Australian Government

Australian Safeguards and Non-Proliferation Office

ANNUAL REPORT

2021–2022

PRODUCED BY

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ANNUAL REPORT

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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:

1. report by the Director General ASNO on key developments in 2021–22 and a preview of the year ahead
2. a review of selected topics in ASNO's work
3. functional overview of ASNO, including its operating environment and outcomes– outputs structure (the first outcome demonstrates accountability to Government, and the second outlines public outreach and education)
4. report on ASNO's performance during 2021–22 and
5. key features of ASNO's corporate governance and the processes by which ASNO is directed, administered and held accountable.

As 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 and
- ecologically sustainable development and environmental performance.

Letter of Transmittal

Australian Government

Australian Safeguards and Non-Proliferation Office

1 October 2022

The Hon Penny Wong
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 2022. 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, under the Chemical Weapons Convention, and, in anticipation of entry into force, under 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 verification measures against the proliferation of weapons of mass destruction. Efforts focused on activities at the national, regional and international levels, and by working closely with colleagues across government, including in Australia's diplomatic network.

Yours sincerely

Geoffrey Shaw (Dr)
Director General

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Overview of Australian Safeguards and Non-Proliferation Office

The goal of Australian Safeguards and Non-Proliferation Office (ASNO) is to enhance Australian and international security through activities which strengthen the effectiveness of regimes against the proliferation of weapons of mass destruction.

ASNO ensures that Australia's international obligations are met under the Nuclear Non-Proliferation Treaty (NPT), Australia's NPT safeguards agreement with the International Atomic Energy Agency (IAEA), the Amended Convention on the Physical Protection of Nuclear Material (A/CPPNM) and Australia's nuclear cooperation agreements. In the nuclear area, ASNO has four main areas of responsibility:

- the application of safeguards in Australia
- the physical protection and security of nuclear items in Australia
- the operation of Australia's network of nuclear cooperation agreements, including tracking Australia's uranium exports
- contribution to the operation and development of IAEA safeguards and the strengthening of the international nuclear non-proliferation regime.

ASNO ensures that Australia's international obligations under the Chemical Weapons Convention (CWC) are met while at the same time ensuring that the rights of relevant areas of the chemical industry are protected. ASNO also promotes effective international implementation of the CWC, particularly in Australia's immediate region.

ASNO co-ordinates work in Australia developing the verification system for the Comprehensive Nuclear-Test-Ban Treaty (CTBT), including facilitating the operation of 21 Treaty monitoring facilities in Australia. ASNO also contributes to the technical work of the CTBTO Preparatory Commission in developing procedures for the conduct of CTBT verification activities.

The position of Director General, Australian Safeguards and Non-Proliferation Office (ASNO) embraces the statutory responsibilities of Director of Safeguards, Director, Chemical Weapons Convention Office (CWCO) and Director, Australian Comprehensive Test Ban Office (ACTBO). The Director General reports directly to the responsible Minister for Foreign Affairs.


IAEA
IAEA

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DIRECTOR GENERAL'S REPORT

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Dr Geoffrey Shaw
Director General
Australian Safeguards and Non-Proliferation Office

The Year in Review

The International Non-Proliferation Environment

New strategic tensions and global volatility have added to non-proliferation and disarmament challenges in the 2021–22 reporting period. Against this backdrop, the need for international collaboration is increasingly important if we are to realise the ultimate goal of eliminating chemical and nuclear weapons.

Russia's unilateral, illegal and immoral invasion of Ukraine has undermined international oversight of Ukraine's nuclear facilities, risking their safe and secure operation. Reports of military operations within or near Ukrainian nuclear facilities remain concerning. Ukraine continues to support IAEA activities where it can, but the seizure of territory and nuclear facilities by an invading power poses unprecedented challenges for its compliance obligations. For the second year, Ukraine did not receive the IAEA's broader safeguards conclusion[1] because 'current circumstances prevent the Agency from verifying certain nuclear material'.

IAEA efforts to engage with Iran to implement the Joint Comprehensive Plan of Action (JCPOA), have been impacted by Iran's systematic reduction in cooperation. Issues around Iran's past compliance with its Comprehensive Safeguards Agreement remain unresolved.

The Democratic People's Republic of Korea (DPRK) has intensified WMD-related activity in 2022. Ballistic missile tests – including intercontinental ballistic missiles – have occurred with unprecedented frequency. Renewed activity at the Punggye-ri nuclear test site raises concerns that the DPRK may resume nuclear explosive testing.

1 The IAEA can draw the 'broader conclusion' for a State as a whole that 'all nuclear material remained in peaceful activities'. This is a more fulsome assessment for a State than 'declared nuclear material remained in peaceful activities'.

Despite these challenges, the IAEA continues to effectively verify that States are upholding their respective nuclear non-proliferation commitments, using the tools available under safeguards agreements and under the Additional Protocol (where in place).

Australian Dr Robert Floyd (former ASNO Director General) commenced as Executive Secretary of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) Preparatory Commission on 1 August 2021. The election of Dr Floyd is a strong demonstration of Australia's commitment to nuclear non-proliferation and disarmament.

Syria is continuing to obstruct of the Organisation for the Prohibition of Chemical Weapons (OPCW) to verify its initial declaration. The deployment of the Declaration Assessment Team has been delayed and Syria is not responding to certain OPCW requests for information. The Investigation and Identification Team continues its work to identify perpetrators of chemical weapons use in Syria. Until outstanding issues are resolved, the international community cannot verify that the Syrian chemical warfare program has been eliminated.

The possibility of chemical weapon use in Ukraine remains a cause for concern, including 'false flag' operations. There were unverified reports that Russia employed chemical weapons in Mariupol in early April 2022. Elements of the media continue to publish uncorroborated accusations that chemical attacks are being planned in Ukraine. Sporadic attacks against Ukrainian chemical plants persist, elevating the risk of hazardous chemical release. Russia has repeatedly accused Ukraine of sabotaging its own chemical plants and transport.

Lastly, it was a great honour to take up the reigns as ASNO's Director General in January 2022. ASNO continues to face an incredible array of challenges, however, these challenges also present the organisation with opportunities to make future positive contributions to strengthen the global non-proliferation regime. I would also like to thank Dr John Kalish for looking after ASNO between the departure of Dr Floyd and my commencement.

Nuclear Non-Proliferation and Safeguards Developments

Naval Nuclear Propulsion for Australia

Over an 18-month period, starting in September 2021 and set to conclude in March 2023, Australia, the United Kingdom, and the United States are examining the full suite of requirements that underpin the delivery of a nuclear-powered submarine capability for Australia. Non-proliferation is central to this initiative. AUKUS partners are committed to strengthening the global non-proliferation regime and setting the highest possible non-proliferation standards for Australia's nuclear-powered submarines program.

Since the initiative's announcement, the AUKUS partners have engaged proactively and transparently with the IAEA to ensure Australia's acquisition of conventionally-armed, nuclear-powered submarines is fully consistent with its non-proliferation obligations and commitments. The Australian Government is pursuing a safeguards approach within the framework of Australia's Comprehensive Safeguards Agreement and Additional Protocol. ASNO, consistent with its remit, has been advising relevant Australian Government departments and agencies, including the Department of Foreign Affairs and Trade and the Department of Defence, on Australia's international safeguards obligations and assisting the Government's engagement with the IAEA.

International Safeguards Developments

The IAEA's Safeguards Implementation Report for 2021 showed that the IAEA overcame the challenges posed by the COVID-19 pandemic and maintained a level of effectiveness of safeguards implementation consistent with previous years. On most inspection-related metrics the intensity of IAEA safeguards activities during 2021 has been higher than pre-pandemic levels. During 2021, the IAEA conducted more inspections than at any time since at least 2016.

The IAEA continued to report 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 has drawn this 'broader conclusion'[2] that all nuclear material remained in peaceful activities for Australia every year since 2000. Overall, 72 States received the broader conclusion in 2021.

As of 30 June 2022, 178 non-nuclear-weapon states have concluded a comprehensive safeguards agreement and the Additional Protocol was in force in 139 States and Euratom. Another 13 States have signed the Additional Protocol but have yet to bring it into force.

In March 2022, I met with IAEA DG Rafael Grossi in Vienna where we discussed global safeguards developments and the situation in Ukraine.

Director General ASNO, Dr Geoffrey Shaw, met with the IAEA Director General Rafael Grossi in Vienna in March 2022 (Image courtesy of Dean Calma/IAEA, IAEA Flickr account)

2 See Appendix E

Regional Safeguards Developments

The Asia Pacific Safeguards Network (APSN) held its 12th annual meeting virtually on 24–25 February 2022. This meeting was hosted by the Government of Vietnam as current chair of APSN. The virtual meeting was interactive with participants sharing experiences on IAEA safeguards implementation, capacity building, and promoting gender balance in safeguards. It was also decided that Vietnam will pass the chair of the APSN to Thailand for 2023–24.

Bilateral Safeguards Developments

During 2021–22, all Australian Obligated Nuclear Material (AONM) was accounted for in accordance with the procedures and standards prescribed in Australia's network of 25 Nuclear Cooperation Agreements (NCAs), covering 43 countries, plus Taiwan.

In 2021 Ukraine received the first shipments of nuclear fuel containing AONM, manufactured in Sweden. (See the Current Topics.)

Australia maintains its ban on uranium transfers to Russia that was introduced in response to the Russia's purported annexation of Crimea in 2014.

Domestic Safeguards Developments

During the reporting period, the IAEA conducted twelve separate inspections, mostly at the Australian Nuclear Science and Technology Organisation (ANSTO). The inspectors were able to meet their inspection goals while fulfilling national and state health requirements associated with the COVID-19 pandemic. (See Output 1.1 and Appendix D.)

Nuclear Security Developments

Russia's invasion of Ukraine has given rise to significant nuclear security challenges. Importantly the IAEA has been able to conduct several missions to the Chornobyl nuclear power plant since the invasion, to assist Ukraine restore nuclear safety, security, and safeguards equipment and reporting. More broadly, the IAEA must be able visit and provide assistance to all nuclear facilities in Ukraine.

In September 2021, the IAEA Board of Governors approved the Nuclear Security Plan 2022–2025. The Plan highlights several key areas of engagement in nuclear security, including: strengthening the nuclear security framework globally; strengthening the protection of sensitive information and computer based systems, recognising the threat to nuclear security from cyber-attacks; and the continued importance of adherence to the Amended Convention on the Physical Protection of Nuclear Material (the A/CPPNM).

I was pleased to lead the Australian delegation to the first Conference of the Parties to the A/CPPNM. In my plenary statement I highlighted the need for transparency and cooperation in strengthening nuclear security, and the central role of the A/CPPNM in setting the highest standards of physical protection for nuclear materials and facilities. It was agreed that a second Review Conference be convened– a vital outcome given the challenges facing nuclear security, arms control and non-proliferation institutions today.

Comprehensive Nuclear-Test-Ban Treaty

In 2022, the CTBT celebrated its 25th year of being open for signature. While the CTBT is not yet in force, it did see three additional state ratifications (Gambia, Tuvalu and Dominica) during the year, bringing the total ratifications to 173 States. More than 90 per cent of International Monitoring System (IMS) facilities are operating, including all 21 Australian facilities. The IMS, and the International Data Centre that provides IMS data and products to member states, continues to function well.

With the recommencement of in-person meetings, ASNO experts were able to re-engage the Provisional Secretariat on activities that had been deferred during the COVID-19 pandemic, including planning for sustainment work on Australian IMS facilities.

In March 2022, I met with CTBTO senior management and toured the International Data Centre and IMS technology at CTBTO headquarters in Vienna.

Director General ASNO, Dr Geoffrey Shaw, received a briefing on CTBT radionuclide detection equipment (in foreground) in Vienna. (Image courtesy of CTBTO)

Chemical Weapons Convention Developments

International CWC Developments

The OPCW inspection schedule has yet to return to pre-pandemic levels. In 2021, only 80 of the planned 241 inspections – the pre-pandemic yearly number of inspections – occurred. For 2022, the OPCW had set a target of 75% of the standard annual number of inspections. However, it has already acknowledged that this reduced inspection target will not be met.

I met with OPCW DG Fernando Arias in The Hague in April 2022. We discussed progress on the implementation of the Convention including the OPCW's verification regime and efforts to uphold the global norm against chemical weapons. DG Arias briefed me on the construction of the OPCW's Centre for Chemistry and Technology. This centre will become an essential tool to strengthen the capability of the OPCW to respond to chemical threats and to enhance the capability of OPCW Member States to effectively implement the CWC.

Director-General of the OPCW, H.E. Ambassador Fernando Arias, H. E. Ambassador Matthew Neuhaus, Australia's Permanent Representative to the OPCW, and Director General ASNO, Dr Geoffrey Shaw. (Image courtesy of OPCW Flickr account)

Regional CWC Developments

A key priority for ASNO has been the development of a partnership with the Malaysian CWC National Authority through a Partnership Program of the OPCW. Such relationships are designed to help participating States Parties CWC implement, legislation and enhance chemical safety and security. The first exchange was held in Australia in March 2022, with meetings in Canberra and a site visit to Sydney. (See Section 4 Output 1.5.)

Domestic CWC Developments

ASNO facilitated four industry inspections by the OPCW, all successfully demonstrating treaty compliance. (See Section 4 Output 1.5.)

ASNO conducted one inspection pursuant to the *Chemical Weapons (Prohibition) Act 1994* and 18 industry outreach visits. (See Section 4 Output 1.5.)

Other Non-Proliferation and Disarmament Activities

International Partnership for Nuclear Disarmament Verification

In April 2022, the French and German Governments sponsored an in-person Nuclear Disarmament Verification exercise, bringing together international disarmament experts to explore the practical and procedural challenges associated with applying multilateral verification to the dismantlement of a nuclear warhead. ASNO participated as both Inspector and Host, contributing to the success of this immersive week-long exercise.

In June 2022, ASNO also participated in an International Partnership for Nuclear Disarmament Verification (IPNDV) table-top verification exercise in Brussels, Belgium, examining verification requirements for transport and long-term storage of warheads prior to dismantlement.

Group of Government Experts on Nuclear Disarmament Verification

ASNO experts worked closely with the Australian delegation to the Conference on Disarmament to promote practical outcomes from the UN-mandated Group of Government Experts (GGE) on Nuclear Disarmament Verification. The first meeting of the GGE took place in February 2022 in a hybrid format.

The Year Ahead

ASNO will continue its efforts to promote effective safeguards implementation internationally, including through its APSN leadership role, by supporting programs such as the IAEA's COMPASS initiative and by contributing to technical safeguards workshops.

ASNO will continue to manage Australia's network of bilateral nuclear cooperation agreements and provide detailed oversight of the transfer and use of AONM around the world. A return to in-person meetings and reconciliation visits with our international counterparts will help strengthen regulatory ties.

ASNO remains focussed on strengthening nuclear security domestically, including incorporating the highest standards of security for nuclear materials and nuclear facilities. The ASNO review of the OPAL Reactor Periodic Safety and Security Review (PSSR) is a key planned activity.

ASNO will continue preparatory work for full field CTBTO on-site inspection exercises. These exercises were originally planned to 2020 and will now occur in 3–4 years' time.

The ASNO experts will travel to Malaysia in August 2022 to meet with the Malaysian CWC National Authority for the second exchange of the OPCW Partnership Program. The visit will have a focus on CWC implementation, in particular outreach to industry.

In September 2022, ASNO will host a specialist meeting with regulatory authorities of like-minded nations to discuss best practice approaches to monitoring and tracking obligated nuclear material as it moves through the nuclear fuel cycle (see Appendix C).

ASNO will co-host a CWC regional conference with Malaysia and the OPCW in Brisbane during October 2022, focused on capacity building for Pacific Island countries. DG OPCW, H.E. Ambassador Fernando Arias, will attend and present a keynote speech.

ASNO will promote Australia's achievements implementing the Additional Protocol at the IAEA's 2022 Symposium on International Safeguards. The symposium mark 25 years of additional protocols.

ASNO and DFAT will host a plenary of the IPNDV in Sydney in December 2022, bringing together nuclear disarmament experts to look at domestic and internationally developed verification technologies.

ASNO will continue to provide technical advice and support for the development of Australian Government policy positions on safeguards and non-proliferation matters, including to the Nuclear Powered Submarine Taskforce, in the Tenth NPT Review Conference in August 2022 and in the lead-up to the CWC Fifth Review Conference in May 2023.


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25 years of the Chemical Weapons Convention

In 2022, the CWC will celebrate its 25th anniversary since entry into force. During this time, the CWC has successfully guided international efforts to eliminate the development, production, stockpiling, and use of chemical weapons (CW).

Successes

Over the past 25 years, 193 States Parties have signed on to the CWC, with 98 per cent of the world's population living under its protection. Only four states have either not signed or not ratified the Convention: Egypt, the Democratic People's Republic of Korea, South Sudan, and Israel. Ninety-nine per cent of all declared chemical weapons stockpiles have been destroyed and the process verified. It was for these extensive efforts the OPCW was awarded the 2013 Nobel Peace Prize.

The OPCW has undertaken nearly 5,500 facility inspections since entry into force. This ensures that chemicals and facilities have not been diverted into the manufacture of chemical weapons.

The OPCW has also responded to allegations of CW use by conducting investigations. The Investigation and Identification Team (IIT) was established by the OPCW to determine the facts around the alleged use of chemical weapons during the Syrian conflict. The IIT found that it was reasonable to conclude that the Syrian Air Force used CW in Syria on multiple occasions. Following these reports, the Conference of the States Parties condemned this use and suspended many of Syria's rights and privileges under the CWC.

Challenges

Unfortunately the spectre of CW use persists – from the Syrian conflict to Russia's use of novel CW agents as a means of assassination. The CWC has been further challenged by Russia's illegal invasion of Ukraine. We have seen the reckless bombing of chemical facilities and, so far unverified, allegations of CW use. We have also witnessed a long-running Russian disinformation campaign on CW, aimed to sow confusion and undermine trust in the OPCW.

What's Next?

The continued success of the CWC will centre around collective efforts to: prevent the re-emergence of chemical weapons; respond effectively to threats, including chemical terrorism; and strengthening implementation. The first step towards this is to encourage the remaining non-member States to ratify the Convention and to help states meet national CWC obligations.

ASNO will continue its efforts to build implementation capacity across the Indo-Pacific region.

Looking ahead, the CWC Fifth Review Conference in May 2023 will provide an important opportunity to set the strategic direction of the OPCW and reinforce the centrality of its verification mandate.

The future OPCW Centre for Chemistry and Technology is under construction. The project seeks to strengthen the OPCW's capabilities to fully address new and emerging chemical weapons threats, as well as to support capacity building in OPCW Member States. Construction of the ChemTech Centre is planned to be finished by the end of 2022. (Image courtesy of OPCW Flickr account)

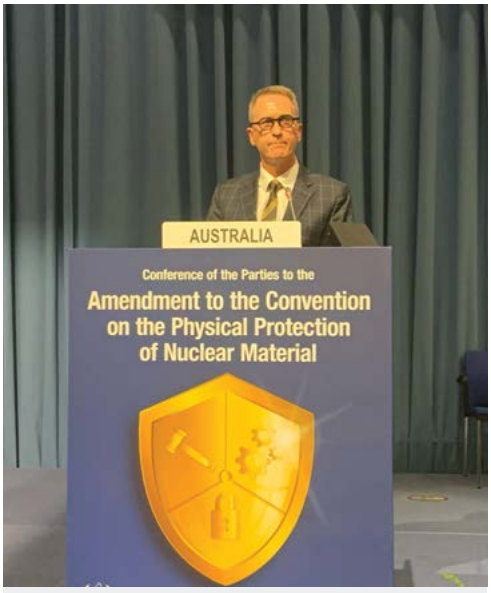
The Convention on the Physical Protection of Nuclear Material and its Amendment

The 1979 CPPNM was established primarily to facilitate cooperation between states for the physical protection of nuclear material in international transport.

Over time, calls to expand the scope to apply to nuclear material in domestic use, transport, and storage led to agreement on an Amendment to address this and to criminalise both acts of sabotage against nuclear facilities and trafficking in nuclear materials. While adopted in 2005, it took over ten years for the Amended Convention (the A/CPPNM) to enter into force in 2016.

Australia's Engagement at the A/CPPNM Review Conference

The first A/CPPNM Review Conference was held in-person from 28 March to 1 April 2022 at IAEA Headquarters in Vienna, Austria. Proceedings and discussion centred on the Convention's core pillars: (1) physical protection of nuclear material and facilities, (2) criminalisation of malicious acts relating to nuclear material and facilities, and (3) expanded international cooperation on physical protection.



Director General ASNO Dr Geoffrey Shaw at the A/CPPNM Review Conference. (Image courtesy of ASNO)

The Review Conference was set against the backdrop of Russia's illegal invasion of Ukraine and the threat to Ukrainian nuclear facilities, including the Zaporizhzhia and Chornobyl Nuclear Power Plants. States Parties expressed concern regarding the security of nuclear material at these facilities as well as the welfare of plant personnel, and Australia joined a majority calling on Russia to withdraw immediately from occupied territories and to enable the reestablishment of Ukraine's nuclear security.

Implementing effective, integrated cybersecurity in the physical protection of nuclear material and nuclear facilities was a particular focus for States Parties. As traditional physical protection measures like electronic access control to facilities and closed-circuit television are reliant on computer-based systems, we simply cannot have effective physical protection without comprehensive cyber security. Australia is meeting this challenge by integrating our operational cyber security arrangements at nuclear facilities with our physical protection requirements and Australia's national framework for cyber security. Our engagement at the Conference included a call to action to centre effective cybersecurity in States' nuclear security programs, recognising this as an essential

ingredient in meeting the A/CPPNM's nuclear security obligations.

Promoting the need for ongoing review, transparency and accountability in global nuclear security, States Parties requested that the IAEA Director General convene a second Review Conference within six years.

I was particularly pleased by States' commitment to making real progress as a community of practice with a common interest in ensuring the robust, resilient and evolving security of nuclear materials into the future.

War in Ukraine

Russia's reckless actions following its' unilateral, illegal and immoral invasion of Ukraine, especially in and around Ukrainian nuclear facilities, disregards internationally agreed safeguards and threatens global safety and security. The IAEA must be able visit and provide assistance to all nuclear facilities in Ukraine. To enable this to happen, Russia should immediately return control of all Ukrainian nuclear facilities to Ukrainian authorities.

Australia has had a nuclear cooperation agreement with Ukraine since 2017 with Australian uranium used in nuclear fuel supplied by Sweden to Ukrainian reactors. However Ukraine declared martial law on 24 February 2022 and concurrently suspended all transfers of nuclear material. ASNO continues to closely monitor the circumstances surrounding existing AONM in Ukraine and remains engaged with likeminded countries regarding nuclear security and safeguards in Ukraine. There are no indications that any nuclear material, including AONM, has been diverted.

The invasion of Ukraine has reinforced the need for the IAEA to be able to fulfil its technical mandate in the global nuclear system. The regular provision of verified information on the situation in Ukraine from DG Grossi and the IAEA has been appreciated around the world. Among other support, Australia has provided AUD 686,000 as well as critical radiation detection and protection equipment through the IAEA to help ensure the safe and secure operation of Ukraine's nuclear facilities. ASNO will continue to work constructively with the IAEA and likeminded countries as the situation in Ukraine evolves.

IAEA inspectors conduct a radiological survey of the land around the Chornobyl Nuclear Facility after Russia de-occupied the area. (Image courtesy of IAEA Flickr account)

The Nuclear Industry – Some Current Issues

As a major uranium exporter and holder of the world's largest uranium reserves, Australia maintains consideration interests in current and future developments within the nuclear industry. Nuclear energy generation continues to steadily increase, recovering from the significant drop that followed the Fukushima incident in 2011. In calendar year 2021, nuclear reactors generated 2653 TWh of energy, about 10 per cent of global power generation.

At the end of 2021, there were 436 operable reactors, with 53 under construction.[1] Asia continues to be the heartland of new nuclear power plants with 36 reactors currently being built, predominantly in China, India, South Korea and the United Arab Emirates.

Carbon emissions targets, coupled with the destabilisation of global energy markets after Russia's invasion of Ukraine, are renewing global interest in nuclear power. Governments, including the USA and the European Union, have implemented, or considering, mechanisms such as funds and tax incentives to extend the operation of existing nuclear power plants and encourage new builds.

Advanced and Small Modular Reactor (SMR) companies, aided by significant investment from governments and the private sector, are also aiming to deploy new capabilities later this decade. Many of these new reactors will require high-assay low enriched uranium (HALEU) fuel that, until now, has been primarily supplied by Russia. Pursuit of enhanced domestic production capabilities by countries such as the United States could impact the demand for and destination of Australian uranium exports.

In the long term, the IAEA have increased their projections for global nuclear generating capacity out to 2050. The IAEA's most optimistic estimate is that the global nuclear generating capacity will increase to 792 GW(e) in 2050, compared to 393 GW(e) in 2020.[2]

Global electricity generation is also expected to double over the next three decades, so nuclear power generation capacity will need to increase to maintain its share of mix. If global nuclear generating capacity increases at the IAEA's high case projection, nuclear power would generate 12 per cent of the world's electricity by in 2050.

Uranium Exports and Production

Australia has approximately one third of the world's uranium deposits and, as at 30 June 2022, has two operating uranium mines in South Australia – Olympic Dam and Beverley/Four Mile. Australia fell from the second largest producer of uranium ore concentrate (UOC) in the 2020 calendar year to fourth largest in 2021, behind Kazakhstan, Namibia and Canada. This fall is due to both increased production internationally and reduced production domestically – arising from a combination of the closure of Ranger uranium mine and maintenance activities at the two operating mines.

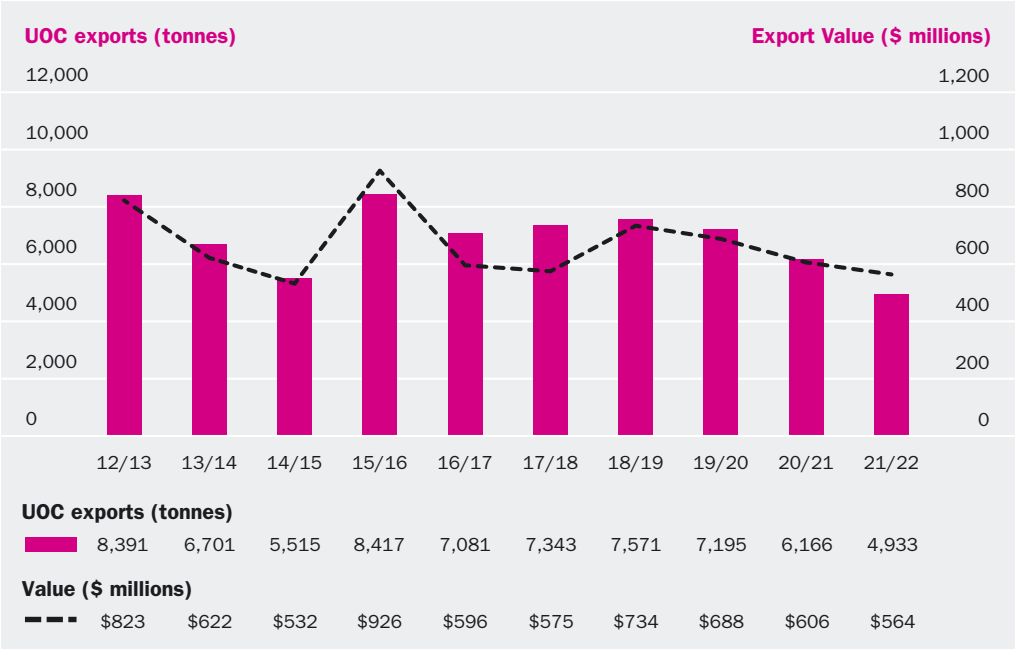
Future production outlook is positive, with two projects looking to resume or begin uranium mining in coming years. Honeymoon in South Australia is working to restart production in the final quarter of 2023 and Mulga Rock in Western Australia is undertaking a feasibility study with the goal of beginning production in 2025. Mine owners are motivated by the increased price of uranium which is at its highest price per ton in a decade.

1 World Nuclear Association – World Nuclear Association (world-nuclear.org)
2 https://www.iaea.org/newscenter/pressreleases/iaea-increases-projections-for-nuclear-power-use-in-2050

Table 1: UOC (U_3O_8) export and nuclear electricity statistics

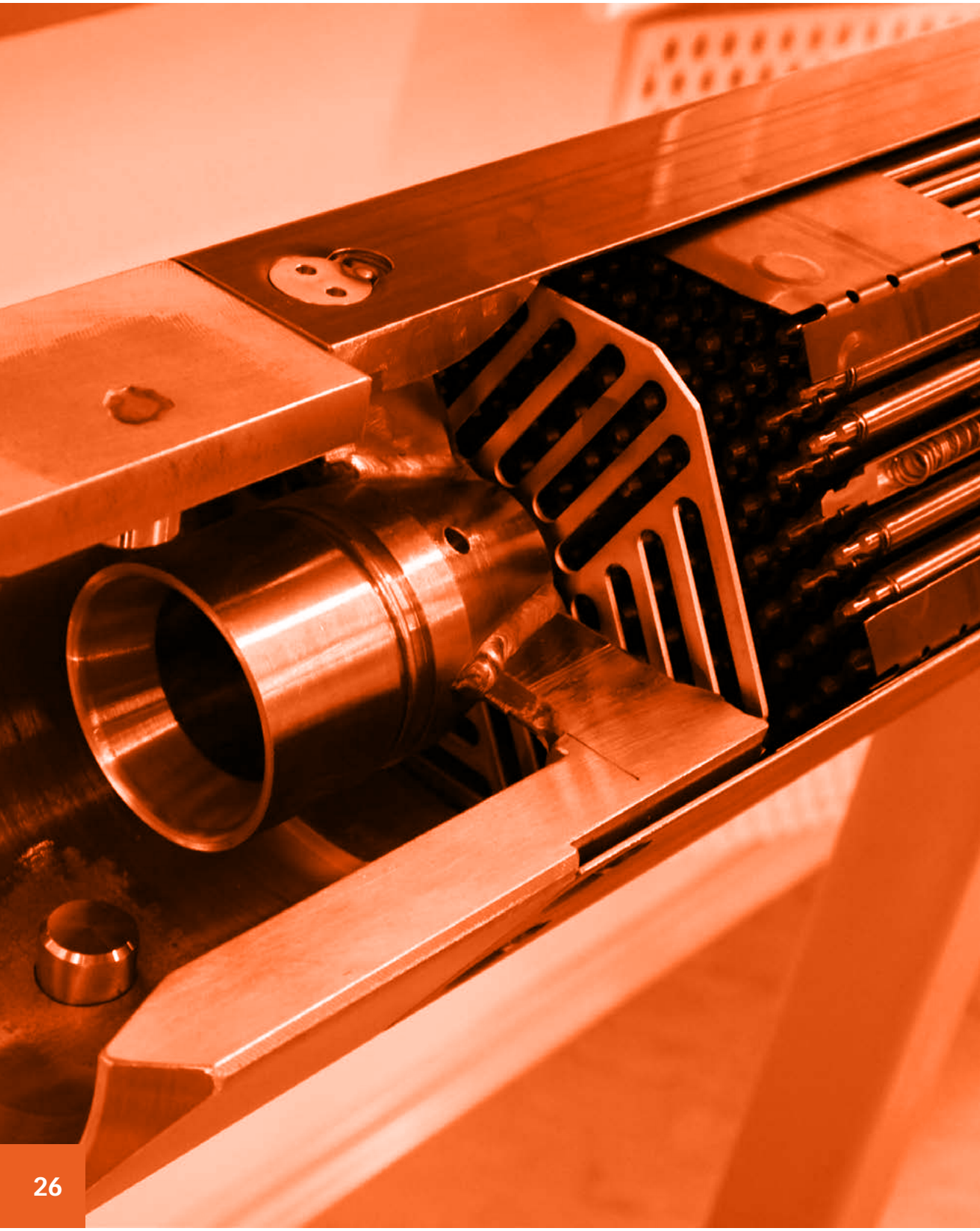
Item	Data
Total Australian UOC exports 2021–22	4,933 tonnes
Value Australian UOC exports	$564 million
Australian exports as percentage of world uranium requirements[3]	6.7%
Power generated by these exports	178 TWh
Expressed as percentage of total Australian electricity production[4]	67%

Figure 1: Quantity and value of Australian UOC (U_3O_8) exports from 2012–13 to 2021–22



3 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 Nuclear Power Reactors and Uranium Requirements, August 2022.

4 Based on Australia's electricity generation in 2019–2020 of 265 TWh from the Department of Industry, Science, Energy and Resources, Australian Energy Update 2021.



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ASNO works to enhance Australian and international security through activities which strengthen the effectiveness of the WMD non-proliferation regimes. In particular, through treaty implementation, domestic regulation and 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 one of the United Nations' most successful multilateral treaties. The NPT has become almost universal, with 191 Parties. India, Israel, Pakistan and South Sudan have never joined the NPT. The Democratic People's Republic of Korea (DPRK) was purported to withdraw from the NPT in 2003.

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

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 and security 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[1]
- the Amended Convention on the Physical Protection of Nuclear Material (A/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 the 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 monitoring 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.

1 See Appendix A

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 for the CTBT Organization (CTBTO) was established in 1997, made up of CTBT States Signatories and supported by a Provisional Technical Secretariat. The tasks of the CTBTO 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 CTBTO 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 CTBTO 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.

ASNO's 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 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 CTBTO 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.

Chemical Weapons Convention Functions

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

ASNO is Australia's designated national authority for the CWC. It acts as the primary 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 conducts compliance inspections of relevant facilities in Australia. 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 to formulate policy and provide practical implementation assistance.

ASNO's 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, subsequently reported to the OPCW if declarable
- 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.

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
- 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 under 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 carrying out inspections in Australia.

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, which enabled its entry into force. The Treaty has 13 parties: Australia, Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

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.

South Pacific Nuclear Free Zone Treaty Act 1986

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

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 2: ASNO's Operating Environment

Australian Safeguards and Non-Proliferation Office

Treaties

Verification Development

Implementation

Technical Support

Policy

Development

Implementation

Legislation

Regulatory Activities

International Stakeholders

IAEA

OPCW

CTBTO PrepCom

Overseas counterparts, including regional counterparts

Asia-Pacific Safeguards Network

Nuclear cooperation agreement partners

Domestic Stakeholders

DFAT including posts

Commonwealth agencies

ANSTO

DSTG

Uranium industry

Nuclear material users

Chemical industry

Research and development institutions

Importers/exporters

CTBT facility operators

State and Territory Governments

Tertiary institutions

General public

Outcomes and Outputs Structure

Table 2: ASNO's Outcomes and Outputs Structure

Outcome 1	**Australian and international security protected and advanced through activities which contribute to effective regimes against the proliferation of nuclear and chemical weapons**	
	Output 1.1	Operation of Australia's national system of accounting for, and control of, nuclear material, items and facilities
	Output 1.2	Protection of Australia's nuclear facilities, nuclear material and nuclear items against unauthorised access and sabotage, including Australia's uranium supplied overseas
	Output 1.3	Nuclear material and associated items exported from Australia under bilateral agreements remain in exclusively peaceful use and obligations under nuclear cooperation agreements are effectively implemented
	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 and disarmament regimes
	Output 1.8	Provision of high-quality, timely, relevant and professional advice to Government
Outcome 2	**Knowledge about Australian's efforts to prevent the proliferation of weapons of mass destruction enhanced through public advocacy**	
	Output 2.1	Provision of public information on the development, implementation and regulation of weapons of mass destruction, non-proliferation regimes, and Australia's role in these activities


IAEA
IAEA

SECTION

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PERFORMANCE

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Output 1.1: National Safeguards Systems

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

Performance Measures

- Australia continues to receive the broader conclusion that 'all nuclear material remained in peaceful activities' from the IAEA.
- Australia's obligations are met under Australia's Comprehensive Safeguards Agreement and Additional Protocol with the IAEA.
- Australia's system of safeguards permits and authorities is administered in a timely and effective manner.
- The quantities, categories, locations and intended end-uses of nuclear material and associated items within Australia are accounted for.

Performance Assessment

International Obligations

Reporting Obligations under the Australia – IAEA Comprehensive Safeguards Agreement

During the reporting period, ASNO submitted all reports, declarations and notifications to the IAEA on nuclear materials, facilities and activities, ensuring that Australia met its obligations under its safeguards agreements with the IAEA.

For each material balance area (summarised in Table 3), ASNO provided reports to the IAEA as required by the Comprehensive Safeguards Agreement.

Table 4 is a summary of total quantities of nuclear material by category in Australia. A small quantity (2.7 kg) of ^{235}U in 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.

As well as requiring reporting on nuclear material inventory and transactions, the Comprehensive Safeguards Agreement also requires reporting on design and operational attributes (relevant to safeguards) of nuclear facilities. This information is provided to the IAEA in Design Information Questionnaires (DIQs) for each facility material balance area (MBA), and in the case of MBAs for locations outside facilities (LOFs), in LOF information questionnaires. No DIQs were updated during the reporting period.

The Safeguards Act requires permits for possession of nuclear material, as well as associated material, associated equipment and associated technology (collectively termed associated items). Permits for associated items ensure Australia can maintain regulatory controls on technology, equipment and material with potential proliferation risks, can report on design attributes for DIQs, and meet other reporting obligations under various nuclear cooperation agreements. Table 5 lists the inventory of associated items in Australia.

Table 3: Material Balance Areas (MBAs) in Australia for IAEA safeguards purposes

Location	Material balance area (MBA)	Name of facility or location outside facility (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, ASE1& ASE2	Other locations in Australia (e.g. universities, industrial radiography companies, hospitals)
Lucas Heights	AS-F	OPAL reactor
Lucas Heights	AS-H	Synroc waste immobilisation (SyMo) plant
CSIRO (various sites)	AS-I	CSIRO

Table 4: Nuclear Material in Australia at 30 June 2022

Category	Quantity	Intended end-use
Source Material		
Uranium ore concentrates (UOC)	785 tonnes	Export for energy use pursuant to bilateral agreements
	3.5 tonnes	Storage
Natural uranium (other than UOC)	4,487 kg	Research, storage
Depleted uranium	28,477 kg	Research, shielding
Thorium ore residues	59 tonnes	Storage/disposal
Thorium (other than thorium ore residues)	1,936 kg	Research, industry
Special Fissionable Material		
^{235}U – low enriched	204,311 grams[1]	Research, radioisotope production, storage
^{235}U – high enriched	2,747 grams	Research, storage
^{233}U	3.8 grams	Research
Plutonium (other than ^{238}Pu)	1,201 grams	Research, neutron source

1 The quantity of ^{235}U in low enriched uranium in Australia increased between 30 June 2021 and 30 June 2022 primarily due to the import of fresh fuel assemblies for the OPAL reactor.

Table 5: Associated Items[2] in Australia at 30 June 2022

Category	Quantity	Intended end-use
Associated Material		
Deuterium and heavy water	20.9 tonnes	Research, reactors
Nuclear grade graphite	83.3 tonnes	Research and storage
Associated Equipment		
HIFAR[3]	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[4]	1	Reactor
OPAL control rods	14	Reactor components
OPAL control rod drives	6	Reactor components
Nuclear-grade zirconium tubes	<50 kgs	R&D and storage
Self-powered neutron detectors	46	Reactor components

Reporting Obligations under the Australia – IAEA Additional Protocol

The Additional Protocol 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 that states do not have any undeclared nuclear material or activities. Australia was the first country to sign and ratify an Additional Protocol with the IAEA, which came into force for Australia on 12 December 1997.

ASNO prepares and provides annual declarations under a range of Additional Protocol categories, as well as quarterly declarations on relevant exports. An important aspect of the Additional Protocol is reporting to the IAEA on nuclear fuel cycle related research and development activities and plans relevant to the development of the fuel cycle. ASNO ensured that all IAEA requirements were met during the reporting period, including with respect to Australia's intention to acquire conventionally-armed, nuclear-powered submarines.

Safeguards Developments in Australia

The IAEA implements safeguards in Australia in accordance with the provisions in a range of legal instruments: the Comprehensive Safeguards Agreement; Additional Protocol; Subsidiary Arrangements; facility

2 Not including items categorised as associated technology.
3 The ANSTO Board decided to cease operation of HIFAR in January 2007. The reactor was de-fuelled in May 2007. It is awaiting decommissioning.
4 Includes, *inter alia*, the reactor reflector vessel and core grid.

attachments and LOF attachments for each material balance area (MBA).

Australia's MBAs are described in Table 3. The overarching framework the IAEA uses to prioritise and optimise various in-field verification and headquarters (i.e. at the IAEA) analysis activities under these instruments is the State-level approach (SLA) for Australia. The IAEA recently completed a minor update to Australia's SLA under its SLA Improvement Project.

ANSTO continues to construct its SyMo facility (Synroc Waste Immobilisation Facility) and, the IAEA conducted design information verification at the facility in May 2022. The IAEA is likely to conduct baseline environmental sampling in 2023.

All entities holding a permit to possess nuclear material are required to conduct an annual physical inventory taking (a stocktake of nuclear material held). The 2022 physical inventory taking was completed successfully with subsequent reporting to the IAEA submitted on time.

ASNO continued to engage with the Australian Radioactive Waste Agency (ARWA) in its mandate to establish a facility for Australia's radioactive waste.

Permits and Authorities System

ASNO continued to operate Australia's state system of accounting for and control of nuclear material (SSAC) in accordance with Australia's Comprehensive Safeguards Agreement with the IAEA and national legislation. Australia's SSAC is implemented through permits issued under the Safeguards Act. Notices of all permit changes were published in the Australia Government Gazette as required by subsection 20(1) of the Safeguards Act. A summary of all permits granted, varied, revoked and expired in the reporting period is in Table 6. During the reporting period, all permits related to the transport of nuclear material were varied and extended as part of ASNO's rolling plan of permit updates.

Essential for the operation of the permit system is a fit-for-purpose database for managing permits and preparing routine reports on nuclear material inventory and transactions to the IAEA. ASNO continued to work with the database development team (under DFAT's Information Management Division) on the continuing development of ASNO's NUMBAT database.

Table 6: Status of permits and authorities under the Safeguards Act at 30 June 2022 and changes in the reporting period

Permit or authority	Current total	Granted	Varied	Revoked	Expired
Possess nuclear material	115	6	14	1	0
Possess associated items	10	0	4	0	0
Transport nuclear material	16	0	17	0	5
Transport associated items	0	0	0	0	0
Establish a facility	1	0	0	0	0
Decommission a facility	2	0	0	0	0
Communicate information contained in associated technology	7	0	3	0	0
Total	**151**	**6**	**38**	**1**	**5**

IAEA Inspections

The IAEA conducted inspections in accordance with standard arrangements under Australia's Comprehensive Safeguards Agreement and the Additional Protocol. 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.

In the reporting period, the IAEA made two separate visits to Australia. The IAEA conducted a short notice random inspection in December 2021 and its annual, scheduled Physical Inventory Verification (PIV) inspections in May 2022. The IAEA also conducted Complementary Access at Silex Systems Limited in December 2021, and at Olympic Dam and a Defence waste store in May 2022. Details on all inspections are provided in Table 7. The IAEA's findings from these inspections (where available at the time of publishing this Annual Report) are listed in Appendix D.

Overall, the IAEA has maintained the 'broader conclusion' for Australia that 'all nuclear material remained in peaceful activities'. (See Appendix D.)

Table 7: IAEA Safeguards Inspections 2021–22

Date	Facility	Material balance area[5]	Type[6]
8–9 December 2021	ANSTO	AS-F	Short Notice Random Inspection
9 December 2021	ANSTO Silex	AS-C	Complementary Access (4.a.i)
10 May 2022	Defence	AS-E	Complementary Access (4.a.i)
12 May 2022	Olympic Dam Mine	AS-E	Complementary Access (4.a.i)
16–24 May 2022	ANSTO	AS-C	Design Information Verification & Physical Inventory Verification
		AS-D	Design Information Verification & Physical Inventory Verification
		AS-F	Design Information Verification & Physical Inventory Verification
		AS-H	Design Information Verification
25 May 2022	ANSTO	AS-C	Complementary Access (4.a.i)

5 See explanation of each material balance are in Table 3.
6 Details on different types of inspections are outlined in Appendix D.

IAEA and ASNO inspectors at Olympic Dam Uranium Mine during the Complementary Access, May 2022. (Image courtesy of BHP Olympic Dam)

ASNO Safeguards Inspections

ASNO accompanied the IAEA on all the inspections listed above to ensure Australia's obligations were met in a timely and efficient manner and to ensure the inspections were conducted effectively. ASNO inspectors are able also to use these opportunities to observe the inspected organisation's performance against their domestic permit conditions. ASNO also conducted domestic inspections and separately visited some permit holders to discuss their arrangements for implementing permit conditions. (See Output 1.2.)

Inventory balances

ASNO performed the annual material balance evaluation of the nuclear inventory accounts for each MBA with minor differences between book and physical inventory. These inventory differences were reported to the IAEA in conjunction with inventory change reports and physical inventory listings. Details are provided in Table 8. Differences were due to re-measurement of small batches of nuclear material at universities and research institutes and correction to mis-assigned weights of shielding in radiography devices.

The mislocated item of depleted uranium reported in last year's report was found and the apparently mislocated item of thorium was resolved as a case of double counting. The permit holder involved is updating their procedures to improve their accounting and control of nuclear material.

Table 8: Inventory Differences Recorded during 2021–22

Material Balance Area	Difference between book and physical inventory	Comment
Other locations (MBA AS-E & ASE1)	–45.67 kg depleted uranium	Re-measurement and re-assignment of batch weights, including industrial radiography cameras, dismantled aircraft counterweights and chemical reagents.
	+0.19 kg natural uranium	
	–0.02 kg thorium	
CSIRO (MBA AS-I)	–0.00 kg depleted uranium	Re-measurement of batch weights as part of CSIRO's campaign to characterise legacy inventory in storage, including one correction of an error in assignment of a decimal place
	–0.04 kg natural uranium	
	+0.61 g plutonium	
	–0.03 kg thorium	

Output 1.2: Nuclear Security

Protection of Australia's nuclear facilities, nuclear material and nuclear items against unauthorised access removal 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 (A/CPPNM), the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT) and bilateral nuclear cooperation agreements, as well as according with relevant IAEA guidelines.
- Internationally agreed standards for the security of nuclear material are applied to all Australian obligated nuclear material (AONM).
- Proactive and professional contributions are made to the development and effective implementation of nuclear security worldwide.

Performance Assessment

Australian Nuclear Material Categories

The table below lists the permit holders for which physical protection or information security is required, categorised according to the materials or items held.

Table 9: Distribution of permits holders according to security category.

Nuclear Material Category	Type of 'Facility'	Number of Permit Holders
Category II[7]	Research reactor, storage	1
Category III	Storage, scientific research	1
Category IV[8]	Scientific research	1
Uncategorised[9]	LOFs, radiographers	106
Natural uranium (UOC)	Uranium mines and concentration plants	4
Transport of nuclear material	Transport companies, ports, shipping lines	19

7 Nuclear material category is based on IAEA Nuclear Security Series No. 13
8 Category IV limits are 15g≥Pu>10g; 15g ≥(^{235}U≥20%)>10g; 1000g ≥(^{235}U<20%–10%)>10g; 10 000g ≥(^{235}U<10%)>10g; 15g ≥^{233}U>10g; unirradiated source material ≤5000kg. (%-enrichment)
9 i.e. below Category IV quantities

Nuclear Material Category	Type of 'Facility'	Number of Permit Holders
Associated Items		
Associated Equipment and Technology	Enrichment research, storage and archives	4
Associated Technology	Patent attorneys	5

International and Bilateral Obligations

The regulation of ASNO permit holders verifies that security arrangements at Australian nuclear facilities are in accordance with Australia's obligations under the A/CPPNM and relevant bilateral nuclear cooperation agreements. Australia continues to subscribe to the IAEA's fundamental principles of nuclear security and is committed to incorporating IAEA nuclear security recommendations[10].

Throughout the reporting period, ASNO ensured that domestic nuclear security arrangements incorporated IAEA recommendations. During the export of uranium ore concentrates (UOC) from Australia, ASNO notified relevant parties of transhipments to meet Australia's international shipment notification obligations under the A/CPPNM.

Exports of Australian Uranium

Shipping and port supply chain disruptions and delays affected shipments of Australian UOC to international converters. Ongoing communication with relevant government agencies and overseas counterparts minimised the physical security impacts of these delays.

Australian uranium exports are subject to security arrangements that include checking the physical condition and integrity of fitted seals and containers at each port of unloading or transhipment. There were no reports of malicious acts involving the transport of UOC in Australia during the reporting period. However, there were several reports of minor incident received, each of which was reviewed and managed appropriately with no ongoing security issues.

10 The 2014 Joint Statement on Strengthening Nuclear Security was distributed by the IAEA as INFCIRC/869 and can be found at: https://www.iaea.org/sites/default/files/publications/documents/infcircs/infcirc869.pdf

Nuclear Security of UOC at Australian Mines and in Transport

During the reporting period, ASNO inspected several UOC transport and mining-related companies. In December 2021, UOC transport company, Neil Mansell Transport Pty Ltd, requested ASNO approval for a new depot and newly-constructed storage area. ASNO approved the storage yard as an approved location for UOC in containers incidental to transport.

Heathgate Resources, operator of the Beverley Uranium mine, submitted a revised Uranium Ore Concentrate – Physical Protection and Security Plan for the Beverley, Beverley North and Four Mile Operations, which ASNO approved in August 2021. Changes to the approved transport company for UOC required updates to the submitted Transport Security Management Plan. ASNO approved the transport security plan in December 2021.

BHP Olympic Dam submitted a revised Uranium Security Management Plan, which ASNO approved in December 2021.

ASNO also visited the offices of a proposed uranium mine in Western Australia in early June 2022 to provide guidance on nuclear security, safeguards and ASNO approval processes.

Review of Permits to Transport Nuclear Material and UOC

ASNO permits are reviewed according to industry type or permit class in an ongoing five-year cycle. In September 2021, ASNO reviewed and varied permits for the transport of nuclear material and UOC by road, rail and sea. These included permits in classes T1, T2, U2 and U3. All revised permits conform with relevant governance and risk management policies under the Government's regulatory reform agenda.

Route and Vessel Approval to Transport UOC

During the reporting period, ASNO approved 20 UOC transport routes and 29 vessels for the transport of UOC.

ASNO Requires UOC to be stored below deck. (Image courtesy of ASNO)

Major DBT Review

ASNO commenced a planned major review of Australia's design basis threat (DBT). As a central concept in the internationally-recognised IAEA nuclear security guidance document Nuclear Security Series No. 13[11], the DBT is a statement of credible adversary intentions and capabilities. Physical protection systems at high-consequence nuclear facilities are designed and implemented to provide high assurance of protection against the DBT. ASNO maintains the DBT with the support of other Australian Government Agencies. Upon completion, an unclassified version of the DBT will be published on ASNO's website.[12]

11 Also referred to as INFCIRC/225/Rev.5
12 https://www.dfat.gov.au/international-relations/security/asno/Pages/design-basis-threat

Nuclear Security at Lucas Heights (ANSTO)

ASNO has continued to maintain strong regulatory oversight and effective communication with ANSTO, including with in-person visits and inspections. Key security matters progressed, including the March 2022 return of ANSTO intermediate level waste (ILW) from the UK through close collaboration between ASNO, ANSTO and several State and Federal Government agencies.

ANSTO, ASNO and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) held quarterly security and safeguards meetings covering a range of issues, including regulatory coordination. During the reporting period, ANSTO appointed a Group Executive – Nuclear Safety, Security and Safeguards; a new Chief Security Officer; and an acting Agency Security Advisor.

ANSTO's Permit to Possess Nuclear Material and Associated Items was due for review during the reporting period, and a variation was granted on 30 June 2022. As a permit condition, ASNO continues to review a number of key security documents for the Lucas Heights facility. ANSTO has submitted a comprehensive periodic safety and security review (PSSR) of the OPAL reactor. The conduct of the PSSR is a requirement that is imposed by both ASNO and ARPANSA jointly. ASNO is now reviewing the suite of PSSR documents.

SILEX Enrichment Technology

ASNO conducted an inspection at Silex Systems Limited (SSL) on 23 May 2022, reviewing ongoing development activities, security plans and arrangements. A compliance verification was also conducted on a number of documents and communication procedures.

ASNO reviewed the existing SSL Permit to Possess Associated Technology and Authority to Communicate, issuing a revision on 30 June 2022. To facilitate the development of the Silex process towards commercialisation, ASNO also worked with stakeholders towards component transport approval. ASNO continues regulatory oversight of SSL's activities, including regular meetings and monthly reports.

Inspection of locations outside of facilities (LOF)

On 2 June 2022, ASNO inspected two approved LOFs: SGS Australia Radiation Safety Services Pty Ltd and the Department of Health Radiation Health Unit, to verify that physical protection measures remain suitable and that nuclear material safeguards are compliant with ASNO-issued permits to possess nuclear material.

Small inventories are inspected at a permit holder (Image courtesy of ASNO)

Ubaryon Enrichment Technology

Ubaryon Pty Ltd holds a Permit to Possess Associated Technology for research and development of an innovative uranium enrichment technique. Flooding in NSW affected Ubaryon resulting in a decision to relocate operations. ASNO continues to support the company to develop its security measures and provides security compliance guidance during discussions on the commercial partnership and technology development.

Nuclear Security Guidance Committee (NSGC)

The primary role of the Nuclear Security Guidance Committee (NSGC) is to manage the production of guidance documents in the IAEA Nuclear Security Series (NSS). The NSGC comprises over 50 IAEA member states, is constituted on rolling three-year terms and meets twice per year at the IAEA in Vienna (i.e. six meetings per term). Australia (ASNO) has been a member since its inception in 2012.

The fourth term of the NSGC commenced in 2021, and the new Director, Nuclear Security Section ASNO (Ms Rebecca Mackenzie) was nominated as the Australian NSGC representative in June 2022. The 21st meeting of the NSGC was held in Vienna in June 2022. It continued to focus on the development of nuclear security guidance, the nuclear safety/security interface, and the revision or drafting of future publications.

Scorched but still safeguarded material (Image courtesy of ASNO)

Output 1.3: Bilateral Safeguards

Nuclear material and associated items exported from Australia under bilateral agreements remain in exclusively peaceful use and obligations under nuclear cooperation agreements (NCAs) are effectively implemented.

Performance Measures

- Australian Obligated Nuclear Material (AONM) is accounted for in accordance with the procedures and standards prescribed under relevant bilateral agreements.
- Foreign Obligated Nuclear Material (FONM) is accounted for in accordance with the procedures and standards prescribed under relevant bilateral agreements.
- Nuclear Cooperation Agreements (NCAs) are effectively implemented and administrative arrangements are reviewed and revised as necessary to ensure their continuing effectiveness.

Performance Assessment

Australian Obligated Nuclear Material

A principal responsibility of ASNO under the NCAs listed in Appendix A is to maintain accurate inventories of Australian Obligated Nuclear Material (AONM) as it moves through the international fuel cycle (as described in Appendix C). Based on ASNO's analysis of reports and other information from counterparts on AONM located overseas, ASNO concluded that all AONM remained in peaceful use and was satisfactorily accounted for. Details are provided in Table 10.

During 2021 there were 40 UOC shipments from Australia and ASNO took an average of 2.1 days to approve each shipment. ASNO notified the safeguards authorities in relevant countries of each export. In every case, relevant safeguards authorities confirmed to ASNO receipt of the shipment. ASNO also notified the IAEA of each UOC export to non-nuclear weapon states pursuant to Article 35(a) of Australia's Safeguards Agreement with the IAEA as well as each export to nuclear-weapon states under the IAEA's Voluntary Reporting Scheme.

A summary of transfers of AONM through the network of countries with NCAs is provided in Table 11. The AONM typically moves through several countries before its intended end-use of electric power production in civil nuclear reactors and research or development for civilian applications. AONM cannot be used for any military purpose.

This is the first reporting period that has included deconversion as a fuel cycle stage in the summary of AONM transfers. Deconversion is the process of reducing UF_6 to UF_4 or UO_2 which is more stable for long-term storage. Uranium is converted into the chemical form UF_6 for enrichment and the depleted UF_6 is de-converted back to UF_4 or UO_2 for storage and the recovery of fluorine for re-use. Previously these transfers were regarded as internal transfers within Euratom, as the United Kingdom fell under the Australia-Euratom NCA until 31 December 2020. Details are listed in Table 12.

Table 10: Summary of net accumulated AONM by category, quantity and location as of 31 December 2021[13]

Category	Location	tonnes[14]
Depleted uranium	Canada, China, European Union[15], Japan, Republic of Korea, Russia, United Kingdom, United States	143,508
Natural uranium	Canada, China, European Union, India, Japan, Republic of Korea, United Kingdom, United Kingdom, United States	34,662
Uranium in enrichment plants	China, European Union, Japan, United Kingdom, United States	30,342
Low enriched uranium	Canada, China, European Union, Japan, Mexico, Republic of Korea, Switzerland, Taiwan, United Kingdom, United States, Ukraine	20,553
Irradiated plutonium	Canada, China, European Union, Japan, Mexico, Republic of Korea, Switzerland, Taiwan, United Kingdom, United States	227
Separated plutonium	European Union, Japan	1.5
Total		**229,293**

Table 11: Supply of Australian uranium by region/country during 2021[16]

Region/Country	tonnes UOC (U_3O_8)	Percentage of Total
Canada	3,705	76%
European Union	543	11%
United States	632	13%
Total	**4,880**	**100%**

13 Figures are based on yearly reports to ASNO in accordance with Australia's bilateral agreements and other information held by ASNO.
14 All quantities are given as tonnes weight of the element uranium or plutonium. The isotope weight of ^{235}U is 0.711 per cent of the element weight for natural uranium and from one to five per cent for low enriched uranium.
15 Euratom is the European Atomic Energy Community. The Australian-Euratom NCA covers all 27 Members States of the European Union.
16 Export destinations for Australian uranium are decided by commercial factors including the availability of conversion capacity and customer preference.

Table 12: Summary of AONM Transfers during 2021[17]

Fuel cycle Stage	Destination	U (tonnes)
Conversion	Canada	4,026
	European Union	370
	United States of America	475
Deconversion	United Kingdom	841
Enrichment	European Union	442
	United Kingdom	1,316
	United States of America	716
Fuel fabrication	European Union	64
	Republic of Korea	13
	United Kingdom	35
	United States of America	215
Reactor	European Union	15
	Japan	8
	Switzerland	8
	Ukraine	46

Foreign Obligated Nuclear Material

Just as Australia's bilateral treaty partners report on AONM in their jurisdiction, ASNO in turn maintains an inventory and reports on the movement of Foreign Obligated Nuclear Material (FONM) within Australia. FONM is nuclear material that an Australian company has imported in accordance with a nuclear cooperation agreement with a foreign partner, or nuclear material that has been produced using previously imported FONM. An example of this is the fuel and target plates for the Opal Reactor at ANSTO that are used in the production of radiopharmaceuticals.

Foreign obligations are in addition to the IAEA safeguards that apply to all nuclear material in Australia. Given the international, but jurisdictionally independent nature of the nuclear fuel cycle (as described Appendix C), nuclear material can be obligated by more than one bilateral treaty partner. Exporting countries may also choose not to place an obligation on particular types of nuclear material they export to Australia if they feel that IAEA safeguards alone can provide sufficient assurance of peaceful use.

ASNO tracks the movement of FONM in Australia and provides a FONM report to all bilateral treaty partners each year to reciprocate receipt of their annual AONM report. A breakdown of all FONM in Australia is at Table 13.

In addition to nuclear material, foreign obligations can be placed on non-nuclear material (referred to as 'associated material') such as heavy water, equipment or technology.

17 Figures are for transfers completed between jurisdictions from 1 January to 31 December 2021.

Table 13: The total quantity of FONM in Australia (by category) from all partner countries as of 31 December 2021

Category	Quantity
Source Material	**kilograms**
Natural Uranium (other than UOC)	49
Depleted Uranium	2,622
Thorium (other than Thorium Ore Residues)	739
Associated or non-nuclear material	**kilograms**
Heavy water and deuterium	10,695
Special Fissionable Material	**grams**
^{235}U – low enriched	200,117
^{235}U – high enriched	714
^{233}U	3.7
Plutonium (other than ^{238}Pu)	1,195

Bilateral Agreements

Australia-Ukraine NCA and Australia-Russia NCA

As reported in ASNO's 2020–21 Annual Report, the first shipment of nuclear fuel containing AONM was transferred from Sweden to Ukraine in April 2021. Throughout 2021 there were eight nuclear fuel shipments from Sweden that contained AONM. In February 2022, in response to Russia's unilateral, illegal and immoral invasion, Ukraine declared martial law and concurrently suspended all domestic and foreign shipments of nuclear material. (See Current Topics.)

Australia continues to ban Australian uranium transfers to Russia. This ban has been in place since 2014 after Russia announced its purported annexation of Crimea.

The expansion of Australia's nuclear cooperation network

It has been 35 years since the *Nuclear Non-Proliferation (Safeguards) Act 1987* come into force.[18]

At the end of June 1987, ASNO had implemented 10 NCAs covering 17 countries, including ten countries covered by Australia's NCA with European Union,[19] and Australia had exported a total of 23,017 tonnes of uranium that was being tracked as AONM.

In comparison, ASNO has now implemented 25 NCAs that cover 43 countries. This increase has been driven by both additional countries joining the European Union, and thus falling under the Australia-Euratom NCA, as well as the negotiation of new NCAs. Australia has now exported a total 231,226

18 A major part of the *Nuclear Non-Proliferation (Safeguards) Act 1987* took effect on 31 March 1987. Other parts came into force throughout that year.

19 In 1987, the Australia-Euratom agreement covered Belgium, Denmark, Federal Republic of Germany, France, Greece, Ireland, Italy, Luxembourg, Netherlands and the United Kingdom.

tonnes of uranium under these NCA,[20] ten times more than when the Safeguards Act came into force.

Engagement on Nuclear Cooperation Agreements

During the reporting period, the COVID-19 pandemic prevented in-person reconciliation visits; however, ASNO maintained regular virtual engagement with bilateral partners, including participating in a virtual meetings with counterparts to discuss Nuclear Cooperation Agreements and the peaceful use of nuclear technology more broadly. In line with a relaxation of border restrictions, initial steps towards resuming regular reconciliation visits were made in May 2022 when Director General ASNO and supporting staff visited counterparts in the United States and Canada.

Director General ASNO, Dr Geoffrey Shaw visited Oak Ridge National Laboratory during a trip to the USA. (Image courtesy of ASNO)

20 The difference between exported uranium and the amount tracked AONM is the result of nuclear loss – that is uranium or plutonium 'burnt up' by a nuclear reactor. The fission products (atoms roughly half the size of uranium or plutonium) cannot be used in a nuclear weapon are therefore not safeguarded by the IAEA or tracked as AONM.

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

ASNO continues its active role in international efforts in shaping and developing the effective implementation of nuclear safeguards, through engagement in a range of fora and projects. This includes working directly with the IAEA, as well as with other international bodies, notably through ASNO's membership of the APSN.

On broader aspects of safeguards implementation, ASNO's engagement 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 participated in the IAEA's biennial Member State Support Programme (MSSP) Coordinators' Meeting in March 2022 presenting on aspects of Australia's contributions to developing safeguards technology and approaches, delivering safeguards training, and providing technical services.

Australian Safeguards Support Program

The Australian Safeguards Support Program (ASSP) is one of 22 programs established by Member States and the European Commission to assist the IAEA in safeguards research, development and implementation. Australia has one of the longest-running programs, having been in place for over 40 years.

Under the ASSP, ASNO coordinates contributions from several Australian agencies including ANSTO, CSIRO, ONI, University of Sydney and University of Western Australia (UWA), to several ongoing projects as well as directly contributing its own expertise. During the year, ASNO contributed to the development of IAEA technical guidance documents, including the drafting of STR–396 'International Safeguards Guidelines for the Post-Operational Phases of Nuclear Facilities and Locations Outside Facilities', which the IAEA approved in August 2021.

ANSTO's Centre for Accelerator Science and UWA's Centre for Microscopy, Characterisation and Analysis continue to participate in the IAEA Department of Safeguards' Network of Analytical Laboratories (NWAL), providing analysis of IAEA environmental swipe samples. Following resolution of issues with sources of background in the Accelerator Mass Spectrometry system and successful analysis of re-validation samples in 2020–2021, ANSTO resumed bulk analysis of swipe samples from IAEA safeguards inspections in 2022. UWA uses its large-geometry secondary ion mass spectrometer (LG-SIMS) for uranium isotopic characterisation of particles in environmental samples from IAEA inspections. UWA is increasing its capacity to analyse IAEA samples from about 20 per year to as many as 40 to help meet growing demand for particle analysis.

ASNO is also supporting the IAEA's Comprehensive Capacity Building Initiative for SSACs[21] and SRAs[22] (COMPASS), the IAEA's new initiative to provide tailored safeguards assistance to Member States. Australia contributed to two webinars presenting on how Australia conducts safeguards outreach to LOFs and on Australia's nuclear material licensing system for the benefit of COMPASS pilot countries.

Cooperation with other States

The 2022 virtual meeting of APSN (held over from 2021) was attended by 70 participants from 20 countries, including observers from Papua New Guinea, Sri Lanka and United Arab Emirates, and representatives from the IAEA and ESARDA. Vietnam will pass the chair of the APSN to Thailand for 2023–24. Australia will continue as chair of the APSN Steering Committee in 2022, followed by Japan in 2023.

ASNO presented on 'Nuclear and Non-nuclear uses of nuclear material' at a virtual workshop for Papua New Guinea on International Nuclear Safeguards: Implementing Safeguards Obligations held on 10–11 August 2021, hosted by the United States Department of Energy.

21 The system of accounting for and control of nuclear material used by a state or regional authority.
22 The state or regional authority responsible for safeguards implementation.

ASNO officers participating at virtual workshop with Papua New Guinea on International Nuclear Safeguards: Implementing Safeguards Obligations, 10–11 August 2021 hosted by the US DOE. (Image courtesy of DOE/NNSA INSEP)

IAEA Standing Advisory Group on Safeguards Implementation

The IAEA Director General's Standing Advisory Group on Safeguards Implementation (SAGSI) provides recommendations to the IAEA Director General on vital safeguards implementation issues. The Group currently comprises 17 international experts from 17 Member States. The members serve on the group in a personal capacity (rather than as representatives of their government or organisation). Each expert is invited to serve a three-year term, with the possibility of renewal. Dr Stephan Bayer, Director IAEA Safeguards Section, ASNO, has been appointed to serve as a member of SAGSI until the end of 2024. During the reporting period SAGSI has been examining 30 years of strengthening safeguards with a view to formulating recommendations for the further strengthening of safeguards in the future.

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, amendments and notifications were provided to the OPCW via its Secure Information Exchange portal as follows:

- Article VI declaration of imports and exports of CWC-Scheduled chemicals and of past activities at 39 facilities with CWC-relevant chemical production, processing or consumption activities during 2021 (declared in March 2022)
- Article VI declaration of anticipated activities at nine CWC-Scheduled chemical facilities for 2022 (declared in September and October 2021)
- Article X, paragraph 4, declaration of Australia's national programs for protection against chemical weapons during 2021 (declared in April 2022)
- responses to OPCW Third Person Notes including routine clarification of the operational status of declared chemical plants and
- responses to OPCW notifications and amendments/corrections to inspector details and deletions or additions to the OPCW inspectorate.

OPCW Inspections

Since 1997, the OPCW has conducted 66 routine inspections in Australia. The inspections have occurred at declared chemical plants and a Defence protective purposes laboratory suite in accordance with the provisions of Article VI of the CWC. In the current reporting period, ASNO facilitated four routine OPCW inspections.

The first inspection was of a Schedule 2 processing facility in Victoria. The second, third and fourth inspections were of declared 'Other Chemical Production Facilities' (OCPF), with one in New South Wales and two in Queensland.

The four inspections proceeded smoothly, with excellent support and cooperation from the sites. The OPCW inspection team verified the companies declarations, including the absence of any undeclared CWC-Schedule 1 chemical production, in accordance with the inspection mandates.

ASNO inspections

ASNO conducted an inspection pursuant to Section 35 of the *Chemical Weapons (Prohibition) Act 1994* of a Schedule 2 processing facility in Melbourne. The inspection was called due to an ongoing issue of report past the timeframes identified in the *Chemical Weapons (Prohibition) Regulations 1997*. The issue has been resolved, with reporting occurring on time since the inspection.

ASNO chemical database

Online reporting by regulated chemical facilities and import permit holders, in accordance with statutory obligations, enabled ASNO's preparation of Australia's declaration of past and anticipated chemical activities to the OPCW.

As mentioned in the Annual Report 2020–21, a key challenge for ASNO is assisting with the development and implementation of a new chemical database to support Australia's reporting obligations under the CWC. ASNO's current chemical database and online portal are no longer fit-for-purpose. Efforts to replace the database during the reporting period were unsuccessful. ASNO will continue to work to develop a new chemical database system with an industry access online portal to improve the end-user stakeholder experience and the efficiency of ASNO's regulatory function.

Legislation and Regulation

The CWC is included as a Schedule to the *Chemical Weapons (Prohibition) Act 1994* (the CWP Act). There are three Schedules of chemicals listed in an annex to the CWC known as the 'Annex on Chemicals'. Any changes to the CWC Annex on Chemicals accepted by Australia are regulated by amending the *Chemical Weapons (Prohibition) Regulations 1997*.

Table 14 provides statistics for the permits issued to facilities producing, processing or consuming CWC-Scheduled chemicals during the current reporting period. Thirty-one facility permits were in effect at 30 June 2022.

The permit systems, under the CWP Act and Regulation 5J of the *Customs (Prohibited Imports) Regulations 1956*, continued to operate well. During the reporting period 66 import permits, and one import permit variation, were issued for the import of CWC-Schedule 2 and 3 chemicals. Two permits were issued for the import of CWC-Schedule 1 chemicals and eight permits were issued import unknown samples from/on behalf of the OPCW to use to import OPCW proficiency test samples.

Table 14: Permits for CWC-Scheduled Chemical Facilities

CWC-Scheduled Chemicals	CWP Act 1994	Permit type	Permits at 30 June 2022[23]	New permits 2021–22	Re-issued permits 2021–22	Permits cancelled 2021–22
Schedule 1	s19(4)	Production (Protective)	1	0	0	0
	s19(5)	Production (Research)	8	1	0	0
	s19(6)	Consumption	12	0	1	0
Schedule 2	s18(1)	Processing	7	1	0	0
Schedule 3	s18(1)	Production	3	0	0	0

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, industry cluster meetings and informal consultations in The Hague. ASNO attended the virtual Regional Meeting of CWC National Authorities in Asia on 23–25 May 2022 and the virtual National Authorities for the CWC meeting in November 2021.

In April, Director General ASNO met with DG OPCW, H.E. Fernando Arias, and senior management to discuss CWC challenges, Russia, Syria, ways to support the OPCW Technical Capability and CWC implementation globally, with a focus on the Indo-Pacific region.

Malaysia partnership program

In March, the first exchange of the OPCW Australia-Malaysia Partnership Program was held in Canberra. The discussions focused on CWC implementation legislation, import and export of CWC Scheduled chemicals and chemical safety and security. The Australia Group and strong export control regimes were also discussed.

The Partnership Program had considerable support across government, including: Department of Foreign Affairs and Trade; Australian Border Force, Department of Defence (Defence Science and Technology Group, Defence Export Controls and Strategic Policy's Counter-Proliferation and Arms Control area), Attorney General's Department, Department of Home Affairs and Queensland Fire and Emergency Services. The support of Chemistry Australia and a chemical production facility in Sydney was also greatly appreciated.

The second exchange under the Partnership is scheduled for August 2022 in Malaysia.

23 Permit numbers include new, existing and renewed permits.

ASNO participants, Michelle Kopac, Vanessa Robertson and John Kalish with Ambassador Zainol Rahim Zainuddin, Chairman of National Authority for Chemical Weapons Convention Malaysia and the Malaysian national authority team at the OPCW Australia-Malaysia Partnership Program meeting in Canberra, March 2022. (Image courtesy of DFAT)

Dr John Kalish, Assistant Secretary ASNO (on the right) making opening remarks at the OPCW Australia-Malaysia Partnership Program meeting in Canberra, March 2022. (Image courtesy of DFAT)

Domestic Outreach

ASNO continued its close cooperation on CWC implementation issues with relevant Australian Government departments and agencies.

To assist with meeting CWC reporting obligations and ensure compliance with CWC-relevant legislation, ASNO also continued to strengthen engagement with its constituency in industry, research and trade, including with non-government agencies and associations.

ASNO conducted industry outreach visits at eighteen facilities during the reporting period.

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

Australia hosts 20 monitoring stations and one laboratory as part of the CTBT International Monitoring System (IMS). All are certified as operating to CTBTO technical specifications. Ensuring the effective operation of Australia's IMS stations is a routine focus for ASNO.

Australian CTBT stations performed very well. Performance of Australian seismo-acoustic stations, operated by Geoscience Australia and the Australian National University, has been very good throughout the year with an average operational performance of 99.7 per cent across the 13 stations. Radionuclide monitoring data availability, obtained by ARPANSA, remained high across the seven stations, with an average 98.4 per cent over the 12-month reporting period.

To overcome the problems caused by the pandemic, Geoscience Australia were required to visit the seismo-acoustic IMS stations when the opportunity arose and engage local operators to undertake additional tasks. In March 2022, Geoscience Australia were able to complete the recapitalisation work at Buckland Infrasound IMS Station (IS05) near Hobart in Tasmania, including barometric equipment, power and communication upgrades. In June 2022, an Uninterruptible Power Supply (UPS) system upgrade at Cape Leeuwin Hydro-acoustic station (HA01), providing enhanced autonomous operations and monitoring capability.

ARPANSA staff and maintenance crew replacing the IMS station air sampler (part of AUP08) on Cocos Island. (Image courtesy of ARPANSA)

ARPANSA was able to complete all maintenance operations, except at Mawson Antarctica (AUP05) due to an inability to get to the site. This included the replacement of the air sampler on Cocos Island IMS radionuclide station (AUP08, pictured below).

ASNO continued to work with the CTBTO on plans for maintaining the cable that brings to shore data for the Cape Leeuwin hydrophone array (HA01), including an in-person meeting with staff from the Provisional Technical Secretariat in February. ASNO experts visited Perth and Cape Leeuwin between 31 May and 3 June 2022 to talk with WA state authorities and the local operator and surrounding businesses about the proposed maintenance to HA01.

In March 2022, I met with CTBTO senior management and received a comprehensive technical briefing on the IMS and operations of the International Data Centre.

ASNO experts met with the Australian Antarctic Division in April 2022 to better understand the long-term redevelopment plans of facilities on Macquarie Island and how it can enhance the operation of the IMS radionuclide monitoring facility on the island.

Michael Lane discusses with the local operator proposed maintenance work at the Cape Leeuwin Hydro-acoustic station (HA01). (Image courtesy of ASNO)

Nuclear-Test-Ban Verification

ASNO administers funding for Geoscience Australia to carry out nuclear test monitoring through its network of seismic stations in addition to those of the CTBT's IMS. This arrangement, set out in a Letter of Understanding between Geoscience Australia and ASNO, is reviewed each year. ASNO is satisfied that Geoscience Australia has met its requirements under the Letter of Understanding during the reporting period.

Although the CTBT is not yet in force, its IMS is now substantially in place, with around 90 per cent of Treaty-designated stations certified for operation by 2022. The system detects and reports on many thousands of events each year. Almost all of these can be clearly identified as natural in origin and in the twenty-first century only the DPRK has been detected conducting nuclear test explosions.

Since the 2017 declared nuclear explosion, Geoscience Australia has reported to ASNO on the detection of 59 tectonic events located in the vicinity of the DPRK test site at Punggye-ri. Based on the signal characteristics, some of these appear to be a continuing series of aftershocks following the large September 2017 test explosion. During this reporting period, Geoscience Australia continued to monitor seismic activity in the vicinity of the DPRK test site at Punggye-ri and reported to ASNO on the detection of 12 earthquakes. The sizes of 11 of these events ranged from magnitude 2.2 to 2.8, and an earthquake on 11 February 2022 with a body-wave magnitude (mb) of 3.5 was assessed to be naturally occurring. Based on technical analysis of the detections, it is unlikely that any of these events were the result of the DPRK's recent reconstruction at the test site.

Australian Participation in CTBTO verification development activities

The CTBTO Preparatory Commission, including its member states, continues 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.

Director General ASNO, Dr Geoffrey Shaw received a briefing on CTBT radionuclide detection equipment in Vienna. (Image courtesy of CTBTO)

ASNO coordinates and contributes to Australia's specialist support for this work, which is focused 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 International Data Centre (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. As well as chairing a hybrid session of the CTBTO Working Group B on OSI Manual development in February 2022, Malcolm also participated in meetings of an expert group advising the CTBTO's Provisional Technical Secretariat on plans for on-site inspection exercises in the coming years.

Malcolm Coxhead participated in a tabletop exercise for CTBTO Executive staff, including Executive Secretary (ES) Dr Robert Floyd, where the staff tested the decision-making procedures in place to declare an OSI activity.

ASNO coordinates the involvement of Australians in training aimed at supporting the operation of the IMS and Australia's national data centre (NDC). While around 90 per cent of CTBT IMS stations are now in place worldwide, detailed preparatory work is continuing to bring the IMS and International Data Centre to satisfactory levels of readiness. ASNO coordinates Australia's contribution to the CTBTO's work in this area, working with technical specialists from Geoscience Australia and ARPANSA. During the reporting period, experts from both organisations participated in specialist CTBTO training in support of Australia's IMS and NDC operations.

Civil and Scientific uses of IMS data

Selected IMS data continues to be used for civil and scientific purposes in Australia. For example, data from seismic stations is used in the Australian National Earthquake Alert Centre for the detection and location of numerous Australian and overseas earthquakes and for tsunami warning.

For example, the 15 January 2022 explosive eruption of the Hunga Tonga-Hunga Ha'apai volcano was detected by every seismic, hydro-acoustic and infrasound facility of the CTBT's IMS worldwide. The explosive energy released was up to twice as large as the Soviet Tsar Bomba nuclear test in 1961 – the largest nuclear test ever conducted.

Outreach

Geoscience Australia, in collaboration with New Zealand counterparts, plan to provide NDC training in Malaysia before the end of 2022. This training is an initial engagement with Nuklear Malaysia on CTBT cooperation and is design to build further regional capacity on analysis of CTBT data. ASNO hopes that NDC training can be expanded to other Asia-Pacific states.

Output 1.7: Other Non-Proliferation and Disarmament Regimes

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

Performance Measures

- Contribute to technical developments in the field of nuclear disarmament relevant to Australia's interests, in particular through the International Partnership for Nuclear Disarmament Verification.
- Support Australia's Permanent Mission to the Conference on Disarmament to advance disarmament objectives, including the UN Mandated Group of Government Experts on nuclear disarmament verification and efforts to commence the negotiation of a 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

International Partnership for Nuclear Disarmament Verification

Verifiable nuclear disarmament poses significant technical challenges. Success in addressing these will require the development and application of new technologies and/or concepts. ASNO alongside DFAT and ANSTO continue Australia's active contribution to the IPNDV's work to address these challenges.

The current third work-phase of IPNDV aims to build on this work through practical exercises, including scenario-based discussions and technology demonstrations to examine how concepts and other elements of a verification 'tool-kit' can be implemented. ASNO's Malcolm Coxhead co-chaired the task group examining issues from the perspective of future inspectors throughout the reporting period. Other task groups examined the perspectives of an inspected state and focus on technology issues.

Physical meetings and exercises of IPNDV partner countries re-commenced in 2022, including NuDiVe22 in Germany and JUNEX2022 in Belgium, after the long pause due to COVID-related restrictions. These in-person meetings were heavily supported by monthly virtual meetings.

NuDiVe22, a French and German co-sponsored exercise hosted at Forschungszentrum Jülich near Aachen, Germany, role-played the inspection of a nuclear warhead dismantlement. ASNO's Michael Lane and Malcolm Coxhead participated as Deputy Chief Inspector and Host State Official respectively in this immersive experience, working with advanced measurement technology including a Japanese-developed Gamma imaging camera and the US TRIS special nuclear material templating system.

JUNEX2022 was a Tabletop Exercise (TTX) of the verification of warhead transport and long-term storage, hosted at the Palais d'Egmont in Brussels, Belgium. Malcolm Coxhead co-led the inspection team using inspection procedures jointly drafted by ASNO staff with Dutch and Canadian colleagues. During the TTX, participants used computer simulation software to track the movement of the inspection teams through the passage of two separate three-day inspections.

In December 2022, Australia will host a plenary of IPNDV in Sydney. This meeting will bring together approximately 100 international experts and include demonstrations of technical verification technologies.

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 like-minded countries to help shape and influence multilateral processes. While not progressed during the past year, ASNO remains committed to support the negotiation of a Fissile Material Cut-Off Treaty (FMCT) at the earliest possible opportunity. A verifiable global norm against fissile material production for use in nuclear explosives is still the next logical step in progressing nuclear disarmament.

Malcolm Coxhead and Michael Lane participating in radiation measurement templating of a simulated warhead using TRIS, during the NuDiVe22 exercise in Aachen, Germany. (Copyright: Forschungszentrum Jülich / Sascha Kreklau)

UN Group of Government Experts on Nuclear Disarmament Verification

In 2019, the UN General Assembly established the second Group of Government Experts (GGE) on Nuclear Disarmament Verification (NDV). The second GGE has a mandate to further consider NDV issues, including the concept of a Group of Scientific and Technical Experts, and to build upon the report of the first GGE. The GGE met for the first time in February 2022, and ASNO exports provided direct support to Australia's CD delegation. A further three meetings are scheduled before May 2023.

ASNO, in collaboration with experts from Australia, Sweden and Nigeria, developed a concept paper to be presented at the second session of the GGE in September 2022.

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 that meet the needs of Ministers and other key stakeholders.
- Contribute to the development of Australia's policies on the WMD non-proliferation and disarmament.
- Cooperate on technical issues across government, including with the Australian intelligence community.

Performance Assessment

ASNO continues to provide independent expert advice on various non-proliferation policy and regulatory issues. ASNO's remit is supported by section 43(d),(e) of the *Nuclear Non-Proliferation (Safeguards) Act 1987*, which states that the functions of the Director General include 'to undertake, co-ordinate and facilitate research and development in relation to nuclear safeguards' and 'to advise the Minister on matters relating to the operation of the Australian safeguards system'.

During the reporting period ASNO has provided technical advice to key stakeholders on IAEA safeguards operation and requirements, and the operation of the Australian Safeguards System under the Safeguards Act.

ASNO has contributed technical advice regarding developments at Ukraine's nuclear facilities since Russia's unilateral, illegal and immoral invasion. ASNO has also given advice on assistance Australia could provide to Ukraine through the IAEA Response and Assistance Network (RANET) mechanism. In addition, ASNO provided advice on nuclear-related sanctions Australia has had in place on Russia since 2014.

ASNO continued to provide advice to the Australian Radioactive Waste Agency (ARWA) on the development of the National Radioactive Waste Management Facility detailed business case; licensing process; design of a waste information management system; and provided safeguards-by-design support to ANSTO on the detailed engineering design for the facility.[24]

ASNO provided advice to the DISR and the Department of Home Affairs on the regulatory requirements for exporting Controlled Ores and the potential of future regulatory alignment.

ASNO also works closely with ARPANSA to incorporate best practice for the security of nuclear material, particularly where there are security and safety interfaces, such as:

- Spent fuel management
- Periodic Safety and Security Review (PSSR) for the ANSTO OPAL Research Reactor.

24 ASNO is working with ANSTO to ensure the engineering designs for the facility can meet requirements to facilitate ongoing IAEA verification while seeking to minimise costs associated with verification.

Output 2.1: Public Information

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

Performance Measures

- Effective public education and outreach.

Performance Assessment

While COVID-19 restrictions have limited public diplomacy and outreach activities, ASNO has continued to provide guidance and regulatory support to permit holders and relevant industries, and industry outreach visits have increased. ASNO has also delivering lectures and presentations in academic and other fora (see Appendix F).

ASNO worked closely with the uranium mines and State and Commonwealth government entities to streamline our regulatory requirements and reduce the regulatory burden on the industry.


A2

SECTION

5

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.

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*
- 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 Geoffrey Shaw took up the position of Director General ASNO on 24 January 2022.

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

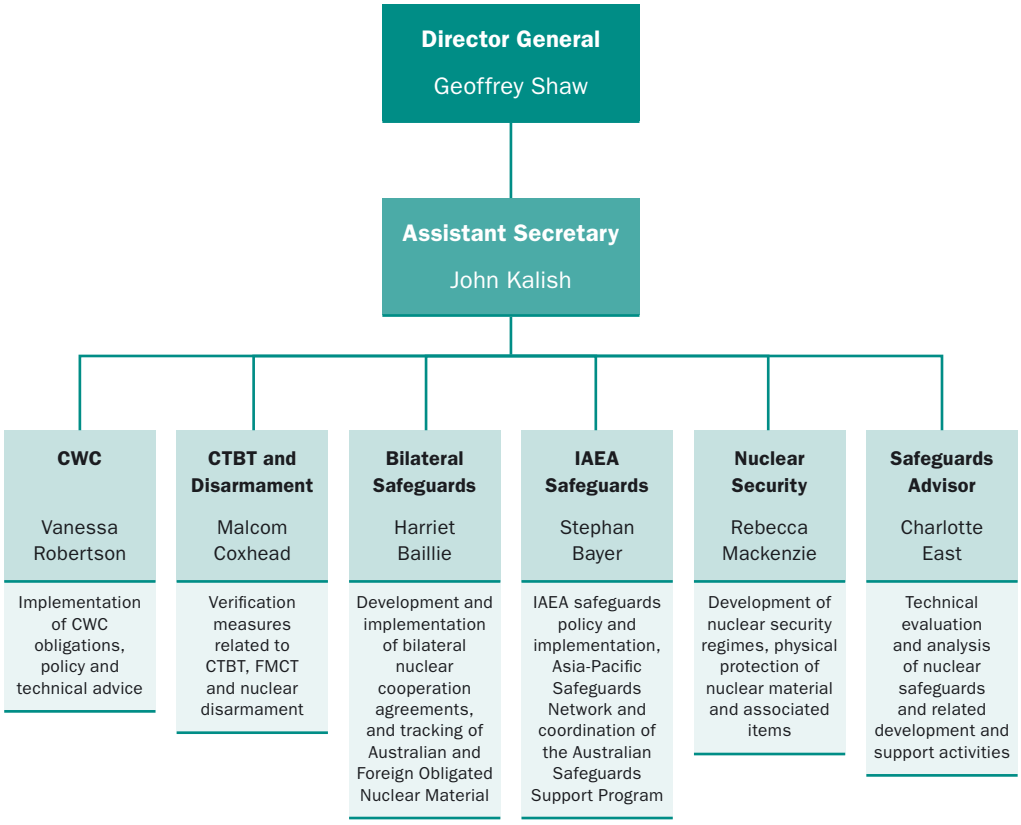
ASNO staff, other than the Director General, are employed under the *Public Service Act 1999* as a division within the Department of Foreign Affairs and Trade (DFAT) and subject to the DFAT Enterprise Agreement. Further details can be found in Table 15 and the DFAT Annual Report 2021–22.

ASNO's organisational structure is closely aligned with its outputs and can be found in Figure 3.

Table 15: ASNO Staff at 30 June 2022

	Male	Female	Total
SES B2	1	0	**1**
SES B1	1	0	**1**
Executive Level 2	2	4	**6**
Executive Level 1	3	2	**5**
APS Level 6	2	2	**4**
TOTAL	**9**	**8**	**17**

Figure 3: ASNO's Organisational Structure at 30 June 2022



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

After the reduction in operational costs in the previous reporting period due to COVID-19, ASNO administrative budget returned to a more typical level, as reflected in Table 16.

Table 16: ASNO Administrative Costs

	2020–21	2021–22
Salaries	2,280,254	2,380,260
Running Costs		
(General)	247,228	479,257
Seismic monitoring[1]	558,204	555,413
Sub-Total	805,432	1,034,670
Total	**$3,085,686**	**$3,414,930**

Regulatory Performance Measures

Previously, ASNO has reported its Regulatory Performance in a stand-alone product available on the DFAT website.[2] This reporting has now been incorporated into the ASNO Annual Report.

Performance Measures:

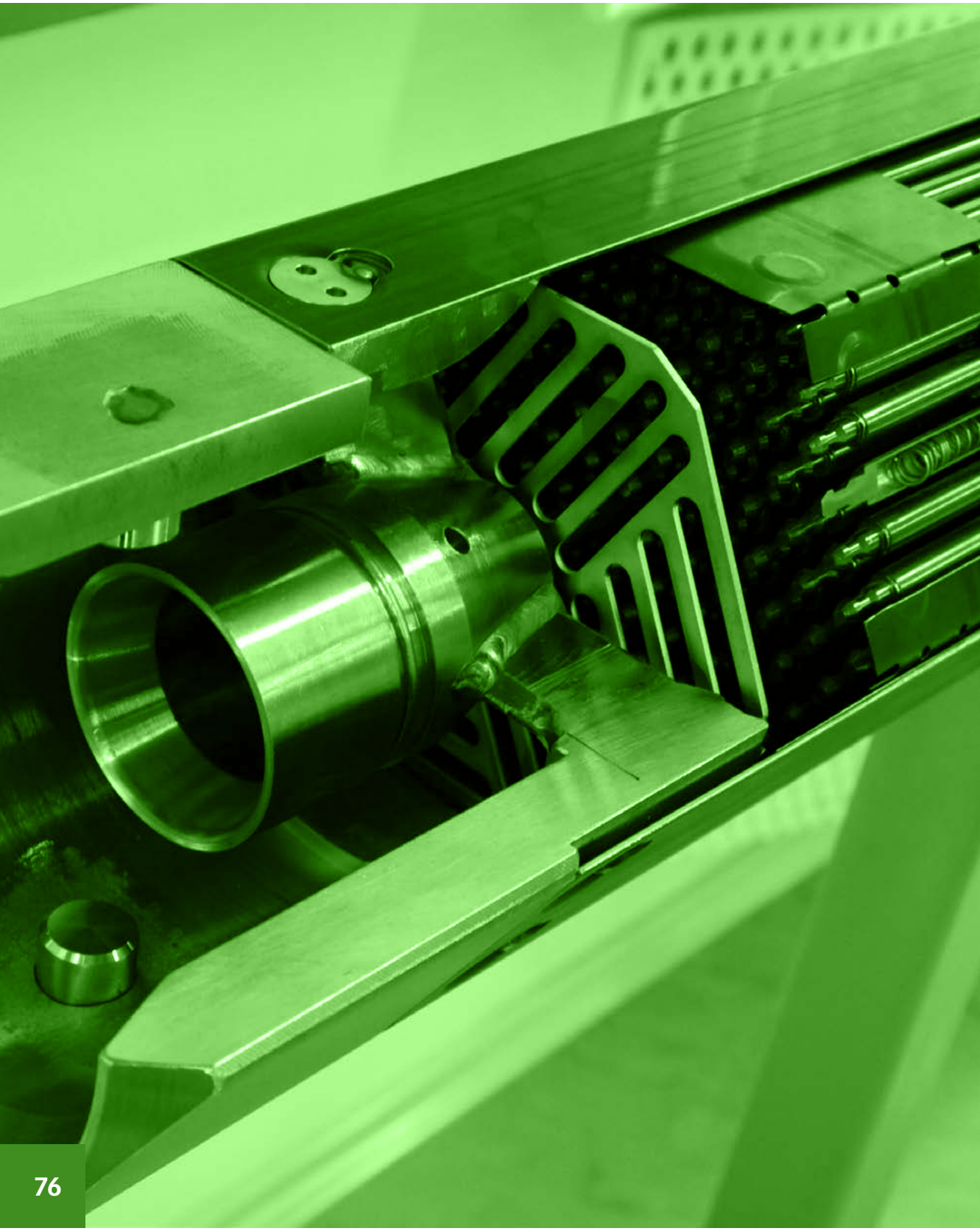
Measure	Performance
Processing of permits and approvals	
90% of nuclear permits to possess and transport nuclear material are processed (new, varied, revoked and expired) within 21 calendar days (See Outputs 1.1 and Output 1.2.)	Met
90% approvals for the transfer of uranium ore concentrate (UOC) internationally are within 7 calendar days (See Output 1.3.)	Met

1 Undertaken by Geoscience Australia.
2 https://www.dfat.gov.au/about-us/corporate/deregulation

Measure	Performance
90% of Schedule 2 or 3 chemical import permit applications are processed within 7 calendar days (See Output 1.5.)	Met
90% of Schedule 1 chemical import permit applications are processed within 43 calendar days (See Output 1.5.)	Met
90% of chemical facility permit applications processed within 21 calendar days (See Output 1.5.)	Met
International Inspections	
100% of IAEA inspections in Australia are facilitated by ASNO staff (See Output 1.1 and Appendix D.)	Met
100% of OPCW inspections in Australia are facilitated by ASNO staff (See Output 1.5.)	Met
Domestic Outreach/ASNO inspections	
Conduct outreach visits/ASNO inspections to ten or more regulated entities (including permit holders and relevant industry) (See Output 1.1, 1.2 and 1.5.)	Met
Transparent Implementation of Regulations	
ASNO Annual Report (https://www.dfat.gov.au/international-relations/security/asno/annual-reports)	Met
Publish Cost Recovery Implementation Statement for the Uranium Producers Charge (https://www.dfat.gov.au/sites/default/files/uranium-producers-charge-cost-recovery-implementation-statement.pdf)	Met
International Reporting	
Australia meets all its reporting requirements to the IAEA and the IAEA maintains the 'broader conclusion' for Australia that all nuclear material in Australia remains in peaceful use (See Output 1.1.)	Met
All exported Australian Obligated Nuclear Material (AONM) and Foreign Obligated Nuclear Material (FONM) are satisfactorily accounted for (See Output 1.3.)	Met
Australia implements best practice for nuclear security in Australia and maintains high standing as a world leader in nuclear security (See Output 1.2.)	Met
Australia meets all its reporting requirements to the OPCW (See Output 1.5.)	Met

Uranium Producers Charge

ASNO is responsible for the Uranium Producers Charge. This charge is payable to Consolidated Revenue Fund on each kilogram of uranium ore concentrate produced (set on 1 December 2018 at 13.5502 cents per kilogram). The charge rate was not changed in 2019, 2020 or 2021.



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Appendix A: Australia's Nuclear Cooperation Agreements

Table 17: Australia's Nuclear Cooperation Agreements at 30 June 2022[1]

Country / Region	Date of Entry into Force
Republic of Korea (ROK)	2 May 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[2]	3 February 2007
Russian Federation	11 November 2010
United States	22 December 2010
European Union[3]	1 January 2012
United Arab Emirates	14 April 2014
India	13 November 2015
Ukraine	15 June 2017
United Kingdom	1 January 2021

Note: The above list does not include Australia's Comprehensive 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 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 Several of the NCAs have been renegotiated over the years to keep them up to date. This list only includes the most recent NCAs for each country/region.
2 Australia has two agreements with China: one covering nuclear material transfers and one covering nuclear cooperation.
3 Euratom is the European Atomic Energy Community. The Australia-Euratom NCA covers all 27 Member States of the European Union.

Appendix B: Australia's Uranium Export Policies

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 Treaty on the Non-Proliferation of Nuclear Weapons (NPT);[4] have a Safeguards Agreement and Additional Protocol with the IAEA in force; and are within Australia's network of bilateral nuclear cooperation agreements. These nuclear cooperation agreements are designed to ensure IAEA safeguards and appropriate nuclear security measures are applied to AONM (Australian Obligated Nuclear Material) exported overseas, in addition to several supplementary conditions. Nuclear material subject to the provisions of an Australian nuclear cooperation agreement is known as 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 using 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 will be sought for transfers of AONM to third parties, enrichment to 20 per cent or more in the isotope ^{235}U, and reprocessing[5]
- 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 AONM in the country concerned
- detailed administrative arrangements will apply between ASNO and its counterpart organisation, setting out the procedures to apply in accounting for AONM
- regular consultations on the operation of the agreement will be undertaken
- provision will be made for the removal of AONM in the event of a breach of the agreement.

Australia currently has 25 bilateral nuclear cooperation agreements in force, covering 43 countries plus Taiwan.[6]

4 On 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.

5 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.

6 Euratom is the European Atomic Energy Community. The Australia-Euratom NCA covers all 27 Member States of the European Union.

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, and 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, nuclear consumption, and nuclear production
- knowledge of the fuel cycle in each country
- regular liaison with, and reconciliation and bilateral visits to, counterpart organisations
- regular liaison with industry
- IAEA safeguards activities and IAEA conclusions on each country.

Australia's Uranium Transhipment Security Policy

For States with which Australia does not have a bilateral nuclear cooperation agreement in force, but through which Australian uranium ore concentrates (UOC) are transhipped, there must be arrangements in place with those States to ensure the security of UOC during transhipment. If the State:

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

then arrangements on appropriate security can be set out in an instrument with less than treaty status.[7] Any arrangements of this kind are subject to risk assessments of port security. For States that do not meet the above requirements, treaty-level arrangements on appropriate security may be required.

7 See page 26 of ASNO's 2008–09 Annual Report for more details on the establishment of this policy.

Appendix C: The International Nuclear Fuel Cycle

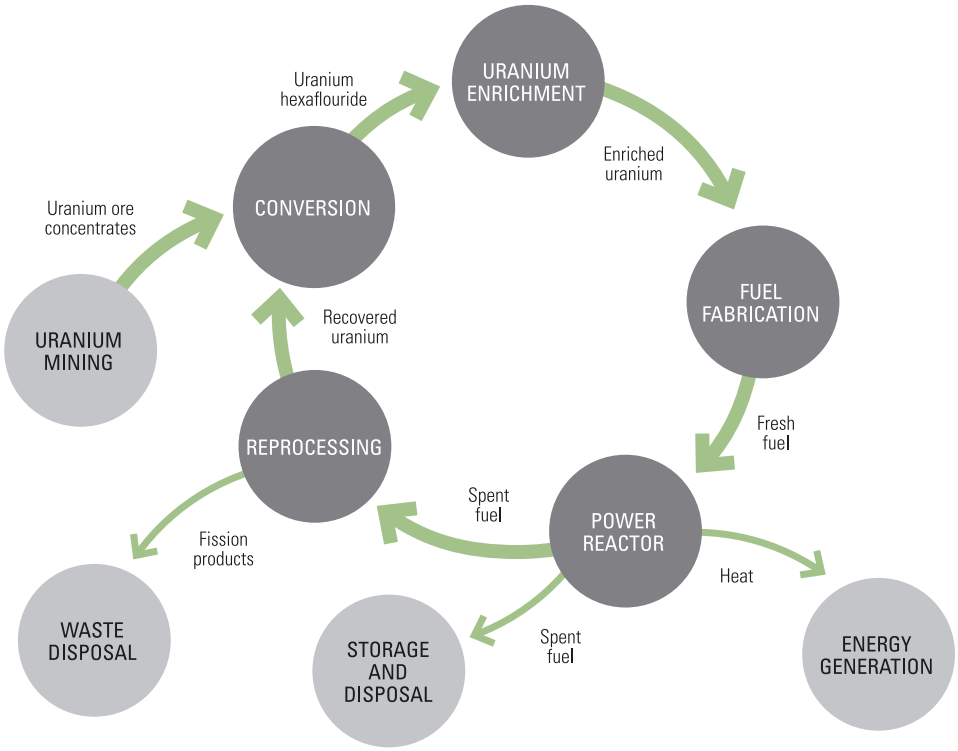
A characteristic of the nuclear fuel cycle is the international interdependence of facility operators and power utilities. It is unusual for a country to be entirely self-contained in the processing of uranium for civil use. Even in nuclear-weapon states, power utilities will often go to other countries 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 can 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.

Figure 4: Civil Nuclear Fuel Cycle



Appendix D: IAEA Statements of Conclusions and Other Inspection Findings for Australia in 2021–22

IAEA Inspection Regime in Australia

The IAEA conducts verification activities (under different names, but all essentially inspections) in Australia under the Comprehensive Safeguards Agreement[8] and under the Additional Protocol,[9] 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 four types of inspection conducted in Australia each year under the Comprehensive Safeguards Agreement:

- **Physical inventory verification (PIV):** a scheduled inspection in a selected material balance area (MBA)[10] to verify the stocktake of physical inventory (known as a physical inventory taking) from that MBA. PIVs involve a more complete verification of inventory than short notice random inspections (SNRI,[11] 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 (AS-F), ANSTO's R&D laboratories (AS-C), and ANSTO's storage areas (AS-D). PIVs for each MBA are scheduled together each year so the IAEA can complete all with one visit to Australia. In total these usually take five days to complete in conjunction with DIVs (see below). For MBAs AS-E, ASE1, ASE2 and AS-I, the IAEA schedules a PIV approximately once every four years for AS-E/ASE1/ASE2 combined, selecting one location (usually a university) taken as a representative sample of all such locations; and once every four years for one of CSIRO's locations in MBA AS-I. These PIVs are usually conducted in one day.
- **Interim inventory verification (IIV):** an inspection in a selected MBA to verify specific types of nuclear material, scheduled at a time other than the PIV. The IAEA conducted an IIV at ANSTO's R&D laboratories (AS-C) in August 2020 to measure the uranium content in solid waste from molybdenum–99 (Mo–99) radiopharmaceutical production using an active well coincidence counter (AWCC). It is anticipated that the IAEA will schedule an IIV approximately once every two years for AS-C.

8 See Schedule 3 of the Nuclear Non-Proliferation (Safeguards) Act 1987.
9 Published in IAEA document INFCIRC/217/Add.1 based on the model in INFCIRC/540 (corrected).
10 Australia's material balance areas for IAEA safeguards are described in Table 3 in Output 1.1.
11 ASNO uses the term 'short notice random inspections' for these inspections because they are performed on short notice on a date chosen by the IAEA at random. These inspections may also be referred to as 'random interim inspections' because they do not coincide with the ending date of a material balance period.

- **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):** an inspection to verify the correctness and completeness of the design features of a facility relevant to the application of safeguards. The IAEA typically conducts a few DIVs together with annual PIVs.

Under the Additional Protocol the IAEA has the right to conduct verification activities (essentially inspections) known as **complementary access**. A complementary access may have three purposes:

1. assuring the absence of undeclared nuclear material or activities in Australia (Article 4.a.i);
2. resolving any questions or inconsistencies related to the correctness and completeness of Australia's declarations under the Additional Protocol (Article 4.a.ii); or,
3. confirming the decommissioned status of a facility (Article 4.a.iii).

The IAEA has conducted a total of 90 complementary accesses in Australia since 1998.

Article 4.a.i complementary accesses are the most common. Since 1998 the IAEA has conducted 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 Lucas Heights site for other inspections (e.g. at ANSTO) can be conducted at any building on site with two hours' notice. Complementary access activities for locations outside Lucas Heights (e.g. universities, uranium mines) require a minimum of 24 hours' notice, however given the considerable distances in Australia are often issued with several days' notice. The IAEA typically conducts two to three complementary access activities in Australia each year, a few at buildings at Lucas Heights, and one outside of Lucas Heights.

IAEA Conclusions on Australia's Compliance

The IAEA's conclusions for Australia are provided at two levels: the IAEA's overarching summary of findings and conclusions published in the IAEA's Safeguards Statement for 2021 (see Appendix E) for all States with safeguards agreements with the IAEA, including Australia; and the statements of conclusions of inspections in Australia.

The highest level conclusion the IAEA draws, known as the 'broader conclusion', is in paragraph 1(a) of the Safeguards 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 2021. 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 Comprehensive Safeguards Agreement: the results of inspections at individual material balance areas (MBAs).
- **Article 91(b)** of Australia's Comprehensive Safeguards Agreement: the conclusions the IAEA has drawn from all its verification activities (headquarters analysis and inspections) in Australia for each individual MBA.[12]
- Statement of results of design information verification activities (DIVs).
- **Article 10.a** of the Additional Protocol: Statement on complementary access activities undertaken.
- **Article 10.b** of the Additional Protocol: Statement of results of activities in respect of any questions or inconsistencies the IAEA has raised with Australia.
- **Article 10.c** of the Additional Protocol: Statement on the conclusions the IAEA has drawn from all complementary access activities.

12 Note: under the standard NPT safeguards agreement printed in IAEA document INFCIRC/153 these provisions are in paragraphs 90(a) and 90(b). Australia's Comprehensive 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: 4 June 2020–3 June 2021

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Interim Inventory Verification	24–27 August 2020	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	27 October 2020
Design Information Verification	30 April 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory"	24 May 2021
Physical Inventory Verification	4, 8 and 9 June 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	27 July 2021
Design Information Verification	4, 8 and 9 June 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory"	27 July 2021
91(b) Statement of Conclusions (10 September 2021)			"The IAEA has concluded from its verification activities carried out at AS-C during the material balance period from 4 June 2020 to 3 June 2021, and based on the information available to date in connection with such activities, that all declared nuclear material has been accounted for and that there were no indications of the undeclared presence, production or processing of nuclear material."	

Material balance area: AS-C (research and development laboratories)
Material balance period: 4 June 2021–18 May 2022

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Physical Inventory Verification	19–20 May 2022	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	22 July 2022
Design Information Verification	19, 20 and 23 May 2022	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory"	22 July 2022
91(b) Statement of Conclusions		Not available at time of publication of this Annual Report		

Material balance area: AS-D (vault storage)
Material balance period: 3 June 2020–8 June 2021

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Physical Inventory Verification	9 June 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	12 August 2021
Design Information Verification	9 June 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory"	12 August 2021
91(b) Statement of Conclusions (3 September 2021)		The IAEA has concluded from its verification activities carried out at AS-D during the material balance period from 3 June 2020 to 8 June 2021, and based on the information available to date in connection with such activities, that all declared nuclear material has been accounted for and that there were no indications of the undeclared presence, production or processing of nuclear material.		

Material balance area: AS-D (vault storage)
Material balance period: 9 June 2021–17 May 2022

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Physical Inventory Verification	18 May 2022	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	1 July 2022
Design Information Verification	18 May 2022	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory"	1 July 2022
91(b) Statement of Conclusions		Not available at time of publication of this Annual Report		

Material balance area: AS-F (OPAL)
Material balance period: 2 June 2020–6 June 2021

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Short Notice Random Inspection	28 April 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	28 May 2021
Physical Inventory Verification	7 June 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	27 July 2021
Design Information Verification	7 June 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory"	27 July 2021

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
91(b) Statement of Conclusions (24 September 2021)			"The IAEA has concluded from its verification activities carried out at AS-F during the material balance period from 2 June 2020 to 6 June 2021, and based on the information available to date in connection with such activities, that all declared nuclear material has been accounted for and that there were no indications of the undeclared presence, production or processing of nuclear material."	

Material balance area: AS-F (OPAL)
Material balance period: 7 June 2021–16 May 2022

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Short Notice Random Inspection	8 December 2021	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	7 February 2022
Physical Inventory Verification	17 May 2022	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results from this inspection were satisfactory"	16 August 2022
Design Information Verification	17 May 2022	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory"	16 August 2022
91(b) Statement of Conclusions		Not available at time of publication of this Annual Report		

Material balance area: AS-H (SyMo)
Material balance period: N/A (nil nuclear material present)

Inspection activity	Date(s) of inspection	Inspection location	Statement of results	Date statement provided
Design Information Verification	23 May 2022	ANSTO	"Based on the activities conducted and the information available to date in connection with such activities, the results of the DIV were satisfactory"	25 July 2022

Additional Protocol Assessment Period: 1 January 2021–31 December 2021

Date of Complementary Access (CA)	Location	10(a) Statement of activities	Date statement provided
28 April 2021	Lucas Heights Science and Technology Centre: Buildings 80, 54	"The IAEA was able to carry out all planned activities during the CA"	18 June 2021
29 April 2021	Lucas Heights Science and Technology Centre: Buildings 88, 23A/B, 76	"The IAEA was able to carry out all planned activities during the CA"	18 June 2021
11 June 2021	CSIRO – Lucas Heights, NSW	"The IAEA was able to carry out all planned activities during the CA"	7 July 2021
15 June 2021	Honeymoon uranium mine (in care and maintenance, Boss Uranium)	"The IAEA was able to carry out all planned activities during the CA"	7 July 2021
9 December 2021	Lucas Heights Science and Technology Centre: 64, 64B, 64C, 64D	"The IAEA was able to carry out all planned activities during the CA"	3 February 2022
9 December 2021	Silex Systems Ltd – Lucas Heights, NSW	"The IAEA was able to carry out all planned activities during the CA"	3 February 2022
10(b) Statement of Activities (14 October 2021)	Thank you for the letter dated 6 September 2021 clarifying the activities at [named hospital]. ASNO's detailed description of the shielded cells at [named hospital] and the accompanying analysis of the cells' characteristics is sincerely appreciated. Based on the provided information, the IAEA could assess that the shielded cells do not meet the definition of hot cells as defined in the Additional Protocol Annex 1 paragraph XV.		

Date of Complementary Access (CA)	Location	10(a) Statement of activities	Date statement provided
10(c) Statement of Conclusions (9 March 2022)	"The IAEA has concluded from its activities carried out during this period, and based on the information available to date in connection with such activities that access pursuant to Article 4.a.(i) did not indicate the presence of undeclared nuclear material or activities at: • PN001 – ANSTO [Lucas Heights] * • Honeymoon Mine • PA091 – Silex LHSTC * Note that conclusions marked with an asterisk (*) are pending the results and evaluation of environmental samples."		

Additional Protocol Assessment Period: 1 January 2022–31 December 2022

Date of Complementary Access (CA)	Location	10(a) Statement of activities	Date statement provided
10 May 2022	Department of Defence waste store	"The IAEA was able to carry out all planned activities during the CA"	28 June 2022
12 May 2022	Olympic Dam mine	"The IAEA was able to carry out all planned activities during the CA"	23 June 2022
25 May 2022	Lucas Heights Science and Technology Centre: Building 3	"The IAEA was able to carry out all planned activities during the CA"	27 July 2022
10(c) Statement of Conclusions	10(c) statements of conclusions are provided early in the year following the assessment period		

Appendix E: IAEA Safeguards Statement for 2021[1,2]

This statement plus further details on safeguards implementation is available at: https://www.iaea.org/sites/default/files/22/06/statement-sir–2021.pdf.

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

'In 2021, safeguards were applied for 185 States[3,4] with safeguards agreements in force with the Agency. The Secretariat's findings and conclusions for 2021 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 thirty-two States had both comprehensive safeguards agreements and additional protocols in force:
   a. For 72 of these States,[4] 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 60 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 45 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 2021, eight 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.

1 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.
2 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.
3 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.
4 And Taiwan, China.

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 undeclared withdrawal from safeguards 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.

Appendix F: 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 https://www.dfat.gov.au/about-us/corporate/freedom-of-information/Pages/freedom-of-information.

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. Presentations include:

Stephan Bayer, Lyndell Evans, *Nuclear and Non-Nuclear Uses of Nuclear Material*, US DOE/INSEP Workshop with Papua New Guinea on International Nuclear Safeguards, 10–11 August 2021, Virtual.

Stephan Bayer, *Resilient Implementation of Safeguards – Australian Experience*, Institute of Nuclear Materials Management, European Safeguards Research and Development Organisation Joint Annual Meeting, August 2021, Virtual.

Kalman Robertson, Stephan Bayer, *The Australian Safeguards Support Program for IAEA Safeguards*, Institute of Nuclear Materials Management, European Safeguards Research and Development Organisation Joint Annual Meeting, August 2021, Virtual.

Kalman Robertson and Stephan Bayer, *Compass XML Code 10 Sharing Experience Activity*, IAEA COMPASS Webinar, September 2021, Virtual.

Vanessa Robertson, *Advocacy and Outreach to the Chemical Industry*, Eighth Annual Meeting of Representatives of Chemical Industry and National Authority of States Parties to the Chemical Weapons Convention, October 2021, Virtual.

John Kalish, *Legal and regulatory issues relevant to nuclear submarine operation*, National Security College, The Australian National University, Canberra, November 2021.

Lyndell Evans, Kalman Robertson, *Outreach to LOFs in Australia*, IAEA COMPASS SSAC Webinar, 16–18 November 2021, Virtual.

Lyndell Evans, Kalman Robertson, *Australia's Nuclear Material Licensing System*, IAEA COMPASS SSAC Webinar, 16–18 November 2021, Virtual.

Lyndell Evans, Kalman Robertson, *Outreach to LOFs in Australia*, IAEA COMPASS SSAC Webinar, 21–23 February 2022, Virtual.

Lyndell Evans, Kalman Robertson, *Australia's Nuclear Material Licensing System*, IAEA COMPASS SSAC Webinar, 21–23 February 2022, Virtual.

Kalman Robertson, *The Australian Safeguards Support Program: Update 2022*, Member State Support Programme (MSSP) Coordinators' Meeting, 3 March 2022, Vienna, Austria.

Vanessa Robertson and Michelle Kopac, *Australian Chemical Weapons Convention implementing legislation*, OPCW-Australia-Malaysia Partnership Program, Canberra, March 2022.

Vanessa Robertson and Michelle Kopac, *Permits and notifications*, OPCW-Australia-Malaysia Partnership Program, Canberra, March 2022.

Vanessa Robertson and Michelle Kopac, *Industry identification and outreach*, OPCW-Australia-Malaysia Partnership Program, Canberra, March 2022.

Vanessa Robertson and Michelle Kopac, *OPCW and ASNO inspections*, OPCW-Australia-Malaysia Partnership Program, Canberra, March 2022.

Vanessa Robertson and Michelle Kopac, *Australian Safeguards and Non-Proliferation Office Chemical (ASNOC) database*, OPCW-Australia-Malaysia Partnership Program, Canberra, March 2022.

Vanessa Robertson and Michelle Kopac, *Trade discrepancies*, OPCW-Australia-Malaysia Partnership Program, Canberra, March 2022.

John Kalish, *Legal and regulatory issues affecting the operation of nuclear submarines*, National Security College, The Australian National University, Canberra, April 2022.

John Kalish, *Legal and regulatory issues affecting the operation of nuclear submarines*, National Security College, The Australian National University, Canberra, May 2022.

Vanessa Robertson, *Australia-Malaysia Partnership Program*, 20th Regional Meeting of the National Authorities of States Parties in Asia, May 2022, Virtual.

Rohan Tepper, *The Australian Safeguards and Non-Proliferation Office – Regulation of Uranium Production and Exports*, South Australia Environmental Consultative Committee Meetings with Uranium Mines, May 2022, Virtual.

Glossary

Term	Description
Additional Protocol (AP)	An agreement designed to complement a state's safeguards agreement with the IAEA in order to strengthen the effectiveness and improve the efficiency of the safeguards system. The model text of the Additional Protocol is set out in IAEA document INFCIRC/540 (Corrected).
Asia-Pacific Safeguards Network (APSN)	A professional network that draws upon safeguards expertise in the Asia-Pacific to facilitate the exchange of safeguards information, knowledge, and practical experience among members in order to strengthen safeguards capabilities in the region.
AUKUS	An enhanced trilateral security partnership between Australia, the United Kingdom and the United States. AUKUS aims to build on the three countries' longstanding and ongoing bilateral ties to enable the countries to significantly deepen cooperation on a range of emerging security and defence capabilities.
Australian Nuclear Science and Technology Organisation (ANSTO)	ANSTO is the Australian public research organisation focused on nuclear science and technology with applications in health including radiopharmaceutical production, engineering, materials science, the environment and the nuclear fuel cycle. ANSTO's operations include the OPAL research reactor and ANSTO Nuclear Medicine (ANM).
Australian Obligated Nuclear Material (AONM)	Nuclear material exported from Australia and nuclear material derived therefrom, which is subject to obligations pursuant to Australia's bilateral nuclear cooperation agreements.
Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)	The Australian Government's primary authority on radiation protection and nuclear safety. ARPANSA regulates Commonwealth entities that use radiation with the objective of protecting people and the environment.
Australian Radioactive Waste Agency (ARWA)	Australia's radioactive waste management organisation. AWRA currently sits within the Department of Industry, Science and Resources. Later it will become a non-corporate Commonwealth entity based in Adelaide, South Australia.
Australian Safeguards Support Program (ASSP)	ASSP is one of 21 programs established by member States and the European Commission to assist the IAEA in safeguards research and development and is coordinated by ASNO.
Broader Conclusion (nuclear)	The IAEA can draw the 'broader conclusion' for a state as a whole that 'all nuclear material remains in peaceful activities'. This is a more fulsome assessment for a state than 'declared nuclear material remain in peaceful activities'.

Term	Description
Central Nervous System-Acting Chemicals (CNSACs)	Toxic (and potentially lethal) chemicals that target the central nervous system.
Challenge Inspection	(For CWC purposes) an inspection, requested by a CWC State Party, of any facility or location in the territory or in any other place under the jurisdiction or control of another State Party.
Chemical Weapon Production Facility (CWPF)	Provisions for dealing with chemical weapon production facilities are addressed in Article V of the CWC.
Chemical Weapons Convention (CWC)	Commonly used name given to the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction.
Complementary Access (CA)	The right of the IAEA, pursuant to the Additional Protocol, for access to a site or location to carry out verification activities.
Comprehensive Nuclear-Test-Ban Treaty (CTBT)	The CTBT bans all nuclear explosions – everywhere, by everyone. While there is almost universal adoption of the Treaty, it will not enter into force until the 44 States specified in Annex 2 have signed and ratified the Treaty.
Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO)	The Vienna-based international organisation established at entry into force of the CTBT to ensure the implementation of its provisions.
Comprehensive Safeguards Agreement (CSA)	Agreement between a state and the IAEA for the application of safeguards to all of the state's current and future nuclear activities (equivalent to 'full scope' safeguards) based on IAEA document INFCIRC/153 (corrected).
Convention on the Physical Protection of Nuclear Material (CPPNM)	CPPNM establishes physical protection measures that must be applied to nuclear material in international transport, as well as measures related to criminal offenses related to nuclear material.
Amended Convention on the Physical Protection of Nuclear Material (A/CPPNM)	The amended CPPNM additionally requires physical protection measures for nuclear facilities and material in domestic use, storage and transport. It also requires states to criminalize malicious acts involving nuclear facilities and material and expands State-to-State cooperation in responding to such acts.
Conversion	Purification of uranium ore concentrates or recycled nuclear material and conversion to a chemical form suitable for isotopic enrichment or fuel fabrication.
CWC-Scheduled Chemicals	Chemicals listed in the Annex on Chemicals 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.

Term	Description
Declaration Assessment Team (DAT)	An OPCW team established to engage the relevant Syrian authorities to resolve the identified gaps and inconsistencies in the Syrian declaration.
Defence Science and Technology Group (DSTG)	The Australian Government's lead agency responsible for applying science and technology to Defence and national security.
Democratic People's Republic of Korea (DPRK)	Also known as North Korea
Depleted Uranium (DU)	Uranium with a ^{235}U content less than that found in nature (e.g. the uranium contains less than 0.711% ^{235}U). Depleted uranium is usually the waste product of the uranium enrichment processes.
Direct-Use Material	Nuclear material defined for safeguards purposes as being usable for nuclear explosives without transmutation or further enrichment, e.g. plutonium, High enriched uranium (HEU) and ^{233}U.
Discrete Organic Chemical (DOC)	Any chemical belonging to the class of chemical compounds consisting of all compounds of carbon, except for its oxides, sulphides and metal carbonates, identifiable by chemical name, by structural formula, if known, and by Chemical Abstracts Service registry number, if assigned. Long chain polymers are not included in this definition.
Enrichment	A physical or chemical process for increasing the proportion of a particular isotope. Uranium enrichment involves increasing the proportion of ^{235}U from its level in natural uranium, 0.711%. For Low Enriched Uranium (LEU) fuel used in a power reactor the proportion of ^{235}U (the enrichment level) is typically increased to between 3% and 5%.
Euratom	Atomic Energy Agency of the European Union. Euratom's safeguards office, called the Directorate-General of Energy E – Nuclear Safeguards, is responsible for the application of safeguards to all nuclear material in Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden; and to all nuclear material in civil facilities in France.
Facility	(For CWC purposes) a plant, plant site or production/ processing unit. (For safeguards purposes) a reactor, critical facility, conversion plant, fabrication plant, reprocessing plant, isotope separation plant, separate storage location, or any location where safeguards-significant amounts of nuclear material are customarily used.

Term	Description
Fissile	Referring to a nuclide capable of undergoing fission by neutrons of any energy, including 'thermal' neutrons (e.g. ^{233}U, ^{235}U, ^{239}Pu and ^{241}Pu).
Fissile Material Cut-off Treaty (FMCT)	A proposed international treaty to prohibit production of fissile material for nuclear weapons.
Fission	The splitting of an atomic nucleus into roughly equal parts, often triggered by a bombarding neutron. In a nuclear reactor, a neutron collides with a fissile nuclide (e.g. ^{235}U) that then splits, releasing energy and further neutrons. Some of these neutrons go on to collide with other fissile nuclei, setting up a nuclear chain reaction.
Fissionable	Referring to a nuclide capable of undergoing fission by 'fast' neutrons (e.g. ^{233}U, ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{241}Pu and ^{242}Pu).
Geoscience Australia (GA)	Geoscience Australia is Australia's leading public sector geoscience organisation. GA conducts nuclear monitoring activities on behalf of the Australian Government agreed through a Letter of Understanding between ASNO and GA. GA is also involved in the installation and maintenance of some of the CTBT IMS stations in Australia and its territories.
Heavy Water (D_2O)	Water enriched in the 'heavy' hydrogen isotope deuterium (^2H) which consists of a proton and a neutron. D_2O occurs naturally as about one part in 6000 of ordinary water. D_2O is a very efficient moderator, enabling the use of natural uranium in a nuclear reactor.
High Flux Australian Reactor (HIFAR)	The 10 MWt research reactor located at ANSTO, Lucas Heights. Currently undergoing decommissioning.
High enriched uranium (HEU)	Uranium enriched to 20% or more in ^{235}U. Weapons-grade HEU is enriched to over 90% ^{235}U.
Hydroacoustic	The study and application of sound in water. One category of CTBT IMS station monitoring changes in water pressure generated by sound waves in the water.
Indirect-Use Material	Nuclear material that cannot be used for a nuclear explosive without transmutation or further enrichment (e.g. depleted uranium, natural uranium, LEU and thorium).
INFCIRC/153 (Corrected)	The model agreement used by the IAEA as a basis for comprehensive safeguards agreements with non-nuclear-weapon states party to the NPT.

Term	Description
INFCIRC/225 Rev.5 (Corrected)	The IAEA document 'Nuclear Security Recommendations on Physical Protection of Nuclear Materials and Nuclear Facilities'. Its recommendations reflect a consensus of views among IAEA Member States on desirable requirements for physical protection measures on nuclear material and facilities, that is, measures taken for their physical security.
INFCIRC/540 (Corrected)	The model text of the IAEA's Additional Protocol.
INFCIRC/66 Rev.2	The model safeguards agreement used by the IAEA since 1965. Essentially, this agreement is facility-specific. For NNWS party to the NPT it has been replaced by INFCIRC/153.
Infrasound	Sound in the frequency range of about 0.02 to 4 Hertz. One category of CTBT IMS stations will monitor sound at these frequencies with the aim of detecting explosive events such as a nuclear test explosion at a range up to 5000 km.
Integrated safeguards	The optimum combination of all safeguards measures under comprehensive safeguards agreements and the Additional Protocol to achieve maximum effectiveness and efficiency.
International Atomic Energy Agency (IAEA)	The IAEA is the world's centre for cooperation in the nuclear field and seeks to promote the safe, secure and peaceful use of nuclear technologies.
International Data Centre (IDC)	Data gathered by monitoring stations in the CTBT IMS network are compiled, analysed to identify events and archived by the Vienna-based IDC. IDC products giving the data about events are made available to CTBT signatories.
International Framework for Nuclear Energy Cooperation (IFNEC)	An international forum for cooperation on the use of nuclear energy for peaceful purposes that is efficient, safe and secure and does not aid proliferation.
International Monitoring System (IMS)	A network of monitoring stations and analytical laboratories established pursuant to the CTBT which, together with the IDC, gather and analyse data with the aim of detecting any nuclear explosion.
International Partnership of Nuclear Disarmament Verification (IPNDV)	IPNDV is an ongoing initiative of more than 25 countries with and without nuclear weapons. The Partners are identifying challenges associated with nuclear disarmament verification and developing potential approaches and technologies to address those challenges.
Investigation and Identification Team (IIT)	An OPCW team responsible for identifying the perpetrators of the use of chemical weapons in Syria.

Term	Description
Isotopes	Atoms of the same element with the same number of protons, but different numbers of neutrons, e.g. ^{235}U (92 protons and 143 neutrons) and ^{238}U (92 protons and 146 neutrons). While different isotopes of the same element behave the same in a chemical reaction, they behave differently in a nuclear reactions.
Light water	H_2O. Ordinary water.
Light water reactor (LWR)	A power reactor which is both moderated and cooled by ordinary (light) water. In this type of reactor, the uranium fuel must be slightly enriched (that is, LEU).
Low Enriched Uranium (LEU)	Low Enriched Uranium. Uranium enriched to less than 20% ^{235}U. Commonly, LEU used as fuel in light water reactors is enriched to between 3% and 5% ^{235}U.
Material Balance Area (MBA)	A delineation for nuclear accounting purposes as required under comprehensive safeguards agreements. It is a defined and delineated area in or outside of a facility such that: (a) the quantity of nuclear material in each transfer into or out of the material balance area can be determined; and (b) the physical inventory of nuclear material in the material balance area can be determined, in order that the nuclear material balance can be established for IAEA safeguards purposes.
Material Balance Report (MBR)	A formal report from a national safeguards authority to the IAEA comparing consolidated inventory changes in a given period with the verified inventories at the start and end of that period.
Material Unaccounted For (MUF)	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.
Mixed oxide fuel (MOX)	Mixed oxide reactor fuel, consisting of a mixture of uranium and plutonium oxides. The plutonium content of fresh MOX fuel for an LWR is typically around 5–7%.
Moderator	A material used to slow fast neutrons to thermal speeds where they can readily be absorbed by ^{235}U or plutonium nuclei and initiate a fission reaction. The most commonly used moderator materials are light water, heavy water or graphite.
Natural uranium	In nature, uranium consists predominantly of the isotope ^{238}U (approx. 99.3%), with the fissile isotope ^{235}U comprising only 0.711%.
Non-nuclear-weapon state(s) (NNWS)	States not recognised by the NPT as having nuclear weapons at 1 January 1967 when the Treaty was negotiated.

Term	Description
Nuclear material	Any source material or special fissionable material as defined in Article XX of the IAEA Statute (in practice, this means uranium, thorium and plutonium).
Nuclear-weapon state(s) (NWS)	States recognised by the NPT as having nuclear weapons at 1 January 1967 when the Treaty was negotiated, namely the United States, Russia, the United Kingdom, France and China.
NUMBAT	'Nuclear Material Balances and Tracking' – ASNO's custom built nuclear database used to fulfil reporting requirements under Australia's safeguards agreements with the IAEA, track Australian Obligated Nuclear Material (AONM) overseas, and maintain a register of permit holders, as required under the *Nuclear Non-Proliferation (Safeguards) Act 1987*.
Old Chemical Weapons (OCW)	Defined under the Chemical Weapons Convention as: • chemical weapons produced before 1925; or • chemical weapons produced between 1925 and 1946 that have deteriorated to such extent that they can no longer be used as chemical weapons.
On-Site Inspection (OSI)	A short-notice, challenge-type inspection provided for in the CTBT as a means for investigating concerns about non-compliance with the prohibition on nuclear explosions.
Open Pool Australian Light-Water reactor (OPAL)	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.
Organisation for the Prohibition of Chemical Weapons (OPCW)	OPCW is an intergovernmental organisation and the implementing body for the Chemical Weapons Convention based in The Hague, Netherlands. It oversees the global endeavour for the permanent and verifiable elimination of chemical weapons.
Other Chemical Production Facility (OCPF)	Defined under the Chemical Weapons Convention as all plant sites that: • produced by synthesis during the previous calendar year more than 200 tonnes of unscheduled discrete organic chemicals; or • comprised one or more plants which produced by synthesis during the previous calendar year more than 30 tonnes of an unscheduled discrete organic chemical containing the elements phosphorus, sulphur or fluorine.
Physical Inventory Listing (PIL)	A formal report from a national safeguards authority to the IAEA on nuclear materials inventories at a given time (generally the end of a Material Balance Report period).

Term	Description
Production	(For CWC purposes) the formation of a chemical through chemical reaction. Production of chemicals specified by the CWC is declarable, even if produced as intermediates and irrespective of whether or not they are isolated. (For safeguards purposes) Nuclear Production is the generation of special fissionable material through irradiation of fertile material in a reactor.
Provisional Technical Secretariat (PTS)	The PTS assists the CTBTO Preparatory Commission in the establishment of a global verification regime to monitor compliance with the CTBT.
^{239}Pu	An isotope of plutonium with atomic mass 239 (94 protons and 145 neutrons). ^{239}Pu is the fissile isotope of plutonium most suitable for nuclear weapons.
Radionuclide	An isotope with an unstable nucleus that disintegrates and emits energy in the process. Radionuclides may occur naturally, but they can also be artificially produced, and are often called radioisotopes. One category of CTBT IMS stations is used to detect radionuclide particles in the air. Other IMS stations are equipped with radionuclide noble gas technology to detect the abundance of the noble gas xenon in the air.
Reprocessing	Processing of spent nuclear fuel to separate uranium and plutonium from highly radioactive fission products.
Safeguards Inspector	For domestic purposes, a 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 IAEA inspections and complementary access in Australia.
Seismic	Referring to the movements of the earth and its crust that can be generated by, among other things, earthquakes, explosions and large impacts (e.g. meteors). The seismic component of the CTBT's IMS 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.
Small Quantities Protocol (SQP)	A protocol to a state's safeguards agreement with the IAEA, for states with small quantities of nuclear material and no nuclear facilities. The protocol holds in abeyance most of the provisions of the state's safeguards agreement.
Source Material	Uranium containing the mixture of isotopes occurring in nature; uranium depleted in the isotope ^{235}U; thorium; or any of the foregoing in the form of metal, alloy, chemical compound, or concentrates.

Term	Description
Special Fissionable Material (SFM)	^{239}Pu; ^{233}U; uranium enriched in the isotopes 235 or 233; any material containing one or more of the foregoing.
Standing Advisory Group on Safeguard Implementation (SAGSI)	An international group of experts appointed by, and advising, the IAEA Director General on safeguards implementation matters.
State-level approach (SLA)	A customised approach to implementing IAEA safeguards for an individual State. An SLA is detailed in an internal document developed by the IAEA Secretariat and is based on the State-level concept.
Technical Assistance Visit (TAV)	The Technical Secretariat of the OPCW can, through a TAV, provide technical assistance and technical evaluation to States Parties in the implementation of the provisions of this Convention, including evaluation of scheduled and unscheduled chemicals.
Treaty on the Non-Proliferation of Nuclear Weapons (NPT)	The Treaty on the Non-Proliferation of Nuclear Weapons, commonly referred to as the NPT, is an international treaty with the objectives of prevent the spread of nuclear weapons and weapons technology, promote cooperation in the peaceful uses of nuclear energy and to further the goal of nuclear disarmament.
^{232}Th	The only naturally occurring isotope of thorium, having an atomic mass of 232 (90 protons and 142 neutrons).
^{233}U	An isotope of uranium containing 233 nucleons, usually produced through neutron irradiation of ^{232}Th.
^{235}U	An isotope of uranium containing 235 nucleons (92 protons and 143 neutrons) which occurs as 0.711% of natural uranium.
^{238}U	An isotope of uranium containing 238 nucleons (92 protons and 146 neutrons) which occurs as about 99.3% of natural uranium.
United Nations Security Council Resolution (UNSCR)	Formal expressions of the opinion or will of United Nations organs.
Uranium ore concentrate (UOC)	A commercial product of a uranium mining and milling operation usually containing a high proportion (greater than 90%) of uranium oxide.
Weapons of Mass Destruction (WMD)	Refers to nuclear, chemical, biological and occasionally radiological weapons.

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