4.a.i)
3–6 April 2017	ANSTO	AS-D	Design Information Verification & Physical Inventory Verification
		AS-F	Design Information Verification & Physical Inventory Verification
		AS-C	Design Information Verification & Physical Inventory Verification
7 April 2017	ANSTO	AS-C	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 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 inspections and drawing conclusions with respect to Australia's safeguards obligations, ASNO inspectors are able to make observations during these inspections 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 (CSIRO's site at Clayton, Victoria) during the reporting period, to assess permit compliance and to hold discussions on permit requirements. Details on this inspection are in Output 1.2.

During the reporting period, some small inventory differences were reported to the IAEA in conjunction with inventory change reports and physical inventory listings. 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 inventory difference of  $-2.48\text{kg}$  natural uranium,  $71.90\text{kg}$  of depleted uranium, and  $2.22\text{kg}$  and  $-3.52\text{kg}$  of thorium, related primarily to re-measurements of the weights of multiple items such as industrial radiography devices and jars of chemical reagents. Some of these re-measurements took place upon export (in the case of industrial radiography devices), whereas others were done as part of inventory re-characterisation programs by some permit holders. Detailed descriptions on inventory differences have been provided to the IAEA for the period.

**Table 10: Inventory Differences Recorded during 2016–17**

Material Balance Area	Difference between Book and Physical Inventory	Comment
Other locations (MBA AS-E)	$-2.48\text{ kg}$ natural uranium	Rounding, re-measurements of batches and corrections of element of nuclear material; including a large recycling campaign of radiography cameras where depleted uranium weight was found to be different than previously recorded.
	$71.90\text{ kg}$ depleted uranium	
	$2.22\text{ kg}$ thorium	
	$0.00$ ( $-0.63\text{g}$ ) enriched $^{235}\text{U}$ isotope	
Other locations (MBA ASE1)	$0.23\text{ kg}$ depleted uranium	Rounding, re-measurements of batches and correction of element of nuclear material.
	$0.07\text{ kg}$ natural uranium	
	$-3.52\text{ kg}$ thorium	

# 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 transshipment of uranium ore concentrates (UOC) exported from Australia.

### Exports of Australian Uranium

Transport of all Australian UOC to destinations abroad is done in accordance with new model transport permit requirements that include verifying the integrity of containers holding UOC. Container seals are checked at each port of unloading or transshipment 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 1 December 2016, a shipment of ten containers due for a conversion facility was

delayed at the Port of Antwerp. Inspection of the containers showed minor exterior damage during transit to three containers. Subsequently, all the containers were inspected and tested for contamination. The Belgian nuclear authority, FANC, approved the undamaged containers to continue to the facility. The damaged containers were inspected and placed in overpacks before being transport to the facility.

### Nuclear Security at Australian Uranium Mines

During the reporting period, ASNO inspected three uranium mines and a transport company. In each case no significant security deficiencies were found.

On 26 July 2016, ASNO visited the Beverley uranium mine, evaluating security plans and procedures against ASNO’s permit requirements. This inspection was the first opportunity for ASNO to review security arrangements relating to the completed new storage yard. ASNO inspectors verified the currency of the plant security plans and arrangements that included actions arising from previous inspections.

ASNO conducted an inspection on 27 July 2016 of the Honeymoon uranium mine site. Boss Resources Pty Ltd, as the new owner and operator of the Honeymoon mine, continues to hold the mine under care and maintenance mode. During the inspection, ASNO inspectors verified the inactive status of the uranium processing plant and confirmed the current inventory of nuclear material samples held on site. ASNO advised on appropriate accountancy and physical protection measures to maintain the security of the mine site in its care and maintenance state.



Inspection at Beverley mine operated by Heathgate Resources. The photo above is of the new storage compound.

On 24 May 2017, ASNO conducted an inspection at Energy Resources Australia's Ranger uranium mine, evaluating security plans and procedures against ASNO's permit requirements and verifying that recommendations arising from the previous inspection had been addressed. The inspection included a review of new security features as installed at the drum packing building perimeter, access control measures, the

on-site laboratory and security arrangements at the main gatehouse.

ASNO visited the uranium storage yard of NQX Freight Systems on the 22 May 2017. NQX transports UOC from the Ranger mine to Darwin and provides storage facilities for UOC shipments prior to export from Darwin, or prior to transfer to rail for transport to Adelaide. ASNO inspectors verified the current security plans and arrangements including actions arising from previous inspections.



Inspection at Ranger uranium mine.

## Review of Permits to Transport Uranium Ore Concentrates

Continuing from ASNO's comprehensive review of permits under the Safeguards Act, ASNO completed a review and re-design of permits to transport uranium ore concentrates by road, rail and sea. One aim of the review was to achieve a more functional permit layout, by separating pre-transport, during-transport and incidental storage requirements. The revision process involved consultation with uranium producers and transporters and drew from the outcomes of a UOC transport workshop attended by both government and

industry. The revised permits conform to the new compliance-code format and were done consistent with the governance and risk management policies under the Government’s regulatory reform agenda.

### Technical Visit on the Implementation of Nuclear Accountancy & Security at Uranium Mines

During 15–22 October 2016, ASNO hosted a technical visit by a delegation from Kazakhstan

including Kazakhstan’s Committee of Atomic and Energy Supervision and Control (CAESC), Kazatomprom and the United States National Nuclear Security Administration, on the implementation of nuclear material accountancy and security at uranium mines. The delegation visited ASNO in Canberra and also the Beverley and Ranger uranium mines. The objective was to show CAESC and Kazatomprom how Australia regulates the uranium mining industry and how Australian mines implement uranium process controls.



*Dr John Kalish (Assistant Secretary ASNO) addressing delegation from Kazakhstan.*

### South Australia Uranium Ore Concentrate Transport Review Working Group

An inaugural workshop on the transport of UOC in South Australia, held in May 2016, led to the formation of a UOC Transport Working Group and a Transport Steering Committee. ASNO joined both the working group and the steering committee. The first working group meeting was held on 28 April 2017, convened by the South Australian Environment Protection Authority and attended by State Government, industry and first responders. The working group aims to provide guidance documents to industry for model standards/obligations (include recovery operations), conduct desktop or field exercises from experiences gained

and guidance content for an industry model transport plan. The first meeting concentrated on taking action on a SWOT analysis done at the inaugural workshop.

### 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 6–7 June 2017. ASNO members delivered presentations titled “Developments in Australia’s nuclear cooperation agreements” and “Regulating the transport of uranium ore concentrates”. 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.





Tammy de Wright (third from left) and Michal Botha (second from right) gave presentations at the AusIMM Uranium Conference.

## 11th Uranium Council Meeting

ASNO attended the annual Uranium Council Meeting held in Adelaide on the 8 June 2017. The meeting provides a forum for stakeholders (federal and state regulators and industry) to present on contemporary challenges as well as providing updated information of current developments in this field.

## Review of IAEA UOC Transport Training material

ASNO attended a consultancy meeting to review an IAEA developed training course on nuclear security for the uranium extraction industry, from 13 to 16 February 2017, in Vienna. The meeting updated the current training material derived from IAEA document IAEA- TDL-003 “Nuclear Security in the Uranium Extraction Industry” to ensure consistency and adequacy in its delivery to national, regional, and international level participants.

## DBT Review

ASNO completed a midterm review of the 2012 Design Basis Threat (DBT). As a central concept in the internationally recognised guidance document Nuclear Security Series No. 13<sup>1</sup>, the DBT is a statement of credible adversary intentions and capabilities and is to

be considered a “worst-case credible threat”. The DBT provides a basis, at a national level, to which nuclear facilities design and physical protection systems are implemented in order to defeat an adversary with clearly defined capabilities. Testing and assessment of security systems against the DBT, provides credible assurance of the security of nuclear materials and facilities against the level of threat specified in the DBT. ASNO worked with other Commonwealth agencies, including ASIO, Defence and ARPANSA, to review the existing DBT in context of the current threat environment. The review resulted in modifications to adversary capabilities. An unclassified version of the DBT is published on ASNO’s web-site.

## Nuclear Security at Lucas Heights

During the reporting period, ASNO confirmed that one building at Lucas Heights could be de-designated as a protected area since sufficient nuclear material had been removed from that building such that it no longer held Category II quantities, in accordance with IAEA NSS No. 13.

In June 2017, ASNO conducted a commissioning inspection of ANSTO’s upgraded perimeter detection system at Lucas Heights. During day and night-time exercises, ANSTO demonstrated

1 Also referred to as INFCIRC/225/Rev.5

that the system had sound maturity and performance. The completion of this project represents a significant increase in security capabilities at ANSTO.

### Silex Enrichment Technology

In July 2016, ASNO conduct an unannounced inspection at Silex Systems Limited (SSL) to verify its procedures for securing classified technology. In January 2017, ASNO conducted a routine inspection concentrating on matters raised in SSL's monthly security reports. No significant security deficiencies were found during either inspection.

In November 2016, ASNO provided renewal of assurances regarding transfers of Sensitive Nuclear Technology under the Australia-US Silex agreement to the US Department of Energy (DOE) so that DOE could renew its "Specific Authorization" under 10 CFR Part 810 to GE-Hitachi Nuclear Energy (GEH).

ASNO issued a revised combined permit to possess associated technology and authority to communicate information, using ASNO's new permit/compliance code model, in June 2017. The revised permit included security provisions more closely aligned with the Australian Protective Security Policy Framework.

### IP Australia

ASNO visited Intellectual Property (IP) Australia on 8 February 2017 to review the status and disposition of historical lapsed patent applications relating to associated technology. ASNO updated and issued appropriate certificates for Prohibition Orders to be issued to patent applications containing associated technology. IP Australia confirmed that all documents are stored consistent with the provisions of the Australian Government Protective Security Policy Framework.

### CSIRO

ASNO conducted an inspection at the CSIRO Clayton (Bayview Avenue, Clayton VIC) campus on 26 May 2017. ASNO requested ARPANSA's assistance to conduct the safe measurement of suspected nuclear material that was not recorded on the current inventory. The inspection also assessed the sufficiency of

security arrangements at the Clayton campus. The inspection report required CSIRO to characterise all nuclear material under its control and provided CSIRO with directions on the acceptable security arrangements for its current and possible future holdings of nuclear material.

### Nuclear Security Guidance Committee (NSGC)

Director, Nuclear Security Section attended the tenth and eleventh meetings of the IAEA's Nuclear Security Guidance Committee (NSGC) during 14–18 November 2016 and 19–23 June 2017, both held in Vienna and attended by some 50 member states. The core role of the NSGC is to manage the production of guidance documents in the IAEA nuclear security series. At these meetings six nuclear security series documents were approved for publication. At the June 2017 meeting, ASNO gave a presentation on Australia's use of the nuclear security series. The next meeting in November 2017 will be the NSGC's last of the current three-year term. It is hoped that significant guidance documents on cyber-security will be approved at that meeting.

### 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 its first IPPAS mission in November 2013 and has committed to conduct a follow-up mission from 30 October to 11 November 2017.

In preparation for the follow-up mission, ASNO held meetings with ANSTO and ARPANSA to update progress on addressing action items from the 2013 IPPAS mission. Along with addressing previous recommendations and suggestions, the mission will cover the current status of cyber-security and nuclear material accounting and control for security purposes.



ASNO's Dr Stephan Bayer at the IPPAS International Seminar in London

ASNO Director, Nuclear Security Section (Dr Stephan Bayer), attended an international seminar to share experience and best practices from conducting IPPAS missions on 22 – 23 November 2016 in London. ASNO presented on “Future IPPAS – Australia Expectation and Objective” that highlighted the 2013 IPPAS mission to ANSTO and looked forward to the follow-up mission in 2017.

Hungary held a follow-up IPPAS mission on 26 June to 7 July 2017. Having participated as a team member in Hungary's IPPAS mission in 2013, Stephan Bayer was invited to lead the follow-up mission. The mission team successfully delivered its draft final report on 7 July<sup>2</sup>, just outside of the reporting period for this annual report.



Dr. Stephan Bayer was team leader of the follow-up IPPAS mission to Hungary.

## ICONS 2016 – Nuclear Security Conference

ASNO attended the second International Conference on Nuclear Security, themed “Commitments and Actions”, which was convened at the IAEA's Headquarters in Vienna on 5–9 December 2016. The conference attracted 2100 registered participants from 139 Member States (47 of which were represented at ministerial level) and 29 organizations.

Australia's national statement<sup>3</sup> to the conference affirmed the IAEA's central and crucial role in coordinating international efforts to enhance nuclear security and encouraged international cooperation where states can assure each other that their respective national nuclear security regimes are robust and implemented to a high standard.

<sup>2</sup> See IAEA media release <https://www.iaea.org/newscenter/pressreleases/iaea-completes-nuclear-security-advisory-mission-in-hungary>

<sup>3</sup> See <http://austria.embassy.gov.au/vien/ICONS2016.html> for full transcript



Dr Rob Floyd (DG ASNO) at the Interactive Session at the International Conference on Nuclear Security, Vienna, December 2016.

Director General, ASNO, provided a presentation titled “The nuclear security role of the IAEA in a changing risk environment” Dr Floyd highlighted the need to be dynamic and agile in a future architecture of nuclear security and the ability for States to have cooperation initiatives. Director, Nuclear Security, ASNO presented on reviews conducted on Australia’s nuclear security regime, including IPPAS missions and periodic security reviews.

The conference also included an interactive session which focused on a hypothetical transport of spent nuclear fuel between two fictional countries involving a transit through another country. The scenario highlighted the applicability of the amended CPPNM during various threat scenarios.

### Post Nuclear Security Summit Activities

The fourth and final nuclear security summit was conducted in Washington DC in early 2016. In order to sustain action and ambition on the achievements made in the nuclear security summits, a number of summit participants (including Australia) formed a Nuclear Security Contact Group (NSCG). The

Statement of Principles have been distributed in IAEA Information Circular 899<sup>4</sup>. Australia has been active in the NSCG which has met four times and is currently chaired by Canada.

Within the NSCG, Australia is leading a discussion on preparing for the Amended CPPNM review conference which is mandated to take place in 2021.

A number Joint Statements (or so called “gift baskets”) that were made during the nuclear security summits have been since distributed as IAEA Information Circulars. The Australian-led Joint Statement on Nuclear Forensics has been published as INFCIRC/917. A full list of the nuclear security voluntary initiatives to which Australia has subscribed can be found in section 9 of Australia’s nuclear security profile located in Appendix D.

In further initiatives to promote nuclear security internationally, Director General ASNO has been active in track 1.5 dialogues, in particular the Nuclear Threat Initiative’s Global Dialogue on Nuclear Security Priorities.

# 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 2016.

**Table 11: Summary of net accumulated AONM by category, quantity and location at 31 December 2016<sup>5</sup>**

Category	Location	Tonnes <sup>6</sup>
Depleted Uranium	Canada, China, European Union, Japan, Republic of Korea, Russia, United States	126 937
Natural Uranium	Canada, China, European Union, Japan, Republic of Korea, United States	24 861
Uranium in Enrichment Plants	China, European Union, Japan, United States	30 578
Low Enriched Uranium <sup>7</sup>	Canada, China, European Union, Japan, Mexico, Republic of Korea, Switzerland, Taiwan, United States	17 834
Irradiated Plutonium <sup>8</sup>	Canada, China, European Union, Japan, Mexico, Republic of Korea, Switzerland, Taiwan, United States	183
Separated Plutonium <sup>9</sup>	European Union, Japan	1.6
<b>TOTAL</b>		<b>200 395</b>

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.

5 Figures are based on yearly reports to ASNO in accordance with Australia’s bilateral agreements and other information held by ASNO.

6 All quantities are given as tonnes weight of the element uranium or plutonium. The isotope weight of 235U is 0.711% of the element weight for natural uranium and from 1 to 5% for low enriched uranium.

7 More than 85 % of Australian obligated low enriched uranium is in the form of irradiated reactor fuel.

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

9 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.

**Table 12: Supply of Australian uranium by region during 2016**

Region	Tonnes UOC (U <sub>3</sub> O <sub>8</sub> )	% of Total
Asia	1,293	17
Europe	1,435	19
North America	4,951	64
<b>TOTAL</b>	<b>7,679</b>	<b>100.0</b>

**Table 13: Summary of AONM Transfers during 2016<sup>10</sup>**

	Destination	U (tonnes)
Conversion	Canada	1469
	China	1096
	European Union	1217
	United States	2729
Enrichment	European Union	1855
	United States	38
Fuel Fabrication	Republic of Korea	106
	United States	126

The shipper’s weight for each UOC consignment is entered on ASNO’s record of AONM. These weights, subject to amendment by measured Shipper/Receiver Differences, are the basic source data for ASNO’s system of accounting for AONM in the international nuclear fuel cycle. ASNO 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 11 and

Table 13 are based on ASNO’s analysis of all available information at the time of publication.

### Australia-Ukraine Nuclear Cooperation

On 15 June 2017, the Australia-Ukraine Nuclear Cooperation Agreement (signed on 31 March 2016) entered into force. In its report released on 16 December 2016, the Australian Joint Standing Committee on Treaties recommended binding treaty action be taken with respect to the Nuclear Cooperation Agreement with Ukraine, noting the need for ongoing risk assessment and contingency planning. The Government Response, tabled on 1 June 2017 outlined the comprehensive risk assessment performed as part of the process leading to negotiating and signing the Agreement and the ongoing contingency planning undertaken by the Government.

ASNO continues to work closely with its counterparts in Ukraine to finalise the Administrative Arrangement and Facilities List required before commercial transfers of Australian obligated nuclear material to Ukraine can commence.

<sup>10</sup> Figures are for transfers completed between jurisdictions from 1 January to 31 December 2016. 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.

### Implications of Brexit and the United Kingdom leaving Euratom

The United Kingdom (UK) Government has decided that withdrawal from the European Union (EU) will also include withdrawal from the European Atomic Energy Community (Euratom). Currently, exports of Australian uranium to the UK take place under a Nuclear Cooperation Agreement between Australia and Euratom, which allows for Australian uranium to be processed and used for civil nuclear power generation in all 28 Euratom/EU states. A 1979 bilateral Nuclear Cooperation Agreement between Australia and the UK remains in force, but will require updating to reflect the UK's new IAEA Safeguards Agreements once it withdraws from Euratom, for exports to continue after Brexit.

ASNO has been actively engaging with counterparts in the UK to ensure continued peaceful nuclear cooperation after the UK formally leaves the EU and Euratom.

### Implementation of the Australia-India Nuclear Cooperation Agreement

The Australia-India Nuclear Cooperation Agreement entered into force on 13 November 2015 and the *Civil Nuclear Transfers to India Act 2016* commenced on

8 December 2016. The Government framework to allow exports of Australian uranium to India is now in place. Exports of Australian uranium to India for civilian nuclear power generation can take place once contracts have been concluded between Australian producers and the Indian Department of Atomic Energy.

The exchange of reporting under the Agreement has commenced and a meeting of the Joint Technical Working Group under the Administrative Arrangement was held in Mumbai in May 2017. The delegation also toured the Nuclear Fuel Complex, Hyderabad where Australian uranium ore concentrate will be processed into natural uranium fuel for use in India's safeguarded pressurised heavy water reactors.

### Bilateral and multilateral engagement on Nuclear Cooperation Agreements

ASNO has continued to liaise closely with bilateral counterparts within our network of nuclear cooperation agreements to ensure the effective operation of the Agreements. This has included meeting bilaterally with counterparts from the United Arab Emirates and India and multilaterally with counterparts from Canada, Euratom, Japan, the US and the UK.

# 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 at 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 that could potentially affect nuclear industrial and research activities in Australia. Maintaining specialist knowledge also 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 was part of the Australian delegation to the IAEA Board of Governors and General Conference meetings in September 2016. At the General Conference ASNO contributed actively to successful negotiation of the Safeguards Resolution (“*Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards*”) which was agreed by consensus.

### Contribution to DFAT policy development

ASNO has provided key contributions to policy developments and international engagement 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 his role of Australian Governor on the IAEA Board of Governors. ASNO plays an important role in providing the Mission with expert 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 following his reappointment will continue in the role through 2018. SAGSI provides recommendations to the IAEA Director General on vital safeguards implementation issues. The Group currently comprises 18 international experts from 18 Member States<sup>11</sup>. 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 implementation topics set by the IAEA Director General. One of the core topics examined over 2016–17 was the use of State-level approaches for addressing anomalies, discrepancies and other inconsistencies identified through safeguards implementation. Other core topics included: strategic planning and management of research and development priorities; termination of safeguards on nuclear material in waste; and recruiting more women to the field of safeguards.

## Australian Safeguards Support Program

ASNO manages the Australian Safeguards Support Program (ASSP), which is one of 21 programs around the world dedicated to assisting the IAEA in safeguards research and development. As of 2016, Australia's program had been running for 36 years, the third longest running support program. The support program comprises collaborative work with counterparts and expert groups in universities, research agencies and others on a number of safeguards projects agreed with the IAEA. Active projects are outlined below.

### Nuclear Inspection Robots and Other Emerging Technologies

During 2015–16, the IAEA demonstrated the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) Zebedee 3D handheld mapping tool as a breakthrough technology in safeguards verification activities. Following its success in field trials and inspections, the IAEA sought assistance from ASNO in establishing a broader collaborative relationship with CSIRO on other technologies. ASNO and CSIRO collaborated in inviting a senior IAEA official with responsibility for technology development and implementation, Mr Sergey Zykov, to tour CSIRO labs. Mr Zykov heads the IAEA Division for Safeguards Technical and Scientific Services (SGTS). The tour of CSIRO labs took place in February 2017, with Mr Zykov accompanied by the IAEA's technology foresight specialist, Mr Dimitri Finker.

The delegation visited CSIRO laboratories in Brisbane, Sydney and Canberra and met with senior officials to explore opportunities for cooperation. The program covered CSIRO's research work in 3D scanning, photogrammetry (taking measurements or co-ordinates from photographs), robotics, chemical identification and advanced analytics. The delegation also visited ANSTO to see its work on novel imaging techniques for gamma rays and the University of Sydney's Australian Centre for Field Robotics.

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



(a)



(c)



(b)



(d)

IAEA delegation touring technology laboratories (a)&(b) CSIRO and (c)&(d) ANSTO in February 2017 (Images ASNO)

The IAEA has a particular interest in development of robotic devices for inspections as some of the tasks undertaken by inspectors involve making repetitive measurements over extended periods in areas that can be difficult to access or have elevated radiation levels. From 20–24 November 2017, CSIRO’s Data61 business unit will host an international technology challenge for the IAEA in Brisbane. The challenge will be used to test robotic devices in land-based and water-based simulated inspection scenarios. No nuclear or radiological material will be involved in the challenge.

The water-based scenario will explore the use of floating robotic devices for mapping the

radiation glow patterns from racks of spent fuel assemblies stored at the bottom of spent fuel storage ponds. Using current equipment, inspectors can take up to one week to confirm the completeness of spent fuel inventories at some facilities. The challenge seeks promising small, floating platforms that can autonomously propel themselves across the surface of a pond while holding the measurement instrument in a stable, vertical position.

The land-based scenario will explore the use of roaming/rolling robotic devices for counting items of specific geometry (such as canisters of uranium hexa-fluoride) and recording information from their identification labels.



IAEA promotional poster for the November 2017 robotics challenge

### Helping detect undeclared nuclear activities using mass spectrometers

The IAEA's Network of Analytical Laboratories (NWAL) is used to analyse environmental swipe samples (typically smears of dust taken from walls and equipment in facilities) taken by IAEA inspectors during site inspections. The IAEA's own laboratory is located in Seibersdorf, Austria. Its NWAL partners include ANSTO and the University of Western Australia, plus mass spectrometer laboratories in nine other IAEA Member States. In 2016, the Agency collected 603 nuclear material samples and 474 environmental samples during inspections.



Typical swipe sample received for environmental analysis (Image courtesy of University of Western Australia)

The University of Western Australia's Centre for Microscopy, Characterisation and Analysis joined the IAEA's analysis network in 2012. The Centre provides an extensive range of analytic services. It is one of only five laboratories in the world accredited by the IAEA to use large geometry secondary ion mass spectrometry (LG-SIMS) for quantifying trace amounts of radioisotopes. In 2016–17, the Centre analysed 20 samples, taking its current total to 90. During the year, the Centre also participated in an NWAL proficiency test, where member laboratories are sent identical samples to analyse. During the previous reporting period, the Centre ranked 4/9 in the proficiency test—a strong result considering this is not the ordinary type of analysis undertaken by the Centre.

During 2016–17, ANSTO did not accept any IAEA samples for analysis. Early in 2016 an issue was found with small amounts of natural uranium contamination entering into the sample process. The source of this has since been

identified and a replacement material is now in use as sample binder in the accelerator ion source. As a result of routine feedback from the IAEA on blind quality control analyses, a procedural problem has also been identified. This has been addressed in a rigorous manner with modifications to the sample tracking process. In August 2016 Dr Michael Hotchkis represented ANSTO at the IAEA Technical Meeting on Bulk Analysis of Environmental Samples. In discussion with the IAEA it was decided that ANSTO should re-validate sample analyses (in particular to verify uranium analysis performance). Work on re-validation is near completion and the next step will be to analyse a set of QC samples, to be provided by the IAEA.

### Proliferation Analysis Training

The tenth Proliferation Analysis Workshop was conducted in June 2017 in Vienna. The workshop participants were drawn from various divisions of the IAEA Department of Safeguards. An analyst from the Office of National Assessments and an analyst from the Australian Department of Defence led the workshop. The focus of the workshop was proliferation analysis in a safeguards environment. Participants explored analytical methodologies and techniques for combining information from disparate sources, in the context of a complex proliferation scenario. The IAEA considers that these workshops enhance participants' analytical knowledge and skills in safeguards-related proliferation issues.

### Releasing Irrecoverable Nuclear Material from Regulatory Control

In August 2016, ASNO and ANSTO attended an expert meeting at the IAEA in Vienna to provide updated advice and guidance for the IAEA to consider in its review of safeguards termination criteria. Safeguards termination criteria allow for nuclear materials to be released from ongoing IAEA safeguards once the material has been conditioned into a form that can be considered to be "practically irrecoverable" at which point the material no longer presents a proliferation risk.

### Assessment of Proliferation Pathways

During the year, ASNO considered projects in support of the IAEA's review of its Physical Model. The Physical Model is the IAEA's set

of documentation that details the technology, possible diversion paths, proliferation indicators and emerging issues for each step of the nuclear fuel cycle. IAEA inspectors use the Physical Model to assist in effectively targeting their inspection and analysis activities. The Physical Model had not been updated since the early 2000s in most cases, so the IAEA has begun a major project of updating all chapters drawing from expertise in different stages of the fuel cycle from a range of countries.

ANSTO Minerals is assisting in the uranium mining and milling chapter of the Physical Model. ANSTO Minerals has considerable expertise over a range of uranium production technologies and processes (both for conventional and non-conventional uranium resources) and their contribution will be a valuable addition to this important project.

### Cooperation with other States Parties

ASNO has close and long-standing relationships with nuclear security and safeguards regulatory and policy agencies in several countries both 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 (APSN).

A key initiative was hosting the “Small Quantities Protocol” (SQP) workshop for IAEA member states with small nuclear material inventories. The SQP applies to States with very small quantities of nuclear material and no nuclear facilities and is implemented where a comprehensive safeguards agreements (CSA) is not called for, by holding several of the CSA provisions in abeyance, thereby simplifying the safeguards implementation burden for these States with very small holdings. The IAEA ran the SQP workshop—held in Melbourne in December 2016—with support from ASNO and a technical tour of ARPANSA’s Yallambie site. The workshop was attended by representatives from Mongolia, Cambodia, Fiji, Lao PDR, Myanmar, Papua New Guinea, Qatar and Tonga. Course work presentations were

delivered by specialists in nuclear safeguards, nuclear security and security of radioactive sources from the IAEA, Mr Tapani Hack from the Finland Radiation and Nuclear Safety Authority, Mr Loch Castle from ARPANSA and Dr Craig Everton from ASNO.

ASNO continued to contribute to ongoing efforts to improve and strengthen the non-proliferation regime in the Asia-Pacific region by its participation in 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 safeguards experience.



(a)



(b)



(c)

Tour of ARPANSA during the Small Quantities Protocol (SQP) Workshop (a) and (b); and delivering coursework during the workshop (c)

The 7th annual meeting of APSN was held 18–19 October 2016 in Tokyo, Japan. The meeting was hosted by the Government of Japan and sponsored by the Japanese Ministry of Foreign Affairs. The meeting was attended by 35 representatives from 14 countries and the IAEA participated as an observer. Australia coordinates the safeguards infrastructure, implementation and awareness-raising working group (WG1 of APSN). WG1 facilitated an information-sharing session on a range of safeguards implementation challenges on recent developments and priorities in IAEA safeguards. This was the last annual meeting chaired by the Japanese Ministry of Foreign Affairs in its two year tenure. The role of Chair and Secretariat of APSN was passed to the Republic of Korea. For the period 2016–2018 the Korean Nuclear Safety and Security Commission (NSSC) will serve as Chair of APSN, with the Korean Institute for Nuclear Nonproliferation and Control (KINAC) acting as Secretariat.

During the last twelve months, assistance, expert advice and training were provided to various other professionals in a range of countries and international organisations including:

- “Risk Based Approaches to Security and Safeguards at Uranium Mines”, keynote presentation and paper to the Institute of Nuclear Material Management annual meeting on “Connecting Science, Technology, Policy and Culture for Effective Nuclear Materials Management” in Atlanta, US, July 2016.
- “Australia’s Safeguards Experiences” and “Australia’s System of Accounting for and Controlling Australian Uranium through the International Nuclear Fuel Cycle”. Presentations to the workshop on Developing a Kingdom System of Accountancy and Control for Greenlandic Uranium, Sweden, August 2016.
- “Reporting LOF (location outside facility) Material Under Comprehensive Safeguards” presentation to the Southeast Asia Regional Workshop on Complementary Access under the Additional Protocol in Kuala Lumpur, Malaysia, September 2016.
- “Australia’s Nuclear Safeguards Experiences”, presentation to the joint IAEA-JAEA (Japan Atomic Energy Agency) International Training Course on State System of Accounting for and Control of Nuclear Material, Tokai, Japan, November 2016.
- “International Cooperation in Safeguards—the Role of Regional Networks”, “Implementation of the Additional Protocol in Australia” and “Verification of Nuclear Warhead Dismantlement: Joining Dots”. Presentations and papers at the European Safeguards Research and Development Association symposium in Dusseldorf, Germany, May 2017.



*Dr John Kalish presents to the International Training Course on State System of Accounting for and Control of Nuclear Material in 2016, Tokai, Japan (Image courtesy of Japan Atomic Energy Agency)*



*Dr Craig Everton presents to the Southeast Asia Regional Workshop on Complementary Access under the Additional Protocol, Kuala Lumpur, September 2016.*

# 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 38 facilities with CWC-relevant chemical production, processing or consumption activities during 2016 (declared in March 2017)
- Article VI declaration of anticipated activities at eight CWC-Scheduled chemical facilities during 2017 (declared in September and October 2016)
- Article X, paragraph 4, declaration of Australia’s national programs for protection against chemical weapons (declared in April 2017)
- OPCW Survey on CWC National Authorities dated 21 February 2017.
- responses to OPCW Third Person Notes including routine clarification of the operational status of declared chemical plants

- 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 53 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 facilitated four routine OPCW inspections. Two inspections were conducted sequentially from 4–9 September 2016 at a declared CWC Schedule 3 facility in New South Wales followed by an ‘Other Chemical Production Facility’ (OCPF) in Victoria. From 3–6 April 2017, two OCPFs were inspected sequentially in Victoria and New South Wales, respectively.

All inspections proceeded smoothly and received excellent support and cooperation from government and industry. The OPCW inspection team verified Australia’s declarations, including the absence of any undeclared CWC-Schedule 1 chemical production, in accordance with the inspection mandates.



OPCW inspectors together with ASNO and industry site representatives during a routine CWC inspection at a declared chemical facility in Victoria, April 2017.

On-line reporting by facility and import permit holders, in accordance with their statutory obligations, enabled ASNO's preparation of Australia's declaration of past and anticipated chemical activities to the OPCW. In the reporting year, for the first time ASNO submitted most of its declarations and correspondence electronically to the OPCW directly via the Secure Information Exchange (SIX). ASNO also received correspondence from the OPCW using SIX. This meant a reduced burden on Australia's embassy in The Hague.

## 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. Table 14 provides statistics for the permits issued to facilities producing, processing or consuming CWC-Scheduled chemicals during the reporting period.

Thirty-two facility permits were in effect at 30 June 2017.

Of the 64 permits issued in 2016–17 for importers of Schedule 2 and 3 chemicals, seven of these were issued to new importers. ASNO worked with the Department of Immigration and Border Protection to obtain Border Integrity Checks, as necessary, for importers of CWC-Scheduled chemicals.

ASNO collaborated with Defence Export Controls (DEC) in preparing permit reporting requirements for companies exporting CWC-Schedule 2 and 3 chemicals. Although exporters are required to apply for export permits through DEC, new arrangements in place require them to report annually to ASNO via the secure online portal (as for importers). ASNO also provided DEC with reporting pro-formas which are to be completed and submitted to ASNO by exporters prior to and following any export of a CWC-Schedule 1 chemical.

**Table 14: Permits for CWC-Scheduled Chemical Facilities**

CWC-Scheduled Chemicals	CWP Act 1994	Permit Type	Permits at 30 June 2017 <sup>1</sup>	New Permits 2016–17	Re-Issued Permits 2016–17	Permits Cancelled <sup>2</sup> 2016–17
Schedule 1	s19(4)	Production (Protective)	1	0	0	0
	s19(5)	Production (Research)	9	1	1	0
	s19(6)	Consumption	11	0	2	0
Schedule 2	s18(1)	Processing	8	0	1	1
Schedule 3	s18(1)	Production	3	0	0	0

<sup>1</sup> Permit numbers include new, existing and renewed permits.

<sup>2</sup> Permits were cancelled due to company mergers and site relocations.

ASNO’s long-standing consultations within DFAT and with the Office of Parliamentary Counsel has resulted in the enactment on 13 December 2016 of The International Organisations (Privileges and Immunities – Organisation for the Prohibition of Chemical Weapons) Regulation 2016. This Regulation declares the OPCW as an organisation to which the *International Organisations (Privileges and Immunities) Act 1963* applies. While Parts 4 and 4A of the Chemical Weapons (Prohibition) Regulations 1997 confer privileges and immunities on OPCW inspectors, their equipment and inspection observers, the new Regulation affords privileges and immunities to the OPCW and other categories of persons. Together both regulations give effect to Australia’s obligations pursuant to paragraphs 48 and 49 of Article VIII(E) of the CWC.

This Regulation confers privileges and immunities that are necessary or desirable for the effective conduct of activities in Australia by the OPCW, its high officers, officers, representatives from other countries attending OPCW conferences and other persons serving on a committee or performing technical missions.

### Cooperation with the OPCW and CWC States Parties

ASNO has continued to support OPCW initiatives and has worked with other States Parties to encourage effective implementation of the CWC.

ASNO provided technical advice and contributed to policy development in preparation for OPCW Executive Council meetings (Australia is currently a member), industry cluster meetings and informal consultations in The Hague. More specifically, ASNO briefing addressed the following proposals:

- to expand the OPCW Central Analytical Database to include new validated data of non Scheduled chemicals relevant to the CWC;
- that declarations include production of discrete organic chemicals via bio-mediated processes;
- requirement for declarations of mixtures of DOCs and under what constraints; and
- in cases where State Parties consent, OPCW inspectors’ use of more portable sampling and analysis equipment including Fourier Transform (FT)-Raman spectroscopy alongside Gas Chromatography–Mass Spectrometry (GC-MS).

ASNO provided advice on issues being considered by the meetings of the OPCW Open-Ended Working Group on Future Priorities to discuss and formulate recommendations to be considered at the Fourth Review Conference in 2018, and also the Sub-Working Group (SWG) on Non-State Actors under the auspices of the Open-Ended Working Group on Terrorism. The SWG continued to discuss a draft paper on this issue and to share experiences among States Parties on the Legal Accountability of Non-State Actors.



In response to an OPCW Note (L/ODG/207945/17) issued in February 2017, the Director-General of ASNO was designated by Australia as the national focal point for coordination of operational issues in the event of a deployment of the Rapid Reaction and Assistance Mission (RRAM) established by the OPCW in May 2016 (S/1381/2016) to help detect and analyse toxic chemicals and provide advice on emergency measures in response to a chemical weapons attack by a non-State actor.

Australia was represented by Government and industry at the Third Annual Meeting of Chemical Industry Representatives and National Authorities of States Parties to the CWC in Doha, Qatar, from 16–18 October 2016. The meeting focussed on outreach and chemical safety and security issues to promote effective implementation of the CWC. First Secretary, Australian Embassy Doha, presented on Australia's mechanisms and frameworks, established in partnership with industry and State and Territory Governments, to address chemical security issues (prepared by ASNO) and Mr Bernard Lee from the Plastics and Chemicals Industries Association (PACIA – now Chemistry Australia) contributed an Australian Industry perspective.

ASNO actively participated in the 18th Annual Meeting of National Authorities of CWC States Parties in The Hague from 23–25 November 2016, which included a break-out session of the Western Europe and Other States (WEOG) group. The WEOG meeting discussed industry cluster issues and facilitated sharing of inspection experiences and assistance to developing States Parties through the OPCW's Mentorship Program. Other break-out discussions focussed on five main areas: identifying declarable activities and minimising transfer discrepancies; achieving effective national implementation of the CWC; receiving inspections; reviewing developments in science and technology; and advancing education and outreach in support of the CWC.

ASNO (Dr Robert Floyd and Dr Josy Meyer) together with a representative from DFAT's International Security Division attended the twenty-first session of the Conference of the States Parties (CSP21) held in The Hague from 28 November – 2 December 2016.

HE The Hon Dr Brett Mason, Head of Australia's delegation, made clear in Australia's National Statement to the Conference the need to uphold the norm against the use of chemical weapons by anyone under any circumstances.

In the margins of CSP21, the OPCW Director-General and the ASNO Director General co-signed the revised facility arrangement between Australia and the OPCW (EC-83/DEC.1 dated 13 October 2016) which had been approved at the 83rd session of the OPCW Executive Council. This sets out the parameters governing on-site inspections at Australia's only Schedule 1 facility for protective purposes at Defence Science and Technology Group.

On 20 June 2017, ASNO and a representative of DFAT's International Security Division attended a high-level forum on the Chemical Weapons Convention 1997–2017: Progress, Challenges and Reinforcing the Global Norm against Chemical Weapons held in Washington DC. Panel discussions covered CWC negotiations and the US ratification process, current issues and future challenges. Australian views on the dangers of Aerosolisation of Central Nervous System Acting Chemicals (CNSACs) for Law Enforcement Purposes were shared during the panel discussion on future challenges. Australia also noted that its joint paper (EC 84/NAT.7 dated 2 March 2017) had achieved cross regional support from 39 co-signatories when it was tabled at the 84th session of the OPCW Executive Council (7–9 March 2017).

At the Australia Group (AG) Plenary meeting held in Paris between 26–30 June 2017 ASNO gave a presentation on Australia's experience with Harmonised System (HS) codes for tracking trade in CWC-Scheduled chemicals, many of which are included on the AG export control list. ASNO expanded on the pros and cons of unique classification codes and how to address these challenges. ASNO explained how its industry guidelines aim to assist traders in assigning correct import tariff and Australian Harmonised Export Commodity Classification (AHECC) codes and to identify chemical mixtures containing CWC-Scheduled chemicals.



*Mr Ian D'Souza, ASNO, giving a presentation at a joint OPCW-Thailand Regional Dialogue on Promoting Global Peace and Prosperity through Chemical Safety and Security, Bangkok, 20–21 July 2017.*

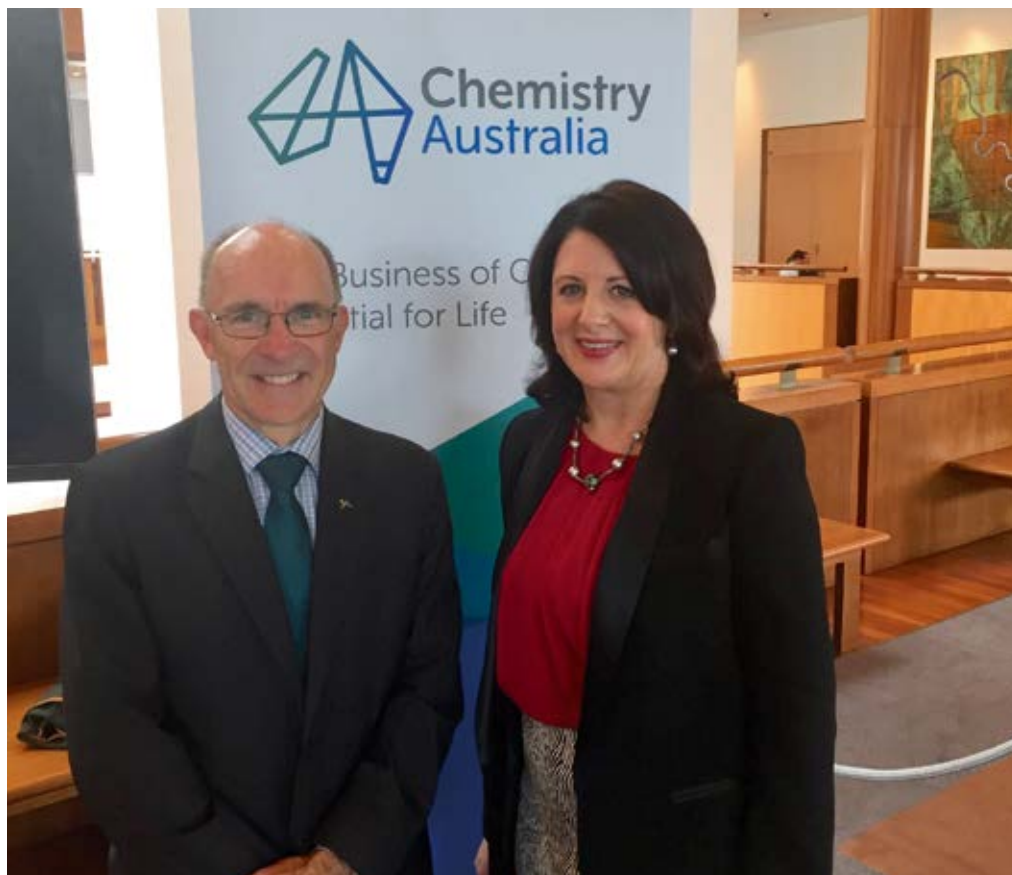
To mark the OPCW's 20th Anniversary, Thailand together with the OPCW hosted a Regional Dialogue on Promoting Global Peace and Prosperity through Chemical Safety and Security that brought together representatives from ten Asia-Pacific countries between 20–21 July 2017. ASNO presented on Australia's

experience in establishing a National Code of Practice for Chemicals of Security Concern to mitigate against the risks of diversion of chemicals from the cradle to the grave, and outreach efforts to foster a chemical security culture in industry, businesses and the community.



*Delegates from each of the countries represented at the OPCW-Thailand Regional Dialogue on Promoting Global Peace and Prosperity through Chemical Safety and Security, Bangkok, 20–21 July 2017. Photo courtesy of the Ministry of Foreign Affairs of Thailand.*

## Domestic Outreach



*Dr Robert Floyd (DG ASNO) with Ms Samantha Read (Chief Executive Officer, Chemistry Australia) at the Chemistry Australia National Launch at Parliament House on 21 March 2017.*

ASNO continued its close cooperation on CWC implementation issues with relevant Government agencies including the National Industrial and Chemicals Notification and Assessment Scheme; the Australian Pesticides and Veterinary Medicines Authority; Defence Export Controls; Australian Border Force; Australian Bureau of Statistics; and the Attorney General's Department.

ASNO attended the National Launch of Chemistry Australia, the new name and identity for PACIA, at Parliament House on 21 March 2017. The association is the peak body representing the Australian chemical industry. ASNO collaborated with Chemistry Australia/PACIA in sending one of its experienced representatives to speak on behalf of industry in support of an OPCW CWC Regional Meeting held in Doha from 16–18 October 2016.

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 in industry, research and trade. To that end, on 7 April 2017 ASNO met with representatives from the New South Wales Health Pathology's Forensic and Analytical Science Service during an on-site visit. ASNO gave a presentation to promote greater awareness of the CWC and its relevance for laboratories and research institutes, and provided helpful advice on the utility of ASNO's secure online portal for reporting purposes.



ASNO representatives visiting the Chemical Criminalistics laboratories at the New South Wales Health Pathology's Forensic and Analytical Science Service on 7 April 2017.

# 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 in the second year of a three-year installation process. Major civil works were completed during the 2016–17 summer, including installation of power and communications systems. The installation of scientific instrumentation, and testing to certify that the station meets CTBT requirements, is scheduled for the summer of 2017–18. The station should come fully into operation during 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 that is reviewed each year. ASNO is satisfied 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 2017, 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, continue to hold the question of Australia's future NDC requirements under review.

### Nuclear-Test-Ban Verification

On 9 September 2016, the DPRK announced that it had conducted its fifth nuclear test explosion. Seismic waves from the test were detected by the CTBT's nuclear test monitoring infrastructure, including in Australia.

Geoscience Australia identified and promptly notified ASNO of an explosive event occurring at approximately 1030 AEDT on 9 September in the vicinity of the P'unggye nuclear test site in north-eastern DPRK, the site of the declared previous tests. Analysis by GA of the seismic event over the following 3 hours confirmed that this test was the largest test conducted to date. Using data from 34 seismic stations of the International Monitoring System (IMS), including 3 Australian stations and complemented by data from other non-IMS networks, GA derived an explosive yield estimated at 6.4 kT and a location estimated at some 300m ENE of the January 2016 test location.

Previously, the DPRK announced in 2006, 2009, 2013 and January 2016 that it had conducted nuclear tests. The table below sets out details. The estimated yield for the September 2016 test is larger than for previous such tests, but remains consistent

with a simple nuclear fission device. It is likely, however, that the series of tests has helped the DPRK to refine its warhead design and reduce its size, potentially to enable delivery with a ballistic missile.

**Table 15: DPRK nuclear tests 2006–16**

	Approximate seismic magnitude	Estimated explosive yield (kilotonnes)	Comment
9 October 2006	mb 3.9	< 1	Likely partial failure
25 May 2009	mb 4.56	1 – 5	Seismic detection consistent with a simple fission device
12 February 2013	mb 4.93	3 – 13	Seismic detection consistent with a simple fission device
6 January 2016	mb 4.83	2.5 – 10	Claimed by DPRK to be test of a “hydrogen bomb”. Seismic detection consistent with a simple fission device.
9 September 2016	mb 5.06	4.4 – 19	Seismic detection consistent with a simple fission device

While around 89 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.

### Australian Participation in CTBTO verification development activities

The CTBTO Preparatory Commission, including its member states, continue to carry out work to ensure the treaty’s verification regime will be ready to meet requirements in the CTBT when the treaty enters into force. ASNO coordinates and contributes to Australia’s specialist support for this work, which is focused mainly on meetings of the CTBTO’s Working Group B. Experts from Geoscience Australia and ARPANSA contribute mainly in relation to ongoing development of the CTBT’s IMS and IDC.

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.

During the reporting period, four Australians participated in CTBTO training activities. Three undertook training in relation to their function as operators of IMS stations. ANSTO’s Alison Flynn is participating in regular events as part of a three-year program to train future specialists to conduct OSI under the CTBT. ASNO coordinates the involvement of Australians in this training.

The CTBTO’s biennial science and technology conference aims to strengthen the scientific foundations for verification of the treaty, and to examine ways in which the treaty contributes to scientific research. ASNO’s Donald Sorokowski participated in the CTBTO’s 2017 Science and Technology conference.

## Outreach

On 6–7 July 2016, Australia, with the CTBTO, co-sponsored a workshop in Naypyidaw to discuss the practical benefits and obligations for Myanmar to ratify the CTBT. ASNO's Malcolm Coxhead worked with Australia's mission to Myanmar to share Australia's experience with implementation of, and continuing practical support for, the CTBT. Myanmar ratified the CTBT on 21 September 2016.

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.

# 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.

### Fissile Material Cut-off Treaty

ASNO continued during the year to provide expert support for 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.

DG ASNO was appointed during the year to the UN-mandated High-level FMCT expert preparatory group tasked to consider and make recommendations on substantial elements of a future treaty. Preliminary meetings of the group were held in New York in February 2017 and in the UK in June 2017. The group will carry out its main work in two two-week sessions in 2017–18.

### International Partnership for Nuclear Disarmament Verifications (IPNDV)

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.

A first phase of practical work by IPNDV is being conducted over 2016 and 2017 focusing on requirements to verify the physical dismantlement of a nuclear explosive device into its critical components. Australia is participating in each of IPNDV’s three working groups and, together with 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 and Craig Everton also participated in three working groups meetings during the year. The article at page 25 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 focus for a second phase of work in 2018–19 is in planning. The next plenary meeting of IPNDV will take place in November 2017 in Buenos Aires when products from the first phase will be released.

## Other

ASNO contributes routinely to Australia's efforts to strengthen international non-proliferation efforts 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.



*Dr John Kalish (Assistant Secretary ASNO) participated in the International Framework for Nuclear Energy Cooperation (IFEC) Infrastructure Development Working Group, Reliable Nuclear Fuel Services Working Group and Steering Committee Meetings from 26–29 June 2017 in Paris, France.*

# 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, Innovation and Science, and the Australian Intelligence Community.

## Performance Assessment

### ASNO’s role in providing independent expert advice

ASNO has a broad remit when it comes to providing independent expert advice on non-proliferation policy issues. 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 for the design of facilities to meet IAEA safeguards requirements, which in turn would be incorporated by ASNO as permit conditions once the facility is operational.

In this regard, ASNO is contributing to the Australian Government’s plans for a national radioactive waste management facility (NRWMF). Through the Waste Acceptance Criteria Working Group and other fora, ASNO has provided advice on the safeguards and security measures that must be applied to nuclear material held within the NRWMF.

Safeguards by design (SBD) is defined in the IAEA’s publication, *International Safeguards in Nuclear Facility Design and Construction* (Nuclear Energy Series No. NP-T–2.8) as 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.

During the reporting period, ASNO has continued working with ANSTO and the IAEA on developing a measurement solution to fully account for the uranium content of the solid waste that arises from radiopharmaceutical production at ANSTO. This work is further covered in Section 1—The Year in Review.

# 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.

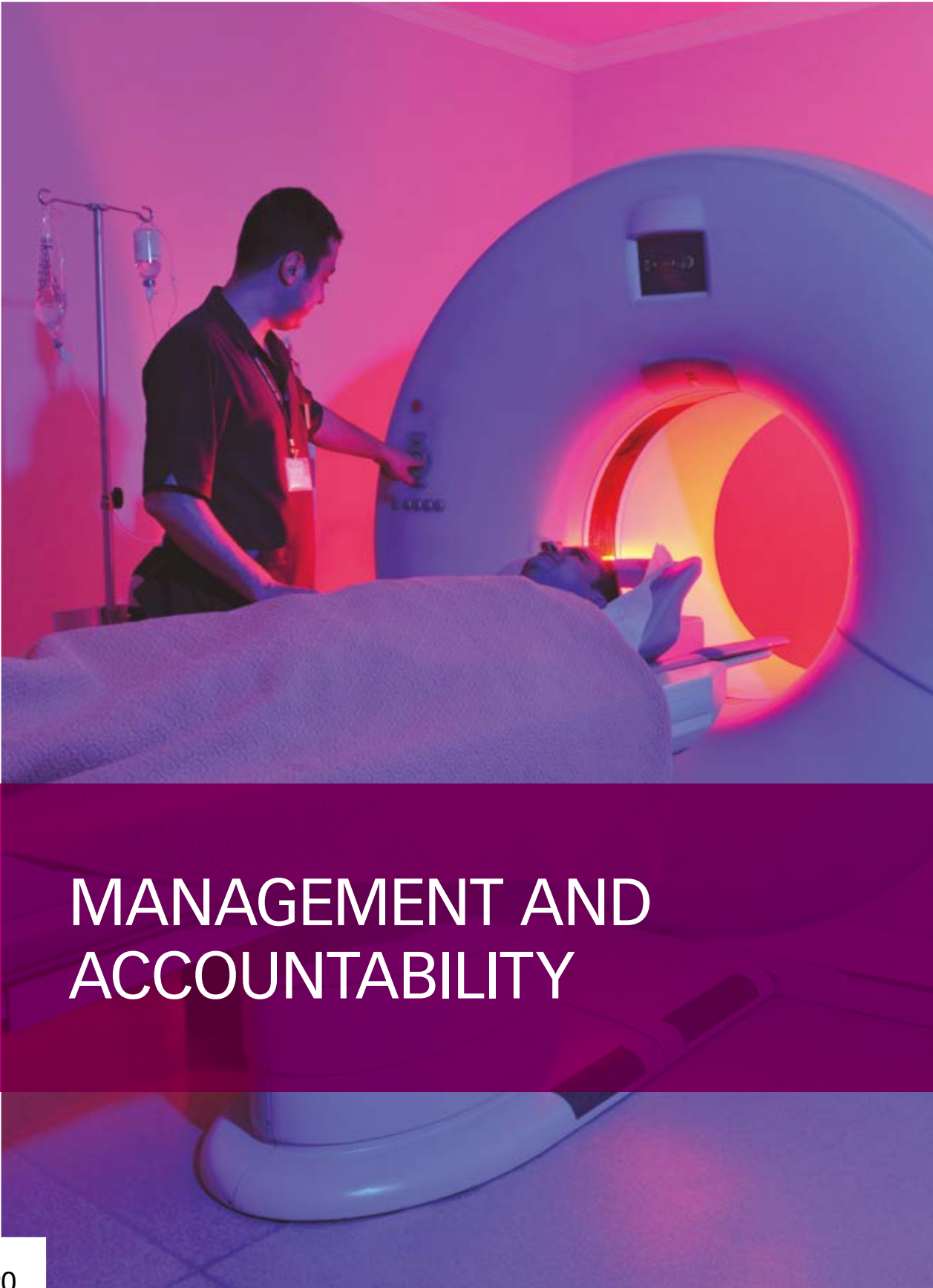
## Performance Assessment

ASNO works to ensure Australia’s WMD non-proliferation objectives are widely understood in the public, private, non-government and academic sectors. ASNO routinely provides different presentations and training activities as part of its outreach activities. ASNO also attends peak industry forums and conducts on-site outreach visits. In 2016–17, ASNO supported public information and outreach activities through:

- Attendance at the Annual Conference of the Australasian Radiation Protection Society to reach out to current and potential permit holders on safeguards issues and permit requirements. DG ASNO delivered a keynote presentation on “Global nuclear non-proliferation and nuclear security regime: Implications for nuclear fuel cycle activities in Australia”. ASNO also delivered a presentation on “Path to best practice nuclear safeguards regulation in Australia”.
- A licence holder forum hosted by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) at the Australian National University, providing ASNO with an opportunity to discuss permits to possess nuclear material in the context of radiation protection.
- Attendance at the Australasian Institute of Mining and Metallurgy (AusIMM) International Uranium conference and presenting on “Developments in Australia’s nuclear cooperation agreements” and “Regulating the transport of uranium ore concentrates (UOC)”.



Presentations to the Australasian Radiation Protection Society conference in Adelaide, September 2016.



# MANAGEMENT AND ACCOUNTABILITY

# 5

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## SECTION

## Management and Accountability

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# 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 16 and the DFAT Annual Report 2016–17.

In 2016–17 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 2017

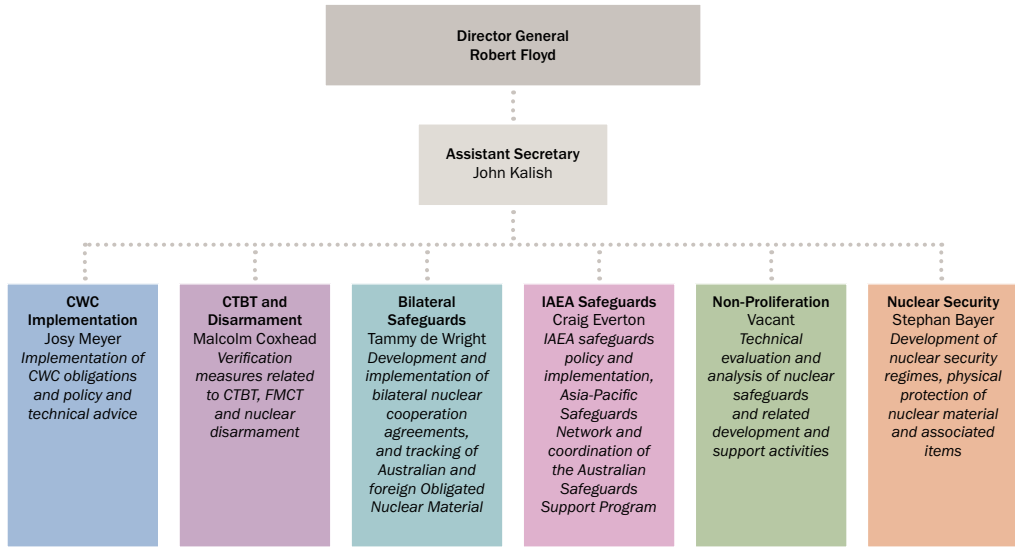


Table 16: ASNO Staff at 30 June 2017

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

## 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 17.

Table 17: Training and Development Activities during 2016–17

Training and Development Activity	Person Days
Formal DFAT courses	24
Structured work unit and on-the-job training, including planning days	18
Seminars, workshops, conferences, overseas negotiations and IDCs	54
External formal courses	46
Academic study	0
Other (IAEA Consultancy)	19
<b>TOTAL</b>	<b>176</b>



# 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 18: ASNO Administrative Costs**

		2015–16	2016–17
Salaries		1 901 285	2 301 536
Running Costs	General	711 796	703 073
	Seismic monitoring <sup>1</sup>	578 804	573 016
	Sub-Total	1 290 600	1 276 089
<b>TOTAL</b>		<b>\$3 191 885</b>	<b>\$3 577 625</b>

(1) Undertaken by Geoscience Australia

## Regulatory Reform

As a portfolio regulator with the Department of Foreign Affairs and Trade, in 2016–17 ASNO completed its second year of participation in the Government’s Regulator Performance Framework.

The Government developed the Framework to measure the performance of regulators in regards to reducing the cost to business of managing regulatory requirements. The program is part of a regulatory reform program coordinated by the Department of Prime Minister and Cabinet. The goal of the program is to measure and publicly report performance that will give business, the community and individuals confidence that regulators effectively and flexibly manage risk.

The Framework consists of six outcomes-based key performance indicators covering the reduction in regulatory burden, communications, risk-based and proportionate approaches, efficient and coordinated monitoring, transparency, and continuous improvement. Within the Framework and mandatory KPIs, ASNO devised a set of metrics (see table below) that focused our staff on how we engage with the industry and organisations that we regulate.

ASNO’s primary regulatory objective is to enable strong and effective regimes against the proliferation of nuclear and chemical weapons. We achieve this with a committed focus on international engagement to influence the global frameworks under which Australia business must operate. With a high-level understanding of Australia’s non-proliferation obligations, ASNO has progressed with implementing strategies for streamlining engagement with nuclear and chemical permit holders.

During the reporting period, ASNO was able to take advantage of a new suite of permit templates that assist businesses identify and apply for the appropriate permit. Modifications of permits for the possession of nuclear material, industrial radiography, security and transport have all been completed and implemented. To support this important achievement, outreach activities were conducted throughout the year that complemented our interaction with regulated industries. We were able to discuss our rationalized processes with business and receive valuable feedback.

An important tactic employed by ASNO is the effective and efficient response to permit holder requests. The information we collected against our metrics showed that our processing time for completed permit applications averaged 14 days, with 81% of all

permits issued within our 21-day benchmark. The efficient turn-around supports business by allowing them to complete undertakings that involve controlled material, equipment and facilities.

**Table 19: ASNO Regulatory Performance Framework Metrics 2016–17**

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 2016 at 14.1775 cents per kilogram).





# APPENDICES



# 6

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## SECTION

# Appendices

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# Appendix A: Australia's Nuclear Cooperation Agreements

**Table 20: Australia's Nuclear Cooperation Agreements at 30 June 2017**

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 <sup>1</sup>	3 February 2007
Russian Federation	11 November 2010
United States	22 December 2010
Euratom <sup>2</sup>	1 January 2012
United Arab Emirates	14 April 2014
India	13 November 2015
Ukraine	15 June 2017

Note: The above list does not include Australia's NPT safeguards Agreement with the IAEA, concluded on 10 July 1974 or the Protocol Additional to that Safeguards Agreement concluded on 23 September 1997. In addition to the above Agreements, Australia also has an Exchange of Notes constituting an Agreement with Singapore Concerning Cooperation on the Physical Protection of Nuclear Materials, which entered into force on 15 December 1989.

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.

# Appendix B: IAEA Statements of Conclusions and Other Inspection Findings for Australia in 2016–17

## IAEA inspection regime in Australia

The IAEA conducts verification activities (inspections) in Australia under the Comprehensive Safeguards Agreement<sup>3</sup> and under the Additional Protocol<sup>4</sup>, with the scope and focus differing between these two agreements.

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)<sup>5</sup> 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 (see below). The frequency of PIVs depends on the types and quantities of nuclear material held in each MBA. In Australia's case, PIVs are scheduled annually for the OPAL reactor (ASF) and ANSTO's R&D laboratories (AS-C). PIVs were scheduled at a frequency of approximately one every two years for ANSTO's storage areas (AS-D), but this has changed to annual PIVs as a result of the IAEA's review of the State-level approach for Australia<sup>6</sup>. 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 sample of all such locations. 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 or 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 (essentially inspections) known as complementary access. A complementary access has three purposes: 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). The IAEA has conducted a total of 71 Complementary Accesses in Australia since 1998. Article 4.a.i Complementary Access are the most common, with only two Complementary Accesses under article 4.a.ii, and one under Article 4.a.iii. Complementary Access activities called while IAEA inspectors are already on the ANSTO site for other inspections can be conducted at any building

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

4 Published in IAEA document INFCIRC/540 (corrected)

5 Australia's material balance areas for IAEA safeguards are described in Table 2 in Output 1.1.

6 A discussion on the IAEA's State-level approaches and the State-level concept can be found on page 64 of ASNO's 2013–14 Annual Report.



on site 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 two to three Complementary Access activities in Australia each year.

## 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 2016 (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 2016. 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)** of Australia's NPT Safeguards Agreement: the results of inspections at individual material balance areas (MBAs)
- **Article 91(b)** 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.

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.

## IAEA conclusions and findings for each Material Balance Area

**Material balance area:** AS-C (research and development laboratories)

**Material balance period:** 20 April 2015–31 May 2016

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Physical Inventory Verification	1–2 June 2016	ANSTO	<p>“Based on the activities conducted and the information available to date in connection with such activities, the results of the inspection were not entirely satisfactory.</p> <p>On a significant quantity basis only a third of the nuclear material on inventory in this facility was available for verification. In particular, while almost all of the plutonium, natural uranium, and depleted uranium were verified, it was only possible to verify 1% of the enriched uranium.</p> <p>The enriched uranium in question is primarily (accumulating) irradiated residues from Mo–99 production and verification will require the development, testing and installation of specialized equipment that can measure this material inside a hot cell. The IAEA was able to reach agreement with ASNO and ANSTO on a plan to accommodate such an instrument and a methodology to perform the required measurements; however, it is expected that developing and installing the instrument may take a few years.</p> <p>On a minor note, the IAEA noted a difference in the way a transaction was reported in the operator’s books and in the State reports. While this transaction was very small, and there was no effect on the final total, steps should be taken so that accounting transactions are recorded consistently in the future.”</p>	26 Nov 2016
Design Information Verification	1–2 June 2016	ANSTO	<p>“Based on the activities conducted and information available, the results of the DIV were satisfactory”</p>	1 Nov 2016

**91(b) Statement of Conclusions (15 March 2017):** “Regarding verification activities carried out at AS-C during the material balance period 20 April 2015 to 31 May 2016, and based on information available to date in connection with such activities, the IAEA was only able to partially conclude that all declared nuclear material has been accounted for due to the fact that only a small amount of the enriched uranium could be verified. As mentioned in the Article 91(a) statement, a measurement method for the remainder of the material is under development. The IAEA did conclude that there were no indications of the undeclared presence, production or processing of nuclear material.”

The IAEA’s statement that “the results of the inspection were not entirely satisfactory” does not relate to ASNO or ANSTO’s preparation or support of the inspection, but to the fact that the IAEA does not yet have a detection system for quantifying the quantity of uranium in solid and liquid waste from ANSTO’s molybdenum–99 radiopharmaceutical production process. This issue, foreshadowed on page 58 of ASNO’s 2015–16 Annual Report, is outside of the control of ASNO and ANSTO, while the IAEA designs and

builds a suitable detection system. There are inherent complexities in this measurement (particularly to balance the IAEA’s verification objectives and minimises disruptions to the radiopharmaceutical production process) given the high radioactivity of the waste. ASNO and ANSTO have been working closely with the IAEA over the last few years on finding a solution to this challenge. The IAEA has now designed and built a prototype detection system, and plans are underway to test this on site in early 2018. See Output 1.1 for further details.

**Material balance area: AS-C (research and development laboratories)**

**Material balance period: 1 June 2016–6 April 2017**

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Physical Inventory Verification	5–6 April 2017	ANSTO	91(a) Statement not available at time of publication of this Annual Report	
Design Information Verification	5–6 April 2017	ANSTO	DIV statement not available at time of publication of this Annual Report	
<b>91(b) Statement of Conclusions:</b>		Not available at time of publication of this Annual Report		

**Material balance area: AS-D (vault storage)**

**Material balance period: 22 April 2015–7 April 2017**

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Physical Inventory Verification	3 April 2017	ANSTO	“Based on the activities conducted and the information available to date in connection with such activities, the results of this inspection were satisfactory”	11 August 2017
Design Information Verification	3 April 2017	ANSTO	“Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory”	11 August 2017
<b>91(b) Statement of Conclusions:</b>		Not available at time of publication of this Annual Report		

Appendix D of ASNO’s 2015–16 Annual Report included an incomplete table of IAEA findings and conclusions for material balance area AS-C for the period 12 March 2014 to 19 April 2015. This material balance period for AS-C is not yet closed due to a small difference

of less than 1g between the aggregated quantities in IAEA and Australian records. The IAEA has undertaken to provide advice to ASNO on which specific inventory and inventory change line entries should be adjusted to bring the accounts into balance.

**Material balance area: AS-F (OPAL)**

**Material balance period: 23 April 2015–30 May 2016**

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	“Based on the activities conducted and the information available to date in connection with such activities, the results from the inspection were satisfactory.”	19 Sept 2016
Physical Inventory Verification	31 May 2016	ANSTO	“Based on the activities conducted and the information available to date in connection with such activities, the results from the inspection were satisfactory.”	10 Nov 2016
Design Information Verification	31 May 2016	ANSTO	“Based on the activities conducted and information available, the results of the DIV were satisfactory”	10 Nov 2016

**91(b) Statement of Conclusions (18 January 2017)**

“The IAEA has concluded from its verification activities carried out at AS-F during the material balance period 23 April 2015 to 30 May 2016, 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 undeclared presence, production or processing of nuclear material.”

**Material balance area: AS-F (OPAL)**

**Material balance period: 1 June 2016–7 April 2017**

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Physical Inventory Verification	4 April 2017	ANSTO	“Based on the activities conducted and the information available to date in connection with such activities, the results of this inspection were satisfactory”	11 August 2017
Design Information Verification	4 April 2017	ANSTO	“Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory”	11 August 2017

**91(b) Statement of Conclusions:**

Not available at time of publication of this Annual Report

## Additional Protocol Assessment Period: 1 January 2016–31 December 2016

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	“The Agency was able to carry out all planned activities during the CA.”
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”
<b>10(c) Statement of Conclusions</b>	<p>“The Agency has concluded from its activities carried out during this period, and based on the information available to date in connection to such activities that: Access pursuant to 4.(a).(i) did not indicate the presence of undeclared nuclear material or activities at: Lucas Heights Science and Technology Centre, Lucas Height, NSW; Olympic Dam Mine, Olympic Dam, South Australia, however, final conclusion is pending the results and evaluation of environmental samples.”</p> <p>“Access pursuant to Article 4.(a).(i) and 4.(a).(iii) at LHSTC – Lucas Heights Science and Technology Centre, SILEX, Building 64, confirmed Australia’s declaration of the decommissioned status of ASG- and did not indicate the presence of undeclared nuclear material or activities, however, final conclusion is pending the results of evaluation of environmental samples.”</p>	

## Additional Protocol Assessment Period: 1 January 2017–31 December 2017

Date of Complementary Access (CA)	Location	10(a) Statement of activities
30 March 2017	Ranger uranium mine	“The IAEA was able to carry out all planned activities during the CA”
31 March 2017	NQX Freight Systems, East Arm, NT	“The IAEA was able to carry out all planned activities during the CA”
7 April 2017	Lucas Heights Science and Technology Centre: Buildings 3 and 20B.	“The IAEA was able to carry out all planned activities during the CA”
<b>10(c) Statement of Conclusions</b>	10(c) statements of conclusions are provided early in the year following the assessment period.	

# Appendix C: IAEA Safeguards Statement for 2016

In 2016, safeguards were applied for 181 States<sup>7, 8</sup> with safeguards agreements in force with the Agency. The Secretariat's findings and conclusions for 2016 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-four States had both comprehensive safeguards agreements and additional protocols in force<sup>9</sup>:
  - a. For 69 of these States<sup>8</sup>, 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.
  - b. For 55 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 49 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.
3. As of the end of 2016, 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.

This statement plus further details on safeguards implementation is available at: [https://www.iaea.org/sites/default/files/statement\\_sir\\_2016.pdf](https://www.iaea.org/sites/default/files/statement_sir_2016.pdf). This statement is

7 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.

8 And Taiwan, China.

9 Or an additional protocol being provisionally applied, pending its entry into force.

copied verbatim from the IAEA's publication, including footnotes.

The designations employed and the presentation of material in this report, including the numbers cited, do not imply the expression of any opinion whatsoever on the part of the Agency or its Member States concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

The referenced number of States Parties to the NPT is based on the number of instruments of ratification, accession or succession that have been deposited.

# Appendix D: 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 (ASNO) (Nuclear material and nuclear facility security)	<a href="http://www.dfat.gov.au/asno">www.dfat.gov.au/asno</a>
Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) (Radioactive sources security, nuclear installation safety and security, and emergency preparedness and response for the Commonwealth)	<a href="http://www.arpansa.gov.au">www.arpansa.gov.au</a>
Key Legislation (available on <a href="http://www.comlaw.gov.au">www.comlaw.gov.au</a> )	
<i>Nuclear Non-Proliferation (Safeguards) Act 1987</i>	
<i>Australian Radiation Protection and Nuclear Safety Act 1998</i>	
<i>Weapons of Mass Destruction Act 1995</i>	
<i>Customs Act 1901</i>	
Customs (Prohibited Imports) Regulations 1956 & Customs (Prohibited Exports) Regulations 1958	
Nuclear Security Requirements	
IAEA Recommendations	Implementation of INFCIRC/225/Rev.5 (NSS-13) is a requirement for all nuclear facilities regulated by ASNO. The IAEA Nuclear Security Series is cited as an international best practice which CEO ARPANSA must take into account when making licensing decisions.
Design Basis Threat	Year of revisions: 2017, 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 Source Network	Jurisdiction-based network of source inventories: 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 – 2017
	Participant	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 – 2016
Nuclear Security Guidance Committee (NSGC)	Member	2012 – present
Emergency Preparedness and Response Expert Group	Member	2012 – 2015
Emergency Preparedness and Response Standards Committee (EPReSC)	Member	2016 – 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
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 – present
IAEA Nuclear Security Training Courses and other courses led by the IAEA Division of Nuclear Security	Expert consultants and presenters	Ongoing

**8. Contributions to Outreach and Capacity Building**

Activity/Event	Date
<b>Events</b>	
GICNT ‘Presenting nuclear forensics findings in court’ workshop, Germany	June 2017
GICNT 10th Plenary Meeting, Japan	June 2017
EPREV Mission, Jakarta	October 2016
APEX GOLD: Ministerial Level Scenario-based Policy Discussion, San Francisco	February 2016
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
ARPANSA-BATAN Preparation, Conduct and Evaluation of Safety and Security Exercises, Jakarta	September 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
<b>Programs</b>	
Working group on nuclear security (Asia-Pacific Safeguards Network)	2011 – present

**9. Voluntary Commitments referenced in IAEA Information Circulars**

IAEA INFCIRC	Joint Statement Title	INFCIRC Date
INFCIRC/869	Strengthening of Nuclear Security Implementation	02/10/14
INFCIRC/899	Nuclear Security Contact Group	02/11/16
INFCIRC/904	Supporting Nuclear and Radiological Terrorism Preparedness and Response Capabilities	14/12/16
INFCIRC/905	National Nuclear Detection Architectures	14/12/16
INFCIRC/908	Mitigating Insider Threats	09/01/17
INFCIRC/909	Transport Security of Nuclear Materials	10/01/17
INFCIRC/910	Strengthening the Security of High Activity Sealed Sources	30/12/16
INFCIRC/912	Minimising and Eliminating the use of Highly Enriched Uranium in Civilian Applications	16/02/17
INFCIRC/917	Forensics in Nuclear Security (Australia is sponsor)	20/04/17
INFCIRC/918	Countering Nuclear Smuggling	19/04/17

# Appendix E: 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>.

## 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:

Lyndell Evans, *Path to Best-Practice Nuclear Safeguards Regulation in Australia*, presentation at the Australasian Radiation Protection Society conference, Adelaide, 11–14 September 2016

Craig Everton, *Australia's Safeguards Experiences*, presentation at the Developing a Kingdom System for Accountancy and Control for Greenlandic Uranium workshop, Sweden, 29–31 August 2016.

Craig Everton, *Australia's System of Accounting for and Controlling Australian Uranium through the International Nuclear Fuel Cycle*, presentation at the Developing a Kingdom System for Accountancy and Control for Greenlandic Uranium workshop, Sweden, 29–31 August 2016.

Craig Everton, *Reporting LOF Material Under Comprehensive Safeguards*, presentation at the Southeast Asia Regional Workshop on Complementary Access and Locations Outside Facilities workshop, Kuala Lumpur, 5–8 September 2016

Craig Everton, *Australia's Experiences with Complementary Access*, presentation at the Southeast Asia Regional Workshop on Complementary Access and Locations Outside Facilities workshop, Kuala Lumpur, Malaysia, 5–8 September 2016

Craig Everton, *Implementation of the Additional Protocol in Australia*, presentation at the Regional Training Course on Safeguards and Nuclear Security for States with Small Quantities Protocols, Melbourne, 12–16 December 2016

Craig Everton, *Regulatory Oversight of Nuclear Material and Activities through Licensing and Domestic Inspections*, presentation at the Regional Training Course on Safeguards and Nuclear Security for States with Small Quantities Protocols, Melbourne, 12–16 December 2016

Craig Everton, *Malcolm Coxhead Verification of Nuclear Warhead Dismantlement: Joining Dots*, ESARDA Symposium, Dusseldorf, Germany, 16–19 May 2017

Craig Everton, *International Cooperation in Safeguards – the Role of Regional Networks*, presentation at the ESARDA Symposium, Dusseldorf, Germany, 16–19 May 2017

Rob Floyd, *Risk Based Approaches to Security and Safeguards at Uranium Mines*, keynote presentation at the Institute of Nuclear Material Management annual meeting, Atlanta, US, 24–28 July 2016

Rob Floyd, *Global Nuclear Non-Proliferation and Nuclear Security Regime: Implications for Nuclear Fuel Cycle Activities in Australia*, keynote presentation at the Australasian Radiation Protection Society conference, Adelaide, 11–14 September 2016

John Kalish, *Australia's Nuclear Safeguards Experiences*, presentation to the joint IAEA-JAEA International Training Course on State System of Accounting for and Control of Nuclear Material, Tokai, Japan, 7–18 November 2016

Josy Meyer, *The CWC and Regulatory Requirements for Producers and Users of Schedule 1 Chemicals*, presentation to a Schedule 1 Consumption Facility during onsite visits, ACT, 11 July 2016.

Josy Meyer, *The CWC and regulatory requirements for Discrete Organic Chemical Production Facilities*, presentation via teleconference to Discrete Organic Chemical production facility, Victoria, 1 September 2016.

Josy Meyer, *The CWC and Regulatory Requirements for Facilities producing, using or trading Schedule 1 and 3 Chemicals and Discrete Organic Chemical Production Facilities*, presentation to CWC-Schedule 3 chemical facility, NSW, 2 September 2016.

Nathan Goldstein, *A Mechanism and Framework for Chemical Security in Australia*, presentation at the Third Annual Meeting of Representatives of Chemical Industry and National Authorities of States Parties to the Chemical Weapons Convention, Doha, 16–18 October 2016. Presentation prepared by Ian D'Souza.

Josy Meyer, *The CWC and Regulatory Requirements for Discrete Organic Chemical Production Facilities*, presentation via teleconference to Discrete Organic Chemical production facility, Victoria, 30 March 2017.

Josy Meyer, *The CWC and regulatory requirements for Discrete Organic Chemical Production Facilities*, presentation via teleconference to Discrete Organic Chemical production facility, NSW, 31 March 2017.

Josy Meyer, *The CWC and Regulatory Requirements for Producers and Users of Schedule 1 Chemicals*, presentation to a Schedule 1 Consumption Facility during on-site visits, NSW, 7 April 2017.

Josy Meyer, *Australia: Experiences with HS Codes for Tracking Trade In CWC-Scheduled Chemicals*, presented at the Australia Group Meeting, Paris, 26–30 June 2017.

Neil Horne, Anelka Labudovic and Josy Meyer, *Australia: Inter-agency Cooperation in Managing Trade in CWC-Scheduled Chemicals*, presented at the Australia Group Meeting, Paris, 26–30 June 2017.

Stephan Bayer, *Review of Australia's Nuclear Security Regime*, paper for International Conference on Nuclear Security: Commitments and Actions, Vienna, 5–9 December 2016,

Rob Floyd, *Nuclear security role of the IAEA in a changing risk environment*, presentation at the International Conference on Nuclear Security: Commitments and Actions, Vienna, 5–9 December 2016

Michal Botha, *Regulating the transport of UOC*, Presentation at AusIMM International Uranium Conference 2017, Adelaide, 6–7 June 2017

Tammy de Wright, *Developments in Australia's Nuclear Cooperation Agreements*, presentation at AusIMM International Uranium Conference 2017, Adelaide, 6–7 June 2017

Stephan Bayer, Robert Floyd, Craig Everton, *Risk based approaches to security and safeguards at uranium mines*, paper for the INMM 57th Annual Meeting, Atlanta, USA, 24–28 July 2017.

Stephan Bayer, *IPPAS missions – Australia Expectations and Objectives*, presentation at International seminar to share experiences from conducting International Physical Protection Advisory Service Missions, 22–23 November 2016.

Stephan Bayer, *Witness at Nuclear Citizens Jury Two – Nuclear Fuel Cycle Royal Commission*, Adelaide, 29 October 2016.

# List of Requirements

PGPA Rule Reference	Part of Report	Description	Requirement
<b>17AD(g)</b>	<b>Letter of transmittal</b>		
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
<b>17AD(h)</b>	<b>Aids to access</b>		
17AJ(a)	p5	Table of contents.	Mandatory
17AJ(b)	p126	Alphabetical index.	Mandatory
17AJ(c)	p120	Glossary of abbreviations and acronyms.	Mandatory
17AJ(d)	p115	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
<b>17AD(a)</b>	<b>Review by accountable authority</b>		
17AD(a)	p3	A review by the accountable authority of the entity.	Mandatory
<b>17AD(b)</b>	<b>Overview of the entity</b>		
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
<b>17AD(c)</b>	<b>Report on the Performance of the entity</b>		
	<b>Annual performance Statements</b>		
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
<b>17AD(c)(ii)</b>	<b>Report on Financial Performance</b>		
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.
<b>17AD(d)</b>	<b>Management and Accountability</b>		
	<i>Corporate Governance</i>		
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 noncompliance with Finance law and action taken to remedy noncompliance.	If applicable, Mandatory
	<i>External Scrutiny</i>		
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
	<i>Management of Human Resources</i>		
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 nonongoing basis; including the following: Statistics on staffing classification level; Statistics on fulltime employees; Statistics on parttime 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 <i>Public Service Act 1999</i> .	Mandatory
17AG(4)(c)(i)	DFAT	Information on the number of SES and nonSES 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 nonsalary 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
<b>Assets Management</b>			
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
<b>Purchasing</b>			
17AG(6)	DFAT	An assessment of entity performance against the <i>Commonwealth Procurement Rules</i> .	Mandatory
<b>Consultants</b>			
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
17AG(7)(b)	DFAT	A statement that " <i>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]</i> ".	Mandatory

PGPA Rule Reference	Part of Report	Description	Requirement
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 “ <i>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.</i> ”	Mandatory
<b>Australian National Audit Office Access Clauses</b>			
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
<b>Exempt contracts</b>			
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
<b>Small business</b>			
17AG(10)(a)	DFAT	A statement that “[ <i>Name of entity</i> ] 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 “[ <i>Name of entity</i> ] 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
<b>Financial Statements</b>			
17AD(e)	DFAT	Inclusion of the annual financial statements in accordance with subsection 43(4) of the Act.	Mandatory
<b>17AD(f) Other Mandatory Information</b>			
17AH(1)(a)(i)	DFAT	If the entity conducted advertising campaigns, a statement that “ <i>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.</i> ”	If applicable, Mandatory
17AH(1)(a)(ii)	DFAT	If the entity did not conduct advertising campaigns, a statement to that effect.	If applicable, Mandatory



PGPA Rule Reference	Part of Report	Description	Requirement
17AH(1)(b)	DFAT	A statement that <i>“Information on grants awarded to [name of entity] during [reporting period] is available at [address of entity’s website].”</i>	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

<b>Additional Protocol (AP)</b>	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.
<b>ANSTO</b>	Australian Nuclear Science and Technology Organisation
<b>APSN</b>	Asia-Pacific Safeguards Network
<b>ARPANSA</b>	Australian Radiation Protection and Nuclear Safety Agency
<b>ASSP</b>	Australian Safeguards Support Program
<b>Australian Obligated Nuclear Material (AONM)</b>	Australian uranium and nuclear material derived therefrom, which is subject to obligations pursuant to Australia's bilateral safeguards agreements.
<b>BAPETEN</b>	Indonesian Nuclear Energy Regulatory Agency (Badan Pengawas Tenaga Nuklir)
<b>BWC</b>	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.
<b>Challenge Inspection</b>	(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.
<b>Complementary Access</b>	The right of the IAEA, pursuant to the Additional Protocol, for access to a site or location to carry out verification activities.
<b>Comprehensive Safeguards Agreement (CSA)</b>	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).
<b>Concise Note</b>	Supplementary explanatory notes on formal reports from a national safeguards authority to the IAEA.
<b>Conversion</b>	Purification of uranium ore concentrates or recycled nuclear material and conversion to a chemical form suitable for isotopic enrichment or fuel fabrication.
<b>CPPNM</b>	Convention on the Physical Protection of Nuclear Material
<b>CTBT</b>	Comprehensive Nuclear-Test-Ban Treaty
<b>CTBTO</b>	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.
<b>Customs</b>	Australian Customs & Border Protection Service
<b>CWC</b>	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.
<b>CWC-Scheduled Chemicals</b>	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).
<b>Department of Defence</b>	Australian Department of Defence
<b>Depleted Uranium (DU)</b>	Uranium with a <sup>235</sup> U content less than that found in nature (e.g. as a result of uranium enrichment processes).
<b>DFAT</b>	Department of Foreign Affairs and Trade
<b>Direct-Use Material</b>	Nuclear material defined for safeguards purposes as being usable for nuclear explosives without transmutation or further enrichment, e.g. plutonium, HEU and <sup>233</sup> U.

<b>Discrete Organic Chemical (DOC)</b>	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.
<b>DOE</b>	United States Department of Energy
<b>DPRK</b>	Democratic People's Republic of Korea, also known as North Korea.
<b>DST Group</b>	Defence Science and Technology Group
<b>Enrichment</b>	A physical or chemical process for increasing the proportion of a particular isotope. Uranium enrichment involves increasing the proportion of <sup>235</sup> U from its level in natural uranium, 0.711%. For LEU fuel the proportion of <sup>235</sup> U (the enrichment level) is typically increased to between 3% and 5%.
<b>Euratom</b>	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.
<b>Facility</b>	(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.
<b>Fissile</b>	Referring to a nuclide capable of undergoing fission by neutrons of any energy, including 'thermal' neutrons (e.g. <sup>233</sup> U, <sup>235</sup> U, <sup>239</sup> Pu and <sup>241</sup> Pu).
<b>Fissile Material Cut-off Treaty (FMCT)</b>	A proposed international treaty to prohibit production of fissile material for nuclear weapons.
<b>Fission</b>	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. <sup>235</sup> 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.
<b>Fissionable</b>	Referring to a nuclide capable of undergoing fission by 'fast' neutrons (e.g. <sup>233</sup> U, <sup>235</sup> U, <sup>238</sup> U, <sup>239</sup> Pu, <sup>240</sup> Pu, <sup>241</sup> Pu and <sup>242</sup> Pu).
<b>Full-Scope Safeguards</b>	The application of IAEA safeguards to all of a state's present and future nuclear activities. Now more commonly referred to as comprehensive safeguards.
<b>GA</b>	Geoscience Australia
<b>GW</b>	Gigawatt (Giga = billion, 10 <sup>9</sup> )
<b>GWe</b>	Gigawatts of electrical power
<b>GWt</b>	Gigawatts of thermal power
<b>Heavy Water (D<sub>2</sub>O)</b>	Water enriched in the 'heavy' hydrogen isotope deuterium ( <sup>2</sup> H) which consists of a proton and a neutron. D <sub>2</sub> O occurs naturally as about one part in 6000 of ordinary water. D <sub>2</sub> O is a very efficient moderator, enabling the use of natural uranium in a nuclear reactor.
<b>HIFAR</b>	High Flux Australian Reactor. The 10 MWt research reactor located at ANSTO, Lucas Heights. Undergoing decommissioning.
<b>High enriched uranium (HEU)</b>	Uranium enriched to 20% or more in <sup>235</sup> U. Weapons-grade HEU is enriched to over 90% <sup>235</sup> U.

<b>Hydroacoustic</b>	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.
<b>IAEA</b>	International Atomic Energy Agency
<b>Indirect-Use Material</b>	Nuclear material that cannot be used for a nuclear explosive without transmutation or further enrichment (e.g. depleted uranium, natural uranium, LEU and thorium).
<b>INFCIRC</b>	IAEA Information Circular. A series of documents published by the IAEA setting out, inter alia, safeguards, physical protection and export control arrangements.
<b>INFCIRC/153 (Corrected)</b>	The model agreement used by the IAEA as a basis for comprehensive safeguards agreements with non-nuclear-weapon states party to the NPT.
<b>INFCIRC/225 Rev.5 (Corrected)</b>	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.
<b>INFCIRC/540 (Corrected)</b>	The model text of the Additional Protocol.
<b>INFCIRC/66 Rev.2</b>	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.
<b>Infrasound</b>	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.
<b>Integrated safeguards</b>	The optimum combination of all safeguards measures under comprehensive safeguards agreements and the Additional Protocol to achieve maximum effectiveness and efficiency.
<b>International Data Centre (IDC)</b>	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.
<b>International Framework for Nuclear Energy Cooperation (IFNEC)</b>	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.
<b>International Monitoring System (IMS)</b>	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.
<b>Inventory Change Report (ICR)</b>	A formal report from a national safeguards authority to the IAEA on changes to nuclear materials inventories in a given period.
<b>Isotopes</b>	Nuclides with the same number of protons, but different numbers of neutrons, e.g. <sup>235</sup> U (92 protons and 143 neutrons) and <sup>238</sup> 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.
<b>Light water</b>	H <sub>2</sub> O. Ordinary water.
<b>Light water reactor (LWR)</b>	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).
<b>Low Enriched Uranium (LEU)</b>	Low Enriched Uranium. Uranium enriched to less than 20% <sup>235</sup> U. Commonly, LEU used as fuel in light water reactors is enriched to between 3% and 5% <sup>235</sup> U.

<b>Material Balance Area (MBA)</b>	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.
<b>Material Balance Report (MBR)</b>	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.
<b>Mixed oxide fuel (MOX)</b>	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%.
<b>Moata</b>	Small training reactor previously located at Lucas Heights.
<b>Moderator</b>	A material used to slow fast neutrons to thermal speeds where they can readily be absorbed by $^{235}\text{U}$ or plutonium nuclei and initiate a fission reaction. The most commonly used moderator materials are light water, heavy water or graphite.
<b>MUF</b>	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.
<b>MWe</b>	Megawatts of electrical power
<b>MWt</b>	Megawatts of thermal power
<b>Natural uranium</b>	In nature, uranium consists predominantly of the isotope $^{238}\text{U}$ (approx. 99.3%), with the fissile isotope $^{235}\text{U}$ comprising only 0.711%.
<b>Non-nuclear-weapon state(s) (NNWS)</b>	States not recognised by the NPT as having nuclear weapons at 1 January 1967 when the Treaty was negotiated.
<b>NPT</b>	Treaty on the Non-Proliferation of Nuclear Weapons
<b>Nuclear material</b>	Any source material or special fissionable material as defined in Article XX of the IAEA Statute (in practice, this means uranium, thorium and plutonium).
<b>Nuclear-weapon state(s) (NWS)</b>	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.
<b>Nuclide</b>	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.
<b>Old Chemical Weapons (OCW)</b>	Defined under the Chemical Weapons Convention as: <ul style="list-style-type: none"> <li>a. chemical weapons produced before 1925; or</li> <li>b. chemical weapons produced between 1925 and 1946 that have deteriorated to such extent that they can no longer be used as chemical weapons.</li> </ul>
<b>On-Site Inspection (OSI)</b>	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.
<b>OPAL</b>	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.
<b>OPCW</b>	Organisation for the Prohibition of Chemical Weapons

<b>Other Chemical Production Facility (OCPF)</b>	Defined under the Chemical Weapons Convention as all plant sites that: <ol style="list-style-type: none"> <li>a. produced by synthesis during the previous calendar year more than 200 tonnes of unscheduled discrete organic chemicals; or</li> <li>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.</li> </ol>
<b>Physical Inventory Listing (PIL)</b>	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).
<b>PrepCom</b>	Preparatory Commission. In this report the term is used for the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization.
<b>Production</b>	(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.
<b>PTS</b>	Provisional Technical Secretariat for the CTBTO Preparatory Commission
<b><sup>239</sup>Pu</b>	An isotope of plutonium with atomic mass 239 (94 protons and 145 neutrons). The fissile isotope of plutonium most suitable for nuclear weapons.
<b>R&amp;D</b>	Research and Development
<b>Radionuclide</b>	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.
<b>Reprocessing</b>	Processing of spent nuclear fuel to separate uranium and plutonium from highly radioactive fission products.
<b>Safeguards Inspector</b>	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.
<b>Schedule 2A/2A*</b>	These are toxic Part A Schedule 2 chemicals (2A: Amiton and PFIB, 2A*: BZ) listed under the CWC.
<b>Seismic</b>	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.
<b>SLC</b>	State-level concept
<b>Small Quantities Protocol (SQP)</b>	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.
<b>Source Material</b>	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.
<b>Special Fissionable Material</b>	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.
<b>Standing Advisory Group on Safeguard Implementation (SAGSI)</b>	An international group of experts appointed by, and advising, the IAEA Director General on safeguards implementation matters.
<b><sup>232</sup>Th</b>	The only naturally occurring isotope of thorium, having an atomic mass of 232 (90 protons and 142 neutrons).

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

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