Australian Government

Ansto

Nuclear-based science benefiting all Australians

Annual Report

2016–2017

AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION

CHAIR'S LETTER

Australian Government | Ansto
Nuclear-based science benefiting all Australians

20 September 2017

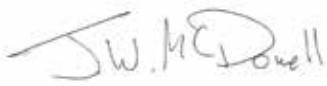
Senator the Hon Arthur Sinodinos AO
Minister for Industry, Innovation and Science
Parliament House
CANBERRA ACT 2601

I am pleased to present the Annual Report of the Australian Nuclear Science and Technology Organisation (ANSTO) for the period 1 July 2016 to 30 June 2017.

This report has been prepared in accordance with the requirements of the *Australian Nuclear Science and Technology Organisation Act 1987 (ANSTO Act)* and section 46 of the *Public Governance, Performance and Accountability Act 2013 (PGPA Act)*.

The report has been approved for presentation to you by a resolution of the ANSTO Board members on 10 August 2017.

Yours sincerely



James (Jim) McDowell
Chair

AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION
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www.ansto.gov.au

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ABOUT ANSTO

The Australian Nuclear Science and Technology Organisation (ANSTO) is one of Australia's largest public research organisations. The Federal Government has entrusted ANSTO with ownership and operation of over $1 billion worth of our country's landmark and national research infrastructure.

This includes the Open Pool Australian Light-water (OPAL) multi-purpose reactor, the Australian Synchrotron, the Centre for Accelerator Science (CAS), the Australian Centre for Neutron Scattering (ACNS) and the National Deuteration Facility (NDF).

More than 500 scientists, engineers and technicians work at ANSTO to answer significant questions relating to the environment, human health, the nuclear fuel cycle and industry using nuclear techniques. On average, ANSTO accommodates approximately 5000 national and international researchers and industry researchers each year.

ANSTO's strategic international collaborations ensure Australian scientists, through connecting researchers and industry to our infrastructure, are well placed to drive innovation for Australia. Partnerships include: agreements with the global fusion energy project, ITER; the Generation IV International Forum (GIF) charter; the European Organization for Nuclear Research (CERN); Research Centre Juelich (Germany); Helmholtz-Zentrum Berlin (HZB); Japan Atomic Energy Agency (JAEA); and Japan Proton Accelerator Research Complex (J-PARC).

These important partnerships give Australian scientists access to some of the world's most sophisticated research techniques, enabling discoveries that benefit Australia and the world.

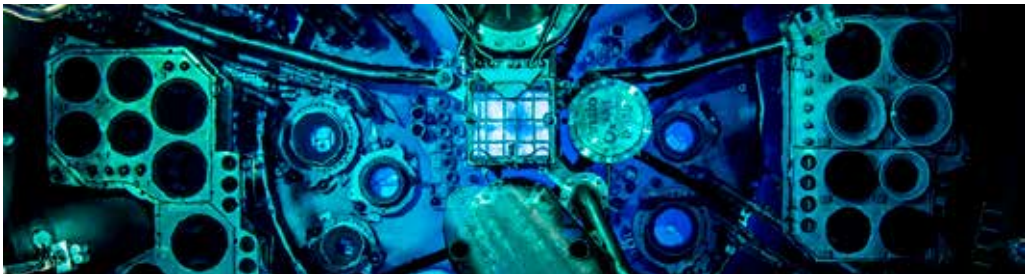
As part of enabling a strong national collaborative network, ANSTO is connected with Australian and New Zealand universities through the Australian Institute of Nuclear Science and Engineering (AINSE), providing researchers with access to Australia's nuclear science, technology and engineering expertise and landmark infrastructure which, in turn, facilitates greater national science collaboration.

ANSTO operates research facilities in three locations — Lucas Heights and Camperdown in Sydney New South Wales, and Clayton in Melbourne Victoria. At the heart of ANSTO's research capabilities are the state-of-the-art OPAL reactor, which is one of the world's most effective multi-purpose reactors and the Australian Synchrotron, a world-class research facility that uses accelerator technology to produce a powerful source of light (X-rays and infrared radiation) many times brighter than the sun.

OPAL is used for scientific research, the production of medical radioisotopes, and the irradiation of silicon for use in microelectronics and other specialised irradiations for research and industry.

OPAL also facilitates specialised research using a suite of 14 neutron beam instruments that comprise ACNS, where scientists apply neutron scattering techniques to solve complex research and industrial problems. Neutron scattering is a non-destructive research technique that enables scientists to see the internal structure of materials, helping researchers understand why materials have the properties that they do, providing new insights that can be applied to problems such as the development of renewable, clean energy technologies or new battery materials, and studying the structural integrity of materials such as railway tracks.

The Australian Synchrotron has 10 beamlines, which harness light to see the invisible structure and composition of materials from the macroscopic to the atomic – with a level of detail, speed and accuracy not possible in conventional laboratories. The Australian Synchrotron also



The OPAL multi-purpose reactor is used for a range of nuclear medicine, research and industrial applications.

supports a broad range of high-quality research, with applications ranging from medicine and nanotechnology through to manufacturing and mineral exploration.

ANSTO's CAS offers a suite of four accelerators — the 2MV Small Tandem for Applied Research (Star), the 10MV Australian National Tandem Research Accelerator (Antares), a 1MV low energy multi-isotope accelerator (Vega) and a 6MV tandem accelerator (Sirius). These facilities provide researchers with access to a suite of tools in one location including ion beam analysis and accelerator mass spectrometry for isotopic dating, air pollution, climate science, modification of materials for future nuclear reactors, radiation damage studies, forensic science, nuclear detector characterisation and microbiological studies.

ANSTO is central to Australia's nuclear medicine manufacturing capabilities. Each week ANSTO delivers over 10,500 patient doses of potentially lifesaving nuclear medicines to over 250 partner hospitals and medical practices across Australia and the region. On average, one in two Australians will benefit from the nuclear medicines that originate from ANSTO in their lifetime.

Construction of the $168.8 million ANSTO Nuclear Medicine Pty Ltd (ANM) facility will position Australia as a global leader in the high-end manufacturing of nuclear medicine used in over 45 million medical procedures globally each year to diagnose cancers, heart disease and skeletal conditions. ANM will secure Australia's supply of nuclear medicines for the domestic market, and deliver the ability to contribute significantly towards meeting international demand. Subject to required regulatory approvals, the facility will be operational in 2017.

The minerals industry relies on ANSTO for consulting and capacity development services in minerals processing. ANSTO also provides expert advice to the minerals sector on the safe treatment and disposal of radioactive waste and offers other specialised irradiation services.

Because of ANSTO, Australia has a strong international role in nuclear science and technology. As a member of the International Atomic Energy Agency (IAEA) Board of Governors, Australia is committed to the peaceful application of nuclear science and technology. ANSTO's long-term partnership with the IAEA has given our country important global responsibilities.

ANSTO is also leading the way in nuclear security in the areas of nuclear forensics, border protection detector technology and nuclear non-proliferation to ensure the peaceful uses of nuclear science and technology.

OPAL was one of the first reactors to use only low-enriched uranium, which is the safest available nuclear fuel because of its proliferation resistance. The production of molybdenum-99 (Mo-99), used in 80 per cent of nuclear medicine procedures, using a low-enriched uranium reactor and low-enriched uranium in starter material, has positioned Australia at the forefront of a global movement to reduce the use of highly-enriched uranium.

ABOUT ANSTO

Strategic priorities

ANSTO's strategic priorities for 2017–2018 are:

Putting people first
Equipping and empowering our people to respond to the growing nuclear science and technology needs of Australia and the world.

World class science and technology outcomes
Create innovative solutions to complex problems and provide new insights into our world.

Strategic management of landmark and national infrastructure
Realise opportunities, serve users and create value.

Nuclear expertise and advice
Provide expert, science and technology based advice and services to support Australia's nuclear policy.

ANSTO's business and innovation
Provide services and products to our customers that benefit the broader community.

Our vision

To deliver excellence in innovation, insight and discovery through our people, partnerships, distinctive competencies, nuclear expertise and landmark infrastructure.

Our Corporate Plan 2017–2018

ANSTO's Corporate Plan 2017–2018 is the enabling document for the organisation to implement strategic priorities and vision. Approved by the ANSTO Board and accepted by the responsible Minister, the plan is a public document, available via the ANSTO website.

Statement of Compliance

This report is written with reference to the *PGPA Act*.

Responsible Ministers

Ministers

The Hon Christopher Pyne MP
Minister for Industry, Innovation and Science
1 July 2016 to 19 July 2016

The Hon Greg Hunt MP
Minister for Industry, Innovation and Science
19 July 2016 to 24 January 2017

Senator the Hon Arthur Sinodinos AO
Minister for Industry, Innovation and Science
24 January 2017 to 30 June 2017

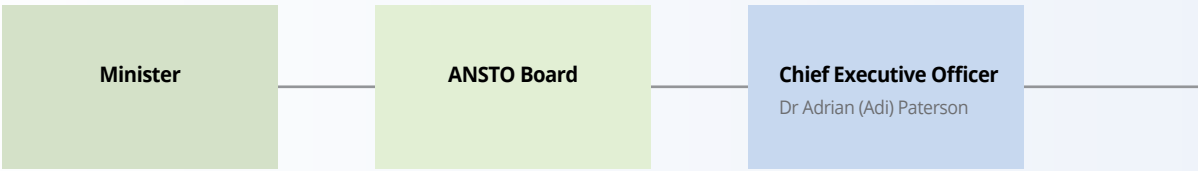
Senator the Hon Arthur Sinodinos AO
Minister for Industry, Innovation and Science

Assistant Ministers

The Hon Karen Andrews MP
Assistant Minister for Science
1 July 2016 to 19 July 2016

The Hon Craig Laundy MP
Assistant Minister for Industry, Innovation and Science
19 July 2016 to 30 June 2017

ORGANISATIONAL CHART



Group Chief Financial Officer
Mr Peter Arambatzis

Group Executive, Asset Management Services
Mr Michael Beckett

Group Executive, People Culture Safety and Security
Mr Rob Blissett

Group Executive, Nuclear Operations
Mr Lubi Dimitrovski

Group Executive, ANSTO Business
Mr Shaun Jenkinson

Group Executive, Engineering and Capital Programs
Mr Con Lyras

Group Executive, Nuclear Science & Technology and Landmark Infrastructure
Dr Simone Richter

MEMBERS OF THE BOARD

Mr James (Jim) McDowell

(Chair)
LL.B (Hons)

Independent business person with 35 years' experience in aerospace and defence, and former CEO BAE Systems Saudi Arabia.

Appointed
12 December 2013

Appointed Chairman
21 August 2014

Term concludes
11 December 2018

Ms Erica Smyth

(Deputy Chair and Risk and Audit Committee Chair)
MSc, FAICD, FTSE

Scientist and business person.

Appointed
12 December 2008

Reappointed
14 March 2013

Appointed Deputy Chair
21 August 2014

Term concludes
13 March 2018

Dr Adrian (Adi) Paterson

BSc, PhD

Chief Executive Officer and materials engineer.

Appointed
1 March 2009

Reappointed
1 March 2014

Reappointed
1 March 2017

Term concludes
28 February 2022

Emeritus Professor Stephen Buckman, AM

PhD, FAPS, FAIP, FinstP

Academic and researcher at ANU.

Appointed
13 August 2015

Term concludes
12 August 2020

Ms Penelope J Dobson

Dip Pharm, MPS, MBA, GAICD

Global pharmaceutical executive and business person.

Appointed
24 April 2014

Term concludes
23 April 2019

Professor Brigid Heywood

BSc (Hons), PhD

Deputy Vice-Chancellor (Research) University of Tasmania.

Appointed
28 June 2016

Term concludes
27 June 2021

Ms Carol Holley

BA, FCA, FAICD

Non-executive Director and Chair of Audit Committee of Australian Pharmaceutical Industries Limited, Chair of the Audit and Risk Committees of NSW Department of Finance, Services and Innovations, NSW Property and Housing Group, Service NSW, NSW Land and Housing Corporation, NSW Department of Parliamentary Services and National Health Funding Body.

Appointed
25 February 2016

Term concludes
24 February 2021

Professor Andrew Scott AM

MBBS (Hons), MD, FRACP, DDU, FAICD, FAANMS

Nuclear medicine physician, scientist, and academic.

Appointed
26 September 2007

Reappointed
29 September 2011

Reappointed
26 September 2016

Term concludes
28 September 2021

Professor Margaret Sheil AO

BSc (Hons), PhD, FRACI, FTSE, FANZSMS

Provost at the University of Melbourne. Previously Chief Executive Officer of the Australian Research Council (ARC).

Appointed
28 June 2016

Term concludes
27 June 2021

ANSTO EXECUTIVE LEADERSHIP TEAM

Dr Adrian (Adi) Paterson

Chief Executive Officer

Mr Peter Arambatzis

Group Chief Financial Officer

Mr Michael Beckett

Group Executive,
Asset Management Services

Mr Rob Blissett

Group Executive,
People Culture Safety and Security

Mr Con Lyras

Group Executive,
Engineering and Capital Programs

Mr Lubi Dimitrovski

Group Executive,
Nuclear Operations

Mr Shaun Jenkinson

Group Executive,
ANSTO Business

Dr Simone Richter

Group Executive,
Nuclear Science & Technology and
Landmark Infrastructure

CHAIR'S REPORT

It has been another year of notable achievements for ANSTO. This has been achieved at a time of general fiscal constraint meaning there are limited discretionary resources to expand services to the communities we serve. ANSTO continues to seek new partnerships and collaborations to amplify our contribution and benefits for Australia.

Most significantly, 2016–2017 saw the successful transfer and integration of the Australian Synchrotron into ANSTO with no adverse impact on its 1500 academic and industrial users. The Synchrotron supports a broad range of high-quality research and complements ANSTO's suite of national and landmark infrastructure. 2016–2017 also saw the commissioning of the facility's new Australian Cancer Research Foundation (ACRF) detector. Under ANSTO's leadership, we are already seeing progress with the development of this world class facility through achieving early success from an aggressive capital expansion project, BR—GHT.

ANSTO's complementary neutron scattering capabilities were also enhanced through the donation of a new neutron reflectometer, Spatz, from ANSTO's long-term partner, the renowned German Helmholtz-Zentrum Berlin. Spatz will be used for a wide range of applications in biomedicine, energy and materials science when it becomes available to users in late 2018.

In recognition of his thought leadership in innovation and science policy, ANSTO CEO, Dr Adi Paterson was invited to participate in the Expert Working Group which provided support to the Chief Scientist for Australia, Dr Alan Finkel AO, in the development of the 2016 National Infrastructure Roadmap. The Roadmap, which provides a comprehensive plan to support an Australian future of innovation, recognised the importance of maintaining the current facilities at the OPAL multi-purpose reactor, the Australian Synchrotron, the CAS and the NDF. It also recognised the need to enhance neutron beam capability at OPAL through additional beam capacity (second Neutron Guide Hall) for research, medical needs and for national sovereignty and global engagement.

ANSTO continued to play a critical role in the reliable supply of nuclear medicine to the Australian healthcare sector. Ahead of the ANM facility coming online, ANSTO upgraded its existing nuclear medicine processing facility, helping prevent a global shortfall in nuclear medicine supplies following the closure of the ageing Canadian National Research Universal reactor in October. Currently, ANSTO supplies approximately 15 per cent of the world's molybdenum-99 (Mo-99). Recognised as the world's most important nuclear medicine, Mo-99 is the base material used in the diagnosis of cancers, heart disease, muscular and skeletal conditions. I look forward to the opening of the new ANM facility later this year which will see production increase to 25 per cent of global demand, ensuring security of supply for Australian patients.

Strategic partnerships and international collaborations are critical to ANSTO's operations. ANSTO continued to pursue these opportunities throughout the year.

In September, ANSTO signed an agreement with the ITER International Fusion Energy Organisation. ANSTO will partner with the Australian National University and other Australian universities to provide ITER with access to Australia's unique expertise in fusion plasma physics and nuclear material engineering. Fusion technology holds the potential to deliver a large-scale and carbon-free source of energy, with very low levels of radioactive waste. Excitingly, ITER will be the first fusion device to produce more energy than it consumes.

In June, Australia became the fourteenth member of the Generation IV International Forum (GIF). This major international research program has the potential to develop reactor designs which will further Australia's non-proliferation and nuclear safety objectives. Australia's success in joining GIF is based on its ability to contribute in areas not previously available to the existing members, in particular ANSTO's world-class capabilities and expertise in nuclear materials engineering.

ANSTO will also be playing a larger role in the health sphere with the signing of a Memorandum of Understanding (MOU) with the Sri Lanka Presidential Taskforce for Prevention of Chronic

Kidney Disease. Chronic kidney disease of unknown aetiology (CKDu) is a significant public health issue in Sri Lanka. ANSTO will bring together experts to use its world-class research infrastructure, including the Australian Centre for Neutron Scattering and the Australian Synchrotron, to increase understanding of the disease. Specifically, ANSTO will facilitate research into the geological, hydrological, meteorological, demographic, and toxicology aspects of CKDu.

The Australian Government has announced it will invest in Australia's first particle therapy centre in Australia, a proton beam facility to be operated by the South Australian Health and Medical Research Institute. This investment is an important first step towards Australia establishing a national approach to delivering proton and carbon ion particle therapy. Particle therapy is a cutting edge treatment that destroys cancer non-invasively using charged ions. ANSTO is facilitating a national discussion on Australia's approach to particle therapy that encompasses the well established proton-based technologies, and the emerging carbon ion-based technologies. ANSTO has also assisted the NSW Government in developing the only proposal to date that would deliver a carbon ion particle therapy facility, at the Westmead medical precinct in Western Sydney.

I would like to thank my fellow Board members for their commitment throughout the year. I would also like to congratulate Professor Margaret Sheil for becoming an Officer of the Order of Australia, Professor Andrew Scott for becoming a member of the Order of Australia, and Dr Adi Paterson, who was awarded an Honorary Doctorate of Science by the University of Wollongong for his extensive national and international experience and impact in science, innovation, energy policy and the nuclear fuel cycle.

The ANSTO Board is strong with the right mix of skills to ensure ANSTO is able to continue to deliver excellence in innovation, insight and discovery.

James (Jim) McDowell
Chair

CHIEF EXECUTIVE OFFICER'S REPORT

ANSTO is the proud custodian of much of Australia's landmark and national research infrastructure, enabling some of the country's greatest minds to make ground-breaking scientific discoveries for the benefit of the Australian people, the economy and the environment.

This report demonstrates ANSTO's continued success in the effective deployment and use of our landmark and national research infrastructure for users, collaborators and partners — putting science and technology to work. At the heart of this key infrastructure are the OPAL multi-purpose reactor, and the Australian Synchrotron. ANSTO took ownership of the Australian Synchrotron during the reporting period. Both OPAL and the Australian Synchrotron achieved their 10 year operating milestones and are recognised as world class facilities.

For the second year in a row, OPAL achieved over 300 operating days at full power. This report card translates to 99 per cent reliability which places the reactor amongst the best of its kind in the world. This achievement is also critical to our ability to produce nuclear medicines that are benefiting some 10,500 patients across Australia every week.

During the reporting period, the Australian Synchrotron facility and staff were successfully integrated into ANSTO. The Australian Government's $520 million commitment provides secure operational funding to 2026.

This has galvanised Australia and New Zealand's research community to make commitments to a new suite of beamlines. As at 30 June 2017, 19 universities, government entities and publicly funded research agencies have committed $75 million in capital investment. ANSTO will commence building two new beamlines in 2017–2018. These new beamlines mark the start of an exciting, new capital expansion that will see eight new beamlines constructed, meeting the growing needs of the Australian and New Zealand research community.

2016–2017 also saw the commissioning of the Australian Cancer Research Foundation (ACRF) Detector at the Australian Synchrotron, which will significantly increase the speed at which cancer-related research can be conducted. These developments will significantly boost the Australian Synchrotron's capacity to deliver world-leading research outcomes across every discipline from medicine to manufacturing, agriculture to the arts.

Part of meeting our mandate to Australia is anticipating future challenges associated with visionary initiatives. During 2016–2017 we have advanced plans to develop an ANSTO Innovation Precinct which will co-locate industry, university graduates and scientific partners in an environment that fosters collaboration and is built around ANSTO's landmark research facilities.

Internationally co-location of leading research facilities, smart researchers, in partnership with universities and industry has provided a powerful incentive to innovation and leveraging outcomes from great companies.

ANSTO is very encouraged by the Australian Government's investment in Australia's first proton-based particle therapy facility in South Australia. This cutting edge technique delivers non-invasive highly targeted treatment for intractable cancers. We are proud to work with teams across Australia who can foresee this as a first step in the establishment of a national capability to bring the benefits of particle therapy to generations of Australians. Similarly we are very encouraged by the local uptake of lutetium-177 (Lu-177) in clinical trials. This therapeutic isotope, produced in OPAL is now provided to three trials and is part of an expanding range of new reactor produced isotopes globally.

Educating and engaging the community in nuclear science and technology is key to inspiring young people to pursue careers in STEMM (science, technology, mathematics and medicine) and achieving a society that is informed about the role nuclear science and technology plays in the Australian setting.

Throughout the year we continued to provide expert advice to the Australian Government on the full life-cycle management of radioactive waste. ANSTO supported the Department of Industry, Innovation and Science in engaging with and educating communities surrounding the nominated sites for the National Radioactive Waste Management Facility. This work is helping communities to make an informed decision regarding their community's ability to host such a facility.

I would like to congratulate all the recipients of the 2016 ANSTO's nuclear science and technology awards, formulated to recognise excellence amongst our staff. I congratulate our Board members, Professor Andrew Scott and Professor Margaret Sheil, on the Order of Australia awards they received during 2016–2017.

The journey to certainty of funding for the Australian Synchrotron had many able and committed supporters.

From the perspective of users, I would like to single out Professor Ian Smith who chaired the Funders Committee which was the custodian of the funds committed by institutions and governments during the uncertain period from 2014, and offer special thanks for his role.

Finally, I would like to thank ANSTO's staff and Executive Leadership Team; without their dedication and hard work, ANSTO's achievements would not be possible. I would also like to acknowledge the ANSTO Board for their good governance and strategic leadership.

ANSTO is well positioned, with the support of our partners and collaborators, to tackle some of Australia's and the region's most significant challenges. We look forward to increasing our reach and impact locally, nationally and globally, and continuing to deliver outcomes that benefit all Australians.

Dr Adrian (Adi) Paterson
Chief Executive Officer

Joint 10 year anniversary for ANSTO's landmark research infrastructure

In August 2016, OPAL reactor, Australia's only multi-purpose reactor, celebrated 10 years since first 'going critical' when it began producing neutrons through a self-sustaining fission reaction. OPAL is the world's first reactor to use only low-enriched uranium fuel and targets to produce nuclear medicines. This is a standard now being adopted around the world.

The OPAL multi-purpose reactor represents Australia's most significant investment in science and is central to Australia's landmark research infrastructure, enabling world class research, the production of nuclear medicines and the irradiation of silicon for the global semiconductor industry.

Also during 2016 OPAL achieved over 99 per cent reliability for the second year in a row. This means the reactor was operating at an optimal level for over 300 days or more during the past two calendar years. This reliability is vital to ensuring Australia's nuclear medicine supply chain and far exceeds the performance of other multi-purpose reactors around the world, including reactors and spallation sources.

The Australian Synchrotron, which moved under ANSTO's ownership in 2016, also celebrated 10 years since 'first light' in August 2016 – the moment when the first beam of electrons, travelling at close to the speed of light, was captured in the synchrotron's storage ring. A decade on from this occasion, the Australian Synchrotron is used for a wide variety of research purposes including human health, agriculture and manufacturing.

In addition, 2016–2017 saw the Australian Synchrotron facility and staff successfully integrated into ANSTO and the facility received a $520 million commitment from the Australian Government, providing operational funding to 2026.

This funding has resulted in 19 universities, government entities, and publicly funded research agencies committing $75 million in capital investment to construct a new suite of eight beamlines to meet the growing needs of Australian and New Zealand researchers.

(L-R) Craig Kelly MP, Craig Laundy MP, Yukiya Amano, Director General of the International Atomic Energy Agency (IAEA), Dr Adi Paterson, ANSTO CEO, Lee Evans MP and Pablo Maximo Abbate at the OPAL 10 year celebrations.

New detector for the Australian Synchrotron accelerates cancer research

In March 2017, a multi-million dollar detector for the Micro Crystallography (MX2) beamline was launched at ANSTO's Australian Synchrotron by the Minister for Industry, Innovation and Science, Senator the Hon. Arthur Sinodinos AO.

Akin to a turbocharged camera, the new detector can take images at a speed and accuracy currently not possible at any other Australian research facility. The detector will enable cancer researchers, medical research institutes, hospitals and universities to increase throughput on the beamline to 14 times faster, ultimately fast-tracking cancer research and improving patient outcomes.

The detector was made possible by a $2 million grant from the ACRF with additional contributions from Monash University, CSIRO, La Trobe University, New Zealand Synchrotron Group, the University of Western Australia, the Walter and Eliza Hall Institute of Medical Research, the University of Melbourne, the University of Queensland, the University of Sydney, the University of Wollongong, the Victor Chang Cardiac Research Institute, the University of Adelaide, the Australian National University (ANU) and ANSTO.

Currently, more than 60 per cent of all research conducted on the Australian Synchrotron's Micro Crystallography (MX2) beamline is dedicated to cancer research, helping scientists to understand and develop new drug targets and refine treatments for a disease that is the leading cause of death around the globe.

This new detector will take a beamline that was previously at full capacity and allow it to deliver more critical research.

AUSTRALIAN CANCER RESEARCH FOUNDATION

Below
The Australian Synchrotron building.

Right
The new ACRF detector.

Generation IV International Forum

ANSTO's capabilities and expertise led to Australia's membership of the prestigious Generation IV International Forum (GIF), a consortium of countries committed to working together on long-term research into advanced nuclear technologies.

Generation IV power reactors represent the next step in nuclear technology and are being developed to use fuel more efficiently with less radioactive waste production, enabling them to be economically competitive while meeting stringent standards of safety and proliferation resistance.

Australia's participation through ANSTO will enable our country to engage with research and development programs and ensure that Australia is kept abreast of new technologies and foster opportunities to engage with global information sharing exchanges.

ANSTO will contribute world-leading capabilities and expertise in nuclear materials engineering to GIF research and development programs.

Australia is required to accede to the GIF Framework Agreement before it is fully able to participate in the Forum's activities. ANSTO has led the treaty accession process, in consultation with the Department of Foreign Affairs and Trade and the Department of Industry, Innovation and Science.

Global fusion energy project — ITER

In September 2016, Australia became the first non-ITER member country to sign a technical cooperation agreement with ITER, the most significant scientific and engineering project under construction in the world.

ANSTO's CEO, Dr Adi Paterson signed the agreement with the Director-General of the ITER International Fusion Energy Organisation on behalf of Australia.

In signing the agreement, ITER acknowledged the benefits of engaging with world-class Australian experts in plasma imaging and materials engineering.

Planning for research collaborations between Australian parties and ITER is underway. As Australia's centres of fusion research and nuclear expertise, ANU and ANSTO are leading this planning process.

The agreement connects the Australian community of fusion experts with those from the European Union, China, India, Japan, Russia, United States and South Korea.

Scheduled to begin operations in 2025, ITER will be the first fusion device to produce more energy than it consumes. A magnetic fusion reactor harnesses the tremendous energy of fusion and captures heat in the walls of the reactor vessel.

Major components of ITER are being constructed by the member nations around the world and assembled at the ITER site in southern France.

ANSTO has collaborated on research relating to the superconducting cables used in the reactor.

Honours for ANSTO Board members

In 2017, ANSTO Board members Professor Andrew Scott received a Member of the Order of Australia Award (AM) in the Australia Day honours and Professor Margaret Sheil received an Officer of the Order of Australia (AO) in the Queen's Birthday honours.

Professor Scott received his AM in recognition of his significant service to nuclear medicine and cancer research as an academic and leading role in professional organisations.

Professor Sheil was honoured for distinguished service to science and higher education as an academic and administrator, through significant contributions to the national research landscape, and to performance standards.

Professor Andrew Scott received a Member of the Order of Australia Award (AM)

Professor Margaret Sheil received an Officer of the Order of Australia (AO)

Arrival of Spatz neutron beam instrument

In February 2017, ANSTO's newest neutron beam instrument, the 29 ton 'Spatz' neutron reflectometer, arrived at ANSTO's Lucas Heights campus after a two-month journey from Germany.

ANSTO negotiated the transfer of the instrument, formerly known as BioRef, from the BER-II Research Reactor at HZB in 2015 in addition to renewing an MOU for scientific collaboration with the renowned German research organisation in 2016.

Named for the German word for sparrow, Spatz uses a high-flux cold-neutron source and has the ability to use a whole new range of sample environments that are not available on the existing reflectometer, Platypus. The new instrument will expand capabilities in studying surfaces and interfaces at ACNS, following approval from Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the instrument will become operational in late 2018.

(L-R) Dr Simone Richter, Group Executive, Nuclear Science Technology & Landmark Infrastructure, Dr Anna Prinz, Ambassador of the Federal Republic of Germany and Dr Jamie Schulz, Leader of the Australian Centre for Neutron Scattering with the new Spatz instrument.

Meeting of minds on next-generation cancer treatment for Australians

In May 2017, ANSTO CEO Dr Adi Paterson, met with leading Italian expert Dr Sandro Rossi, Director-General from the National Centre of Oncological Hardron therapy in Italy and local experts, to discuss how a National Particle Therapy and Research Centre could provide Australians with access to the very latest in leading-edge technology to address difficult-to-treat cancers.

This discussion followed the Federal Government's announcement of a $68 million budget contribution to establish a proton therapy centre in Adelaide — an important first-step to establishing a capability to deliver particle therapies to treat cancers in Australia.

Proton therapy and the new cutting-edge carbon ion therapy, which is an innovative new proton therapy, are being used around the world including Italy to improve outcomes for patients with previously untreatable cancers.

Carbon ion therapy is an exciting development in the field of particle therapy, with patients requiring fewer treatments, experiencing fewer side effects and achieving better outcomes compared to current treatment options.

These discussions and the Senate Select Committee discussion into low survival rate cancers offer the opportunity to make significant advances in treating Australian patients with cancer who have few treatment options.

ANSTO's preferred model would see a central landmark national particle therapy and research centre for both life-changing patient treatment options and research, supported by state-based proton-based particle therapy facilities.

Back: Dr Adi Paterson (CEO, ANSTO), Leena Singh (Director, Strategic Business Development & Commercial Services, Western Sydney Local Health District, Danny O'Connor (Chief Executive, Western Sydney Local Health District), Prof Verity Ahern (Clinician, Princess Mary Cancer Centre Front: Dr Sandro Rossi (Director-General, National Centre of Oncological Hardrontherapy, Italy).

Australia and Sri Lanka sign partnership to fight chronic kidney disease

In May 2017, ANSTO signed an MOU with the Sri Lankan Presidential Taskforce for Prevention of Chronic Kidney Disease to assist in the fight against chronic kidney disease of unknown aetiology (CKDu).

CKDu is a major public health concern in many countries. According to the *Journal of Environmental Health and Preventative Medicine* (2014), CKDu affects around 100,000 people, and is linked to 5,000 deaths every year.

It is also a serious public health problem in other countries, particularly in Central America, and despite more than 20 years of study across the globe, it is not well understood. While CKDu appears to disproportionately affect poor rural male farmers in hot climates, the epidemiology remains unclear.

The World Health Organisation has identified several potential contributing factors, including heavy metals in drinking water, agrochemicals, heat stress, malnutrition and low birth weight, and also leptospirosis (a bacterial infection).

Under the agreement ANSTO, in association with other Australian researchers, will work with Sri Lanka to help identify causes and potential treatments for the disease.

Following the MOU signing, Sri Lanka's President Maithripala Sirisena visited ANSTO's Lucas Heights campus to tour OPAL and ACNS to discuss the partnership further.

This visit, hosted by the Minister for Industry, Innovation and Science, Senator the Hon Arthur Sinodinos AO, marked the first occasion a foreign head of state had visited ANSTO, reflecting the importance of ANSTO's world-class facilities and expertise in helping the fight against CKDu.

ANSTO continues to hold expert working group meetings and maintains regular contact with Sri Lankan counterparts to continue developing the project.

Sri Lanka's High Commissioner to Australia, H.E. Somasundaram Skandakumar (seated left), and the CEO of ANSTO, Dr Adi Paterson, signed the MOU. The signing took place at Australian Parliament House, Canberra, and was attended by Sri Lankan President His Excellency Maithripala Sirisena (standing left) and Australian Prime Minister the Hon Malcolm Turnbull MP.

Solutions for Australian industry

Insight may lead to design of superior metallic alloys

An international research collaboration led by scientists at City University of Hong Kong has explained a long-standing thermodynamic inconsistency in the formation of a class of metallic glass that may lead to the development of new, better metallic alloys.

The advanced properties of metallic glass make it suitable for medical devices, transformers and sports equipment.

The discovery of a hidden amorphous phase in palladium-nickel-phosphorus metallic glass is an important observation in glass physics, which may lead to opportunities to tune the properties in larger sizes for improved industrial applications.

The phase was revealed on an experiment on the Quokka instrument, while simultaneously recording thermodynamic information while the material was being heated.

This research, which included collaborators at Argonne National Laboratory and Hokkaido University was published in *Nature Communications*.

Quokka is a small-angle neutron scattering instrument at ANSTO's Australian Centre for Neutron Scattering (ACNS).

Improving the production of carbon fibres

New infrared imaging technology at the Australian Synchrotron Infrared Microspectroscopy (IRM) beamline, developed specifically for high-resolution surface analysis, has contributed to a better understanding of chemical changes that affect the structure of precursor material used in the production of high-performance carbon fibres.

A research collaboration led by Carbon Nexus, a global carbon fibre research facility at Deakin University, Swinburne University of Technology and the IRM beamline team at the Australian Synchrotron, published their research in the *Journal of Materials Chemistry A*.

The most significant scientific outcome of this study is that the critical chemical reactions for structure development were found to be occurring at a faster rate in the core of the fibre during heating, thus disrupting the more than 50-year-old belief that this reaction occurs at the periphery of the fibre due to direct heat.

Nuclear technique used to evaluate diets of farmed Pacific oysters

Environmental researchers at ANSTO, UNSW Australia and the New South Wales Department of Primary Industries have used stable isotope analysis to evaluate optimal diets and feeding regimes in Pacific oyster hatcheries, an industry estimated to be worth $50 million in Australia.

It is believed to be one of the first studies to use stable isotopes to investigate the appropriate micro-algal diets of bivalve larvae, assimilation of nutrients and their subsequent contribution to growth and survival during the time the oyster larvae are reared in the hatchery.

By comparing the stable isotopic ratios of carbon (^{13}C to ^{12}C) and nitrogen (^{15}N to ^{14}N) from bivalve larvae and microalgae, the study showed that specific species of microalgae, and a combined feed induced the best growth and survival of Pacific oyster larvae.

This principle could lead to the development of optimal diets for hatchery production of other oyster species.

Improving the health of Australia

Exploring new cancer treatments

An international collaboration between human health researchers at ANSTO, the Centre for Medical Radiation Physics at the University of Wollongong and the National Institute of Radiological Sciences, Japan, has undertaken research relating to carbon ion therapy, an advanced form of particle therapy treatment being proposed for introduction in Australia to treat currently inoperable brain tumours and prostate cancer amongst other diseases.

The study investigated the use of a beam of positron-emitting radionuclides for the precise delivery of non-invasive and highly conformal radiotherapy.

The radioactive beam matched the therapeutic performance of current non-radioactive heavy ion beams, but offers a greatly improved ability to verify the delivered dose distribution during treatment, through the use of in-beam positron emission tomography (PET) imaging.

A treatment room at the National Institute of Radiological Sciences' HIMAC Particle Therapy Facility in Chiba, Japan.

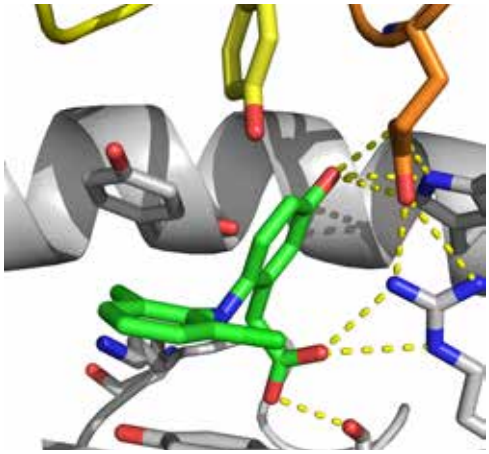
Understanding the immune response to common drugs

Australian researchers used the Australian Synchrotron to bring us a step closer to understanding immune sensitivities to well-known, commonly prescribed, medications.

Many drugs are successfully used to treat diseases, but can also have harmful side effects. While it has been known that some drugs can unpredictably impact on the functioning of the immune system, our understanding of this process has been unclear.

A multi-disciplinary team from Monash University, the University of Melbourne and the University of Queensland investigated what drugs might activate a specialised type of immune cell, the MAIT cell. They found that some drugs prevented the MAIT cells from detecting infections (their main role in our immune system), while other drugs activated the immune system, which may be undesirable.

The results, published in *Nature Immunology*, may lead to a much better understanding of, and an explanation for, immune reactions by some people to certain kinds of drugs. The findings may also offer a way to control the actions of MAIT cells in certain illnesses for more positive patient outcomes.



How a common anti-inflammatory drug affects MAIT cells, one of many findings in this study that could be mapped to atomic resolution.

Protein sheds light on Parkinson's disease, stomach cancer and melanoma

Australian and New Zealand researchers and scientists have shed light on a key protein present in diseases such as Parkinson's disease, gastric cancer and melanoma.

The MX beamline at the Australian Synchrotron was used by researchers from the University of Otago, in collaboration with Australian scientists, to study the structure of a protein, Apoptosis signal-regulating kinase 1 (ASK1) and determine how it gets turned off and on.

This particular protein plays an important role in controlling how a cell responds to cell damage, and can push the cell towards a process of programmed cell death for the good of the body, if damage to a cell is too great.

The findings add to our understanding of how cells can trigger specific responses to different threats or damage encountered, such as oxidants, which damage the body's tissues by causing inflammation.

Robbie Clarken (left) and Dr Tom Caradoc-Davies at the controls of the Australian Synchrotron's MX2 beamline.

Understanding our environment

International coastal pollution study

Australia is leading an international research project that will use isotopic and nuclear techniques to study coastal pollution at a number of global sites in developing and developed countries.

The research, which is being undertaken under the auspices of the IAEA as a coordinated research project, is expected to produce a series of pilot studies, a streamlined harmonised and validated methodology for sediment dating and reliable, high quality and comparable data on temporal trends of pollutants from coastal areas in different geographical locations.

The investigations will reconstruct the past status of the marine environments and identify the sources of pollution and identify trends.

Of the 29 countries that applied to participate, 11 were selected for inclusion in the four year project: Australia, Brazil, Kenya, Kuwait, Malaysia, Mexico, Morocco, Russia, Sri Lanka, Sweden and Vietnam.

ANSTO will lead a small team of environmental researchers who will undertake pollution studies at sites in Australia and Indonesia.

Study of polar ice confirms carbon-climate feedback

ANSTO has participated in a study that has verified and quantified the relationship between the Earth's land biosphere and changes in temperature. The study has provided evidence that temperature impacts the cycling of carbon between land, ocean and the atmosphere.

A high resolution ice core used in the study was collected by an ANSTO-led expedition to the Dome Summit South site in Antarctica, a small ice cap on the edges of the main East Antarctic Ice Sheet in 2005.

ANSTO helped with the dating of the core and with two other cores that were used indirectly in the research.

The polar ice contains air bubbles that preserve gases from the atmosphere, including CO_2.

ANSTO took measurements of the radiocarbon CO_2 bomb pulse — the doubling of the radioactivity of ^{14}C of atmospheric CO_2 that occurred during the 1950–1960s as a consequence of above-ground nuclear testing.

The bomb pulse is a powerful means of 'tuning' the CSIRO model of air diffusion and trapping in compacted snow overlying the impervious ice, that was used in the analysis.

These processes give rise to a spread of ages for each of the atmospheric gases trapped in air bubbles in the ice.

Measurement of the radiocarbon bomb pulse in these samples was only possible because of ANSTO's special capability for making precise ^{14}C measurements on samples that contain just a few micrograms of carbon at ANSTO's CAS.

The research was led by CSIRO. Other collaborating institutions included the University of Melbourne, the British Antarctic Survey, the University of East Anglia, the Australian Antarctica Division, the University of Tasmania and ANSTO.

The research was published in *Nature Geoscience*.

Dr Andrew Smith, with ice core, was part of a team that travelled to the Dome Summit South site in Antarctica.

Nuclear fuel cycle

New materials for next-generation molten salt reactors

ANSTO joined a Sino-Australian project and contributed significantly to research clarifying the origin of the superior mechanical properties in a new class of materials for use in the next generation of molten salt reactors (MSRs).

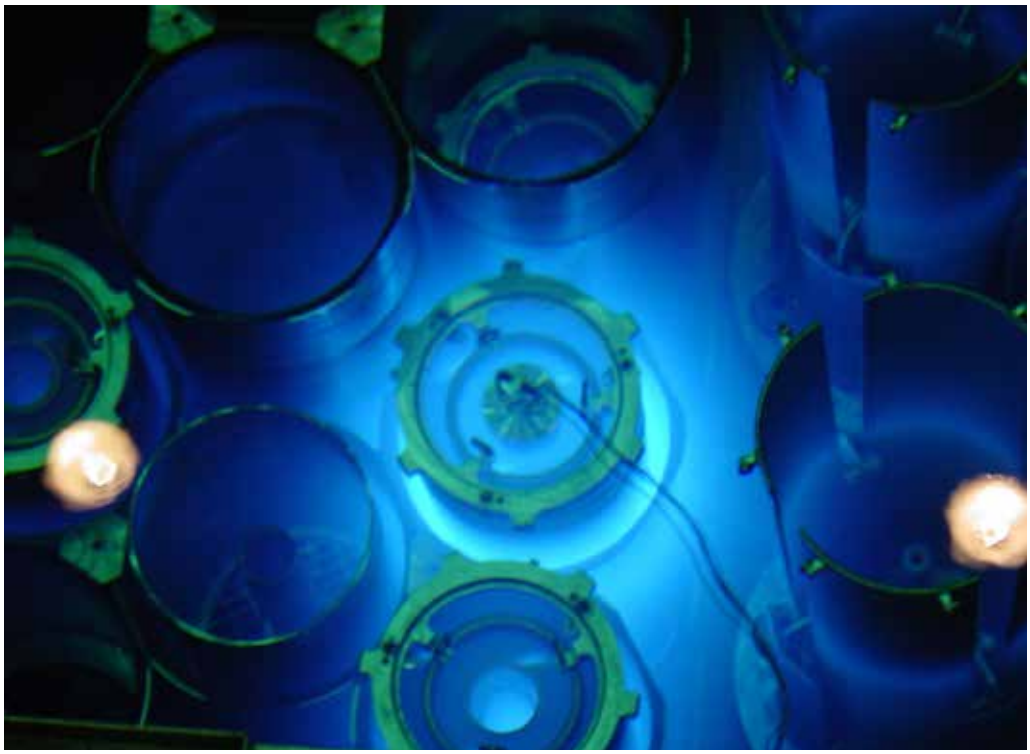
MSRs, advanced Generation IV concept reactors, have advantages over conventional nuclear reactors because of inherent safety, fuel cycle capabilities, efficiencies, and low operating pressure.

The newly developed class of NiMo-SiC alloys has the potential to be used not only in MSRs but also in concentrated thermo-solar energy systems, which also use molten salt as the heat transfer and heat storage medium. Structural materials for MSRs must demonstrate strength at high temperatures, be radiation resistant and also withstand corrosion.

There is a molten salt reactor and thorium energy research and development program at the Shanghai Institute of Applied Physics (SINAP). ANSTO has an international partnership agreement with SINAP.

The development of this new class of NiMo-SiC alloys was initiated at SINAP before being characterised at ANSTO.

In a paper published in *Materials and Design*, researchers from SINAP and ANSTO, reported that these novel NiMo-SiC alloys, prepared from nickel (Ni) molybdenum (Mo) metal powders with added silicon carbide (SiC) particles possess superior mechanical properties.



There has been renewed interest in molten salt reactors in recent years in large part due to the technology's inherent safety. Image source www.extremetech.com.

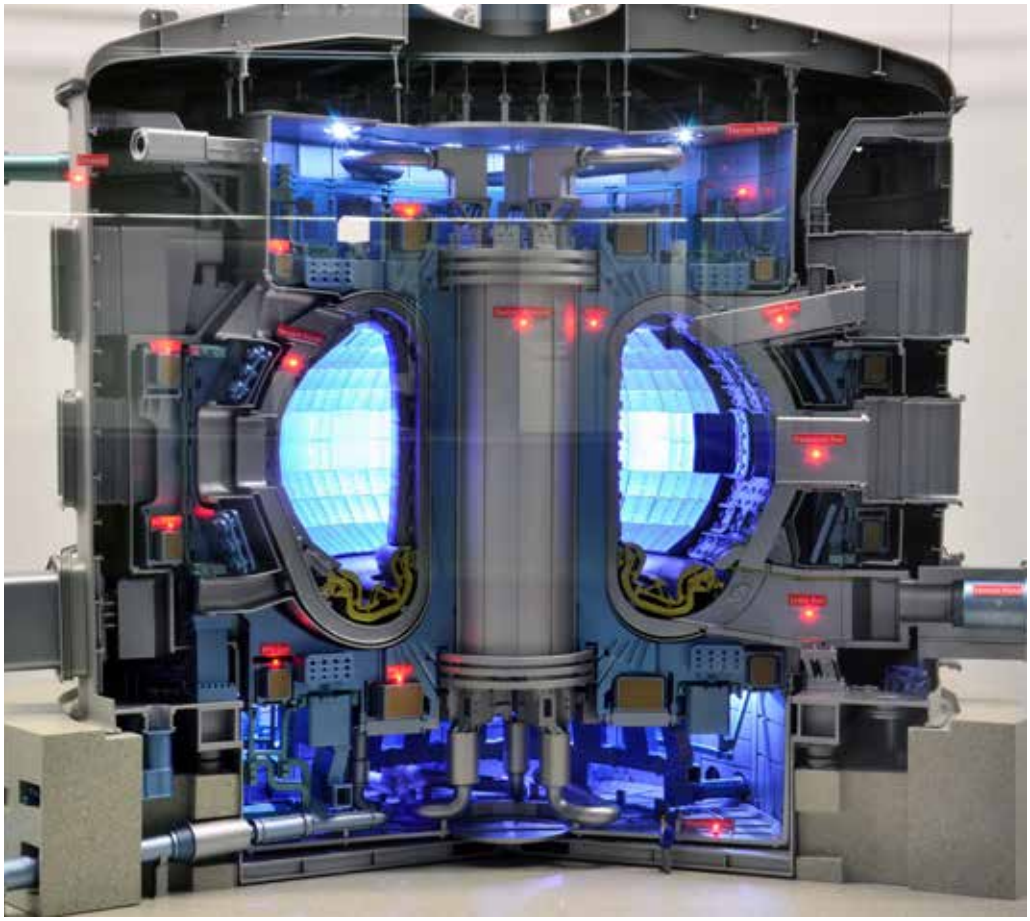
Improving superconducting materials for fusion reactors

ANSTO has participated in collaborative research investigating the microstructure and superconducting properties of a material made with isotopically pure boron, for use in the magnetic coils of nuclear fusion reactors, such as ITER.

An international group led by researchers at the University of Wollongong, who carried out the investigations at ANSTO, published in *Scientific Reports*, found that the superconducting compound Mg11B2 filament made with very low cost starting materials showed an optimal electrical transport current performance.

The result strongly supports the feasibility of replacing NbTi wires in highly radioactive fusion reactors with high performance and low radioactivity $Mg^{11}B_2$ wires.

ANSTO signed a cooperation agreement with ITER in September 2016 to collaborate on research in diagnostics, materials, superconducting technology, fusion plasma theory and modelling for the reactor.



A 1:50-scale model of the ITER Tokamak. Image source ITER.

OPAL

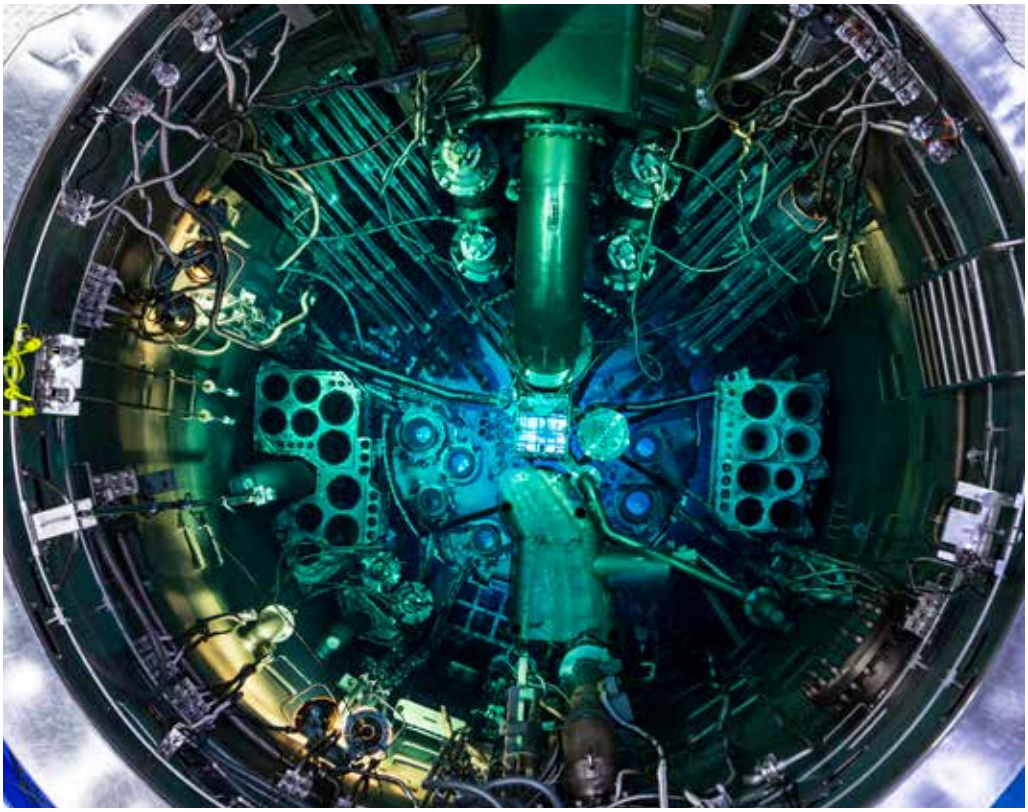
OPAL continues to build on its reputation as one of the world's most reliable and available multi-purpose reactors. In the 2016–2017 financial year, the OPAL reactor operated for 305 days out of a scheduled 305 days. This equates to a planned availability of 100 per cent and reliability of over 99 per cent.

Enhancements to specific plant and equipment used to handle, transfer and deliver irradiated targets have been completed to support increased reactor capacity and capability. These improvements support ANSTO's reputation as a reliable global supplier of radiopharmaceuticals.

Optimised Cold Neutron Source operations throughout the year have continued to boost capabilities for Australian scientists and industry clients. The Cold Neutron Source has operated with 100 per cent reliability, providing low-energy neutrons for research and facilitating the study of molecules such as proteins and polymers.

OPAL has established a high standard of safe and reliable operation through the implementation of an Asset Management Program which focuses on the strategic renewal and upgrade of plant and equipment to enable secure and sustainable long-term operation.

ANSTO has set a 300+ day target in 2017–2018 for the safe operation of the OPAL reactor to meet the increasing national and international radioisotope supply requirements. OPAL's multi-purpose design also allows for a sustained and high availability of neutrons to support ANSTO's research objectives.



OPAL's fuel assemblies (core) are cooled by purified water and are surrounded by a zirconium alloy 'reflector' vessel that contains a special type of water called heavy water.

Australian Synchrotron

One of ANSTO's landmark research facilities, the Australian Synchrotron has over 5000 users, including representatives from over 35 Australian and New Zealand universities as well as government agencies, departments, art galleries, museums and medical research institutes.

Over 200 companies are involved through partnerships, collaborations and contracts. The Synchrotron's commercial access program enables Australian industry to access the unique capabilities of synchrotron science by providing support from sample preparation through to experiment, analysis of data and reporting of outcomes.

Research highlights in 2016–2017 include:

- uncovering the detailed underpainting that lies beneath Edgar Degas' Portrait of a Woman using the Synchrotron's X-ray Fluorescence Microscopy beamline. The discovery has paved the way for the future analysis of priceless artworks;
- understanding the mechanism of how human leukocyte antigen (HLA) alleles play a role in protection against autoimmune diseases;
- an Infrared Microspectroscopy (IRM) study on the hormone-mediated bone regrowth.

The BR—GHT project at the Australian Synchrotron will expand the beamline offering from 10 to 18, thus increasing the scientific benefits enabled by the facility.

With future operational funding secured through the Federal Government's National Innovation and Science Agenda, the Australian Synchrotron has been working with key partners including universities, state governments, research institutes and publicly funded research agencies throughout 2016–2017 to secure funds for the capital program.

Funding for the first two beamlines (micro-computed tomography and medium energy X-ray absorption spectroscopy) has already been secured from early investors, enabling project kick-off in the 2018 financial year.

Contributing organisations will receive special access to the new beamlines for the first six years of operations. Work will continue throughout 2017–2018 to secure funds for the remaining beamlines.

The Australian Synchrotron is located in the Melbourne suburb of Clayton in Victoria.

Australian Centre for Neutron Scattering

ACNS which is partially funded through the National Collaborative Research Infrastructure Strategy (NCIRS) is home to 15 neutron beam instruments.

This year, ACNS hosted in excess of 500 users for over 1400 visits and also received the Spatz neutron reflectometer which was transferred from the BER-II Reactor in Germany.

Some highlights from Australian and international researchers utilising ACNS's neutron beam instruments include:

- visualisation of a stone tool made of chert that was found by archaeologists embedded in a limestone reef on Barrow Island, off the northwest coast of Western Australia using the Dingo neutron imaging instrument;
- measurement of the presence of an unusually long-range cycloidal spin order in Bismuth Ferrite using Taipan which has fantastic potential in the next generation of 'magnonic' data storage;
- determination of the structure of two large, complex silver nanoclusters of 136 and 374 atoms using Koala which have properties that are of particular interest for electronics and optics applications;
- determination of the structure of a new perovskite cathode material for a low-temperature solid-oxide fuel cell using Echidna that demonstrates outstanding and stable electrochemical performance below 500°C;
- understanding the structure, origin and formation of rock found deep in the Earth's crust and mantle using Wombat;
- characterisation of lanthanoid-polyoxometalate single-molecule magnets using Pelican that have potential for use as qubits in quantum computers.

Dr Nickolas de Souza using the Emu instrument at ANSTO's Australian Centre for Neutron Scattering.

Centre for Accelerator Science

CAS consists of four megavolt ion accelerators with 17 beamlines and end stations, and 10 ion sources. During 2016–2017, 132 research proposals were approved, involving 210 users from more than 30 different research institutions from Australia and overseas.

Significant achievements and highlights for CAS over the year include:

- the completion of a major 15-year study funded by the NSW Environment Protection Agency and the NSW Office of Environment and Heritage to apply accelerator-based nuclear techniques to characterise fine particle air pollution in the Sydney Basin. This study found that 60-80 per cent of the pollution in the winter months was due to wood burning for domestic heating particularly in the western suburbs. Fine particles from diesel buses, lorries and motor vehicles contributed a further 20 per cent to the pollution load. This data will greatly assist the EPA in producing strategies to reduce fine particle pollution into the future;
- CAS, together with international partners from Rudjer Boskovic Institute, Zagreb, Croatia, the University of Aveiro, Aveiro, Portugal, the Jozef Stefan Institute, Ljubljana, Slovenia, and the Quantum Science and Technology Institute, Takasaki, Japan were awarded a North Atlantic Treaty Organisation (NATO) project grant to work on engineering silicon carbide for enhanced border and ports security in the framework of the NATO Science for Peace and Security Programme;
- CAS staff performed radiocarbon analysis of ^{230}Th-dated corals from Heron Reef in the Great Barrier Reef and Moreton Bay in south-eastern Queensland that suggest there needs to be a major rethink of ocean circulation systems and how they affect climate change models.

CAS provides ion beam analysis and accelerator mass spectrometry capabilities to national and international researchers.

National Deuteration Facility

In 2016–2017, NDF which is partially funded through NCRIS, produced more than 84 deuterated molecules and supported more than 106 scientific users from 31 institutions.

Sixteen Australian universities and research institutes as well as the CSIRO used the NDF's capabilities to enable world class research. Leading international organisations accessing the NDF included the European Molecular Biology Laboratory (Germany), the neutron science facilities European Spallation Source (Sweden) and Institut Lau-Langevin (France) as well as the universities of Copenhagen, Freiberg, Glasgow, Kyoto, Auckland, Canterbury and Otago.

Some highlights from Australian and international researchers utilising the NDF include:

- structural analysis of bacterial proteins that are potential drug targets for treatment of urinary tract infections;
- characterisation of the regulation of bacterial proteins from oral bacteria implicated in rheumatoid arthritis;
- investigation of the CO_2 adsorption properties of new polymers to be used in molecular organic framework technologies for absorption of a range of gases either for sequestration or for storage of hydrogen fuel;
- characterisation of a new class of single molecule magnets (SMMs). SMMs are a focal point of magnetism research for discovery of structures which may find applications in data storage, quantum information processing and spintronic;
- production of labelled drug molecules to enable an Australian biotechnology company to trace the behaviour of drugs in pre-clinical trials;
- identification of unwanted foreign materials in production line samples of pharmaceuticals formulated in Australia.

Dr Anwen Krause-Heuer in the NDF laboratories. NDF offers molecular deuteration using either *in vivo* biodeuteration or chemical deuteration techniques.

Education

It was another year of growth and expansion of ANSTO's education and outreach programs.

Nationally, the Teacher Professional Development Program was delivered in the five mainland state capitals for the first time. This accredited training provided over 400 teachers with the knowledge and resources to better teach nuclear science in the classroom. Over 50 videoconference sessions were conducted many of which featured young and inspiring ANSTO scientists. There were also 200 applications from students across Australia for the inaugural Big Ideas Forum, a week-long experience at Lucas Heights for Year 10 students. This program has been instrumental in building stronger relationships with the various State education departments.

At Lucas Heights, the tour program remains popular and the school holiday program has grown with more children, more workshops and more variety. ANSTO is committed to encouraging students to pursue STEMM careers and has developed a program of activities under the banner of Next Gen STEMM which includes an interactive careers incursion (called the Future Vision quiz) currently provided to most Sutherland Shire High schools, and the Girls in the Lab workshop, an immersive science experience which has become a very popular gender equity program for Sutherland Shire secondary female students.

In Brisbane, ANSTO had a strong presence at the World Science Festival with the Fact or Fiction show opening the festival and key speakers including ANSTO CEO Dr Adi Paterson and Professor Andrew Peele, Director of the Australian Synchrotron participated in three other events.

ANSTO education programs continue to be featured internationally. ANSTO representatives spoke about our education and outreach approach at a side event of the IAEA General Assembly in Vienna and ANSTO has supported the development of nuclear programs in South East Asia by providing technical experts to workshops in Indonesia, Malaysia and Japan.

Participants in the Girls in the Lab workshop aimed at encouraging young women to consider a career in STEMM.

ANSTO is host to over 15,000 every year participating in educational tours and workshops at its Lucas Heights campus.

Sponsorship and events

ANSTO's sponsorships and events program covers three key categories: research, industry and community.

Through the program, ANSTO reaches a range of stakeholders from: the local, national and international communities; universities and research organisations; community groups; schools; industry; and government.

ANSTO uses sponsorship and event opportunities to build profiles, develop relationships with stakeholders and share information about the role ANSTO plays in contributing to health, the environment and industry.

This year, ANSTO continued its partnership with the Australian Museum including sponsoring the 2016 Science Week Science Festival and the ANSTO 2016 Eureka Prize for Innovative Use of Technology. The 2016 prize was awarded to a team from the University of Newcastle who have developed advances in plant-enzyme-assisted (PEA)-CLARITY tissue clearing technique, building a custom light sheet microscope and founding a new three-dimensional tissue clearing and light sheet microscopy facility.

ANSTO supported the Water Quality Monitoring of Kincumber Creek, where students are conducting water quality tests and collecting feathers as part of the ANSTO and University of New South Wales (UNSW) Feather Map of Australia Project. The students will present their data to the school and local community and communicate their findings in a display at the school during Science Week.

ANSTO continued its support of the Sutherland Shire community where its Lucas Heights campus is located including sponsoring the Sutherland Shire Australia Day festival; the Sutherland to Surf fun run, Menai Business District Awards, Wanda Nippers and the Cook Community Classic.

ANSTO also supported programs that highlight its role in health, including the Cancer Council Relay for Life event in the Sutherland Shire and Operation Art, a program by the Children's Hospital at Westmead and the New South Wales Department of Education that invites NSW schools to submit artwork for display in the children's hospital. The best works are displayed at the Art Gallery of New South Wales.

ANSTO supported a number of industry events such as Science at the Shine Dome run by the Academy of Science, Science meets Parliament, the Australian Academy of Technological Sciences and Engineering's (ATSE) Clunies Ross Awards and the Australian Nuclear Association Conference.

ANSTO engaged with potential scientific users and collaborators by supporting selected Australian and international conferences and workshops.

ANSTO sponsors a range of community events including the Cancer Council Relay for Life event in the Sutherland Shire.

Project Leader for the Feather Map of Australia citizen science project, Dr Kate Brandis, talking with young feather collectors about this innovative research initiative that is helping save wetland birds and their habitats.

Industry engagement

To align with the National Science and Innovation Agenda which was launched in late 2015, ANSTO has actively participated in an ongoing dialogue with the Department of Industry, Innovation and Science and implemented a number of initiatives, including:

- aligning ANSTO research themes and capability development to the national science and research priorities;
- establishing an Innovation Centre which hosts a knowledge transformation and innovation network to enhance collaboration between ANSTO, industry and the broader research community;
- working with AINSE to increase the number of research training opportunities for Australian students and conceptual forward planning towards an ANSTO Graduate Institute to deliver formal research training programs;
- collaborating with the CSIRO to develop an Industrial PhD program;
- maximising the value and effectiveness of ANSTO's world class landmark research infrastructure such as the OPAL reactor, the Australian Synchrotron, ACNS and CAS through the development of a new user access portal.

ANSTO has continued to engage with industry to develop solutions to business challenges and increase the commercial competitiveness of our research partners.

Noteworthy successes include the development of the MilGa diagnostic drug in collaboration with Minomic International. This collaboration involved developing a single-photon emission computed tomography (SPECT) agent for diagnosing prostate and pancreatic cancers from an antibody previously used within hospital pathology laboratories. The project resulted in a new nuclear medicine moving through the drug development pipeline from concept to first in human clinical trials within six months. The collaboration is continuing with ANSTO being the sole supplier of the drug to Minomic for the duration of the initial twelve patient clinical trials. ANSTO is currently in discussions with Minomic to develop a therapeutic drug based upon Minomic's antibody technology.

ANSTO is continuing an internal initiative to address the funding gap between research, product development and taking products to market, through an internal incubator program which sees technologies progressed through formation of virtual companies with their own management team, budget and governance board. Each venture is conducted over a 700 day period with review against agreed deliverables occurring every 100 days. The aim is to have a commercially sustainable venture at the conclusion of the 700 days.

Over the previous financial year, there are two continuing internal ventures incubating technology developed through ANSTO research, namely Synroc and Border Technologies.

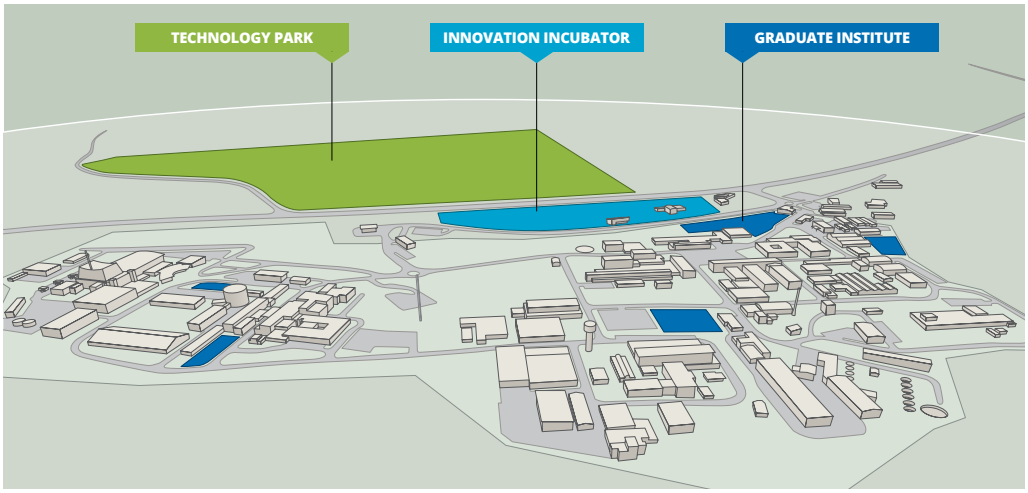
ANSTO has also adopted a new knowledge exchange and commercialisation strategy to best translate ANSTO's world class research outcomes into new products and services. This new approach draws upon the community; network and innovation programs being run within the Innovation Incubator that will open in 2017. The centre will be the first initiative in the ANSTO Innovation Precinct which will provide a home for innovation and entrepreneurship at ANSTO and the whole southern Sydney district. The centre will provide a dynamic co-working space, an entry point into the ANSTO Innovation community, including incubator and innovation programs, business support services and access to world class research outcomes.

The centre will also host a knowledge transformation and innovation network that supports engagement between innovative industry and the research community through monthly community events such as forums, debates and hackathons. Key players in the network are industry, particularly small to medium enterprises, university student accelerator programs, venture capital and angel investors and industry groups.

ANSTO actively encourages collaboration and partnerships with research organisations and commercial users and makes nuclear science and engineering resources available through merit based peer-reviewed, collaborative and commercial arrangements. 'Innovation sandpits' will also be used to assist academic and industry users in the use of nuclear science techniques to meet their research or commercial problems. This assistance can be in the form of experimental design, sample preparation, instruction and training in use of facilities and analysing data.

ANSTO scientists are actively encouraged to develop collaborations with academic and industry partners. This has resulted in cofounded positions and teaching appointments for ANSTO staff within universities and research institutes, such as the University of Sydney — Brain and Mind Centre.

ANSTO researchers have also been seconded for periods of time to companies on a consulting basis to work on commercial projects and internal ventures.



Concept layout for the proposed ANSTO Innovation Precinct at the Lucas Heights campus.

Businesses

ANSTO Health

ANSTO Health is the commercial division of ANSTO responsible for the reliable production and distribution of critical radiopharmaceuticals to nuclear medicine facilities across Australia. ANSTO Health plays an important role in the health of Australia, supplying over 10,500 patient doses of potentially lifesaving nuclear medicines each week. ANSTO Health undertakes this function efficiently, effectively and in line with best practice manufacturing principles.

The ANSTO Health business continues to grow with revenues increasing by 30.2 per cent compared to the previous year driven by increased sales of key products.

Exported Low Enriched Uranium Molybdenum 99

Mo-99 produced by ANSTO uses starter material containing low enriched uranium (LEU) and is irradiated in the OPAL reactor which uses LEU fuel, consistent with ANSTO's support for non-proliferation.

In the first quarter of 2016–2017, ANSTO Health implemented a project to increase capability from its existing Mo-99 production plant. This project subsequently provided ANSTO Health with more Mo-99 to meet increasing domestic demand for this important product. In addition, the project provided additional export product for ANSTO Health's international customers, ahead of transition to the new ANM facility.

Lutetium 177

ANSTO Health is licensed by the Therapeutic Goods Administration to manufacture lutetium-177 (Lu-177) for supply under the special access scheme and to clinical trials. This is an exciting addition to our current portfolio and will allow ANSTO to further support the Australian healthcare community. ANSTO has increased manufacturing capability from fortnightly to weekly operations and is currently providing Lu-177 for two key clinical trials including treatment of neuro endocrine tumours and combined with a PSMA (Prostate Specific Membrane Antigen) trial for the treatment of prostate cancer.

ANSTO Nuclear Medicine

ANM was established to own and operate the new LEU Mo-99 Production Facility. ANM is based at ANSTO's Lucas Heights campus, and will be co-located with SyMo, a waste management facility utilising ANSTO's Synroc technology.

The ANM Mo-99 project continued throughout the 2016–2017 year. The ANM building structure and services were completed by year end and significant progress achieved on the building and equipment control systems by the end of June. The majority of documentation for operating the plant has been completed and a submission made for the operating licence for the facility.

Mechanical testing, qualification and commissioning of the facility are the key remaining steps, followed by external audits. The latter are required to achieve final licensing and are expected in the next few months. Once the appropriate licensing process is completed, production will commence in late 2017.

The ANM building was completed during the 2016–2017 financial year.

Businesses (continued)

PETTECH Solutions

PETTECH Solutions Pty Ltd (formerly PETNET Australia Pty Ltd) is a wholly owned subsidiary of ANSTO that operates two medical cyclotrons for radiopharmaceutical production located at the Lucas Heights campus.

PETTECH routinely supplied NSW and ACT hospitals and other facilities, and continues to hold a strong market share, acquiring 100 per cent of new customers entering into the NSW ^{18}F-FDG market during the period. This is a result of consistently reliable supply of quality products and ongoing commercial support to customers to maximise their business. PETTECH delivered increased revenue earnings for 2016–2017 compared to the previous year.

ANSTO Silicon

Revenue from neutron transmutation doping (NTD) silicon irradiations in 2016–2017 was higher than the prior year. This is mainly due to a further increase in ANSTO's market share.

ANSTO continued to grow its market share by delivering high quality consistent irradiation services for our customer's silicon ingots. ANSTO's market share in the 2016 calendar year reached 49 per cent compared to 41 per cent in the prior year. This is a result of the continued focus on quality operations and customer needs. ANSTO is the leading provider of NTD silicon irradiation services globally.

The end use of this irradiated product, after further processing by the manufacturers, is in high end electronic switching devices. These devices are used in a range of applications such as power infrastructure, high-speed trains and to facilitate the development of energy from renewable sources such as wind.

Steady income and revenue from industrial irradiations of Ir192 discs which is also managed by ANSTO Silicon increased revenue by 20.5 per cent, compared with the previous year.

ANSTO Minerals

ANSTO Minerals provides consultancy and process development services for the minerals industry undertaking industry funded research to develop and improve processes for the treatment of ores containing, uranium, rare earths and other critical metals.

ANSTO Minerals also provides consulting services to minerals processing operations managing naturally occurring radioactivity (NORM), focussing on the management and mitigation of risks that may be associated with NORM.

ANSTO Minerals has established a strong reputation with its clients for high quality technical development, utilising its excellent facilities to allow the scale up of a range of unit operations including roasting, leaching, solid/liquid separation, multi-stage solvent extraction, ion exchange and precipitation. The benefits

ANSTO Minerals is an international consultancy, delivering innovative solutions to the minerals industry for more than 35 years.

accrue from both the technical expertise applied as well as the strong focus on delivering improved energy efficiency and overall economics of processing. ANSTO Minerals also has the only rare earth solvent extraction pilot plant outside of China capable of producing individual rare earth products of greater than 99.9 per cent purity. The team within ANSTO Minerals has grown its consultancy work in 2016–2017 undertaking a number of technology trade-off studies and providing input to pre-feasibility and feasibility studies covering a wide range of metals.

The ANSTO Minerals facilities are well placed to cater for the scale up from laboratory to a mini-pilot plant and to undertake larger, fully integrated pilot/demonstration plant work. In 2016–2017, integrated pilot plant studies were undertaken for a number of clients evaluating the recovery of zirconium, niobium, uranium, rare earths and lithium. ANSTO Minerals' earnings for 2016–2017 showed growth reflecting both a broad growth in development activity in the minerals sector along with the benefits of a broadened customer base from across the minerals industry.

ANSTO Radiation Services

Comprising of the Radiation Consultancy, Radiation Safety Training and Instrument Calibration groups, ANSTO Radiation Services is the leading provider of radiation protection services and advice in Australia.

There has been a commercial downturn in many sections of the radiation protection industry, but with a strong reputation and extensive practical experience across a broad range of radiation protection issues in industry, this year ANSTO Radiation Services has continued to maintain its strong revenue and profitability achieved during the previous year. Much of the focus has been on establishing longer term contracts with key clients including the larger scale characterisation and remediation of legacy buildings and sites, and the management of high activity sources, utilising a range of ANSTO's resources.

The team of experts at ANSTO Radiation Services provide a wide range of specialist radiation protection services.

International engagement

IAEA

ANSTO continued its commitment as an IAEA Collaborating Centre on 'Multianalytical techniques for materials research, environmental studies and industrial applications' through providing access to neutron beam instruments, the Environmental Radioactivity Measurement Centre and other ANSTO facilities. Activities carried out under the Agreement during the year used these state-of-the-art instruments, with ACNS being particularly active in hosting five scientists from developing countries. Training included measuring and evaluating residual stress using neutron and X-ray diffraction methods, and improving proficiency on powder diffractometry and radioanalysis of groundwater samples. The skills acquired will contribute to human resource capacity in the scientists' home countries.

IAEA
International Atomic Energy Agency

ANSTO continued to help Australia fulfil its obligation under Article IV of the Non-Proliferation Treaty to cooperate in the peaceful use of nuclear science and technology through ongoing coordination of Australia's contributions to the IAEA's Technical Cooperation (TC) Program. A senior ANSTO staff member is Australia's National Representative on the Regional Cooperative Agreement (RCA), an important component of TC. The RCA is an intergovernmental agreement of 22 IAEA Member States in East Asia and the Pacific, a revised version of which was agreed in 2015–16 (the 2017 RCA). During the year, ANSTO coordinated Australia's ratification of the 2017 RCA; Australia's instrument of acceptance was deposited with the IAEA in June. During the past 12 months, ANSTO participated in RCA projects in the areas of sustainable groundwater resource management, air pollution characterisation, and the assessment of the impact of routine and accidental releases of radioactivity into the marine environment. For the 2018–2019 project cycle, Australia successfully proposed three new projects. Two of these projects will involve ANSTO; one on coastal vulnerability to sea level rise, and the other on land management. Through the RCA, ANSTO is also supporting some of the IAEA's Small Island Developing States (SIDS) in the region e.g. Palau and Fiji, in their understanding, engagement and partnership building in the peaceful applications of nuclear science and technology.

Forum for Nuclear Cooperation in Asia

FNCA
Forum for Nuclear Cooperation in Asia

For the past eight years ANSTO has led a project aimed at identifying key aspects of safety management systems for nuclear facilities and to develop self-assessment and peer review methodologies for safety. Peer reviews of six regional nuclear facilities were carried out over the duration of the project (which finished in 2016), leading to demonstrable improvements to the safety of those facilities. In demonstrating ANSTO's ongoing commitment to the Forum for Nuclear Cooperation in Asia (FNCA), ANSTO, through the Environment team, is now leading a project on climate change science. There was an enthusiastic response from the member countries to participate in the project, a reflection of the importance of the topic to the FNCA member countries as the region grapples with the impact of climate change. The project will undertake nuclear and isotopic-based analyses that supports research into past climate change, and provide the expertise to interpret the new knowledge to better understand the mechanisms and processes of past climate variability.

Collaborating with Sri Lanka

In May 2017, ANSTO signed a MOU with the Sri Lankan Presidential Taskforce for Prevention of Chronic Kidney Disease, at Parliament House in Canberra. Under this MOU, ANSTO in association with other Australian researchers will work together with Sri Lanka to improve understanding of chronic kidney disease of unknown aetiology (CKDu). CKDu is a major public health concern in many countries, including Sri Lanka, and is linked to thousands of deaths every year. ANSTO's expertise in nuclear science and technology, landmark research infrastructure including the Australian Synchrotron and the ACNS, and connections to the broader Australian research community will be used to support identification of the causes of, and potential treatments for, this disease.

Following the MOU signing, Sri Lanka's President His Excellency Maithripala Sirisena, visited ANSTO's Lucas Heights campus to tour the OPAL Reactor and ACNS as well as to further discuss the partnership. This visit, hosted by the Minister for Industry, Innovation and Science, Senator the Hon Arthur Sinodinos AO, marked the first occasion a foreign head of state had visited ANSTO, reflecting the importance of ANSTO's world-class facilities and expertise in helping the fight against CKDu. ANSTO continues to hold expert working group meetings and maintains regular contact with Sri Lankan counterparts to continue developing the project.

Sri Lanka's President His Excellency Maithripala Sirisena (pictured centre) visiting the control room of the OPAL reactor.

Support to Government

As mandated by the *ANSTO Act*, ANSTO plays a vital role in providing expert and technical advice to the Australian Government on all matters relating to nuclear science, technology and engineering. ANSTO also plays a critical role in contributing to and informing policy making in these areas.

ANSTO's support for government and policy making is achieved through various mechanisms.

ANSTO maintains ongoing engagement with the Minister for Industry, Innovation and Science, the Department of Industry, Innovation and Science, other relevant Ministers and their departments, as well as key agencies and stakeholders.

Throughout 2016–2017, the Minister's Office and the Department were informed of significant events and important developments in a timely manner. ANSTO works with the Department on a daily basis, keeping them abreast of ANSTO's operations, achievements and activities, responding to requests for expert or technical advice regarding nuclear science and technology, and providing input into the formation of science, research and innovation policy.

ANSTO also regularly and proactively engages with the Chief Scientist of Australia, federal and state parliamentarians and local councillors, to update them on ANSTO activities as well as relevant developments in nuclear science and technology. In May 2017, ANSTO hosted a breakfast at Parliament House for over 80 federal parliamentarians and key stakeholders on its plans to develop an Innovation Precinct.

Importantly, ANSTO also made significant contributions to major policy inquiries and expert working groups to support Australian science and innovation policy making. These included the Chief Scientist's expert working group for the *2016 National Research Infrastructure Roadmap, the Independent Review into the Future Security of the National Electricity Market*, Innovation and Science Australia's *2030 Strategic Plan*, the Greater Sydney Commission's *2017 Draft South District Plan*, as well as other parliamentary inquiries.

ANSTO also continued to provide technical support and advice to the Federal Government for the National Radioactive Waste Management Facility (NRWMF) project. ANSTO's expertise stems from decades of experience in safely managing radioactive waste from the production of lifesaving nuclear medicines. Throughout 2016–2017, ANSTO welcomed several delegations from the local communities surrounding nominated sites to its Lucas Heights campus to help them gain a better understanding of Australia's nuclear industry and the kinds of wastes that will be managed at the NRWMF.

Expert advice and technical assistance was also provided to the South Australian Government's Nuclear Fuel Cycle Royal Commission. Upon request, ANSTO provided technical advice to the Royal Commission, the South Australian Government and the South Australian community through the South Australian Government's community roadshow, the Citizens' Jury process, and the South Australian Parliamentary Inquiry into the Royal Commission's findings.

ANSTO also continued to provide expert advice to the Foreign Affairs and Trade portfolio in relation to the peaceful uses of nuclear energy, nuclear security and nuclear non-proliferation.

Above:
Lucy Hughes Turnbull AO, Chief Commissioner (second from left) and Geoff Roberts, Deputy Chief Commissioner and Economic Commissioner (fourth from left) from the Greater Sydney Commission are given a tour of ANSTO's OPAL multi-purpose reactor by CEO Dr Adi Paterson and other ANSTO staff members.

Left:
Senator the Hon Matthew Canavan is shown the intermediate level waste cask currently being stored at ANSTO by CEO Dr Adi Paterson and other ANSTO staff members.

Partnerships and associations

Asia Oceania Forum for Synchrotron Radiation Research

The Asia Oceania Forum for Synchrotron Radiation Research (AOFSRR) is an association of all synchrotron operating and user nations in the Asian region. Its mission is to strengthen regional cooperation in, and to promote the advancement of, synchrotron research.

ANSTO has had a close association with the AOFSRR since its inception in 2006, when the then ANSTO-operated Australian Synchrotron Research Program joined as a foundation member representing Australia. Since 2012, ANSTO has served as the financial manager of the AOFSRR to facilitate the payment of membership fees by the eight full member nations.

The Australian Synchrotron hosted the first AOFSRR Synchrotron School in May-June 2017. More than 40 science and engineering graduate students, postdoctoral fellows and early career researchers from across the Asia-Oceania region attended the week-long school, learning about the theory and applications of synchrotron radiation for a wide range of science and technology research. The AOFSRR Council has endorsed the school as an annual event, with South Korea and Thailand agreeing to host the school in 2018 and 2019 respectively.

Australian Collaboration for Accelerator Science

The Australian Collaboration for Accelerator Science (ACAS) was established in 2010, between the four major accelerator centres in Australia: ANSTO, the ANU, the Australian Synchrotron and the University of Melbourne.

The mission of ACAS is to become an umbrella organisation for all megavolt accelerator systems in Australia. Its aim is to promote and grow the use and understanding of accelerator science activities in Australia, and to link with major international accelerator centres. Internationally, collaborative research projects with CERN, and with the Japanese free-electron laser facility at the Japan Synchrotron Radiation Research Institute (SPring-8), are ongoing.

Australian Institute of Nuclear Science and Engineering

Australian Institute of Nuclear Science and Engineering (AINSE) provides a platform for training and cooperation in the nuclear science and engineering fields. Its membership comprises 44 Australian and New Zealand universities and scientific organisations, including ANSTO, making it one of the few scientific institutions with such a wide membership. AINSE facilitates world class research and education in nuclear science and engineering and promotes the

use of ANSTO and other associated nuclear capabilities by offering scholarships in early career research and supporting training programs such as schools, conferences and workshops.

For the first time AINSE has begun offering industry and Individual memberships. ANSTO CEO Dr Adi Paterson has become the first AINSE Individual Member.

European Organization for Nuclear Research

ANSTO has a formal agreement with the European Organization for Nuclear Research (CERN) which allows respective scientists to collaborate together and receive reciprocal use of research infrastructure.

The agreement has enabled collaborative research in accelerator science, health and life sciences, information technology and radiation detection. By engaging with CERN, ANSTO and Australia are benefiting from cutting-edge research and are able to develop expertise in areas such as particle-therapy platforms and large-scale accelerator facilities.

Cooperative Research Centre for Polymers

ANSTO continued its involvement with the Cooperative Research Centre for Polymers (CRC-P), a national research cooperative of universities and research facilities that is assisting to boost Australia's $9 billion polymers industry.

The CRC-P brings science and industry together to develop products that meet emerging global needs in health therapies and delivery, water and food security, and low-cost solar energy using enabling advanced polymer technology.

Defence Science and Technology Group

ANSTO and the Defence Science and Technology (DST) Group (formerly the Defence Science and Technology Organisation) continue to engage on joint activities and projects, including ongoing cooperation to strengthen Australia's capability to deter, detect and respond to incidents that involve nuclear or other radioactive material.

Helmholtz-Zentrum Berlin

In October 2016, ANSTO renewed its MOU with the renowned large-scale German research organisation, Helmholtz-Zentrum Berlin (HZB) that further advances a program of collaborative scientific research on energy materials. The collaboration opportunities between ANSTO and HZB were further explored at a joint workshop on 'Perspectives for energy and materials science research within large scale facilities' at the HZB BESSY II site in Berlin in March 2017.

Under the agreement, the BioRef reflectometer from the BER-II Reactor was transferred to ANSTO in February 2017, making it the 14th neutron beam instrument installed at OPAL. As part of the new agreement, German users will have access to up to 10 per cent of its beamtime, once BioRef is installed and operating at OPAL. The new instrument will double the overall capacity for neutron reflectometry experiments at OPAL.

ITER

The ITER project, located in southern France, is a collaboration by 35 nations to build the world's largest tokamak, a magnetic fusion device that has been designed to prove the feasibility of fusion as a large-scale and carbon-free source of energy. ITER will be the first fusion device to produce net energy and to maintain fusion for long periods of time.

ANSTO, acting on behalf of the Australian fusion research community, has signed a research collaboration agreement with the ITER Organisation, which will allow researchers from designated Australian organisations to participate in ITER research projects, and to access ITER data and codes. The agreement was ratified by the ITER Council in July 2016 and signed by ITER Director General Bernard Bigot and ANSTO CEO Dr Adi Paterson in September. This is the first time that a nation outside of the ITER membership has been granted access to participate in the project. This development builds on ANSTO taking responsibility, in 2013, for the Australian membership of the International Energy Agency's Fusion Power Coordinating Committee. Five Australian Universities have signed subsidiary MOU's with ANSTO to formalise their participation in the ANSTO-ITER agreement: ANU, Curtin University of Technology, Macquarie University, the University of Sydney and the University of Wollongong.

ANSTO, ANU and the ITER Organisation are working to initiate two collaborative research projects under the new agreement: a fusion materials research project and the design of a coherence imaging system to be installed in the ITER tokamak reactor.

Japan Atomic Energy Agency

ANSTO continues its collaboration with the Japan Atomic Energy Agency (JAEA) for research and development regarding materials testing. The ongoing shutdown of Japan's research reactors following the Fukushima accident in 2011 has led JAEA to seek increasing cooperation with international neutron scattering facilities, including the ACNS at ANSTO.

Japan Proton Accelerator Research Complex

ANSTO undertook several activities under the MOU with the Japan Proton Accelerator Research Complex (J-PARC), which was signed in July 2015. In March 2017 an ANSTO expert participated in both a welding workshop and welding trials for the fabrication of the next generation target for the J-PARC spallation neutron source. ANSTO also assisted in J-PARC's efforts to establish chemical deuteration capabilities for the Japanese neutron scattering community by hosting a J-PARC staff member at the NDF.

Austin Health

ANSTO's partnership with Austin Health established a state-of-the-art PET Solid Targetry Laboratory at the Austin Hospital. The laboratory enables research into new nuclear imaging techniques to benefit patients affected by different types of cancers. The partnership provides a reliable and cost effective system for the production of relevant long-lived PET radionuclides which are suitable for the radiolabelling of biomolecules for research and clinical imaging applications. The partnership agreement was under review for renewal by ANSTO and Austin Health and was close to completion at the time of this report.

Macquarie University

An agreement between ANSTO and Macquarie University is helping geologists and scientists better understand everything from where earthquakes might occur to where gold is deposited. The partnership is promoting work to replicate environments located 400 kilometres beneath the Earth's surface. The study of the physical and chemical processes at these depths will provide a better understanding of the Earth, including how mineral deposits are formed. Furthermore, by providing a fuller working model of the processes that occur in the Earth's interior, scientists hope to better understand how to predict and anticipate geologic events such as earthquakes and volcanic eruptions.

This research makes complementary use of the ANCS' neutron beam instruments and high energy X-rays at the Australian Synchrotron. The team has commissioned a high pressure sample press on the X-ray Absorption Spectroscopy beamline at the Australian Synchrotron and conducted the first experiments.

Monash University

ANSTO's agreement with Monash University is helping facilitate knowledge sharing and creating new training and development opportunities for researchers in the areas of biomedical imaging, cancer therapy, accelerator science and neutron science.

National Institute for Materials Science (NIMS)

Two ANSTO groups visited NIMS in Japan to promote activities under the ANSTO-NIMS MOU. Two officers visited NIMS in October 2016 and discussed a range of potential joint activities and mechanisms for collaboration, and reviewed achievements to date under the MOU, including several successful NIMS experiments at the ACNS. Following on from this visit, two scientists from the Australian Synchrotron visited NIMS in March 2017, funded by the 'NIMS Global Collaboration Research Program' to discuss collaboration in the area of synchrotron science and technology.

RIKEN SPring-8 Centre, Japan

ANSTO has a MOU with the Japanese SPring-8 Centre that gives Australian scientists access to its world leading photon science facility – the SPring-8 Angstrom Compact free-electron Laser. The MOU was signed by ANSTO on behalf of the ACAS, so that its benefits extend to ANSTO's ACAS partners, namely the University of Melbourne, the Australian National University and the Australian Synchrotron.

Shanghai Institute for Applied Physics

ANSTO and SINAP have an ongoing MOU to recognise and enhance the mutual research links between two of the region's key nuclear science and technology organisations. SINAP hosted a team of 11 ANSTO leaders and researchers at the 5th ANSTO-SINAP workshop. Future collaboration opportunities were identified in a number of areas including nuclear materials, waste forms, reactor physics and synchrotron beamline design and instrumentation. SINAP also hosted the 2015 AOFSRR Conference immediately following the workshop, which was attended by six of the ANSTO delegation.

University of New South Wales

A collaboration between ANSTO, UNSW and the Centre for Nuclear Engineering at Imperial College, London, is delivering a nuclear engineering program, the only one of its kind in Australia. UNSW's Master of Engineering Science degree with a specialisation in Nuclear Engineering provides graduate students with the opportunity to train for a career in the nuclear industry. The program features contributions from national and international specialists in the nuclear engineering sector, including staff from ANSTO.

University of Sydney

ANSTO has a long standing MOU with the University of Sydney that covers a broad range of collaborative activity. One key area of collaboration is with the University's Brain and Mind Centre with whom ANSTO is a joint partner in a node of the National Imaging Facility. ANSTO operates the National Medical Cyclotron Research Facility as well as sharing advanced imaging capability. A key focus for the collaboration is to develop new radiotracers, instruments and scientific methods that extend the potential applications of molecular imaging in the future.

University of Tokyo

The Institute for Solid State Physics (ISSP) at the University of Tokyo and ANSTO have a MOU covering access by Japanese researchers conducting collaborative non-proprietary research, intended for publication in the open refereed literature, at the neutron beam facilities at the ACNS. The ISSP acts as a central funding agency for Japanese researchers to assist them in accessing international neutron scattering facilities.

University of Tsukuba

ANSTO and the University of Tsukuba in Japan have a formal collaboration which enables both to benefit from each other's expertise and experience in the areas of physics, materials science, nuclear science and technology, mathematical modelling and scientific computing, and allied disciplines. Materials science is a particular focus of this collaboration. During 2016–2017 ANSTO staff from CAS assisted with the installation of a 6MV accelerator at the University of Tsukuba, and helped resolve some technical issues. In addition, ANSTO's Nuclear Fuel Cycle researchers and CAS worked together on quantifying the defects in bulk ceramics and thin films using University of Tsukuba positron annihilation spectroscopy facility and expertise.

University of Wollongong

An ANSTO-University of Wollongong (UoW) Steering Committee was established in 2014–2015 to coordinate and develop the relationship between the two organisations. A second joint research seed funding scheme was run in 2016, for projects to be undertaken in 2017. The primary objective of the scheme continues to be to assist UoW and ANSTO researchers to form substantial research partnerships with visibility and prominence, both nationally and internationally. A total of $75,000 was awarded to six projects.

ANSTO hosted the annual ANSTO-UoW workshop on 9 June 2017, attended by about 50 researchers from both institutions. The program included updates from the 2015 seed funding projects, 11 short research presentations and a poster session.


AOF
Synchrotron Radiation


ACAS
Australian Collaboration for Accelerator Science


AINSE


CERN


Cooperative Research Centre for
Polymers


DST
GROUP


HZB
Helmholtz
Zentrum Berlin


iter
china eu india japan korea russia usa


JAEA


J-PARC


Austin Health


MACQUARIE
University


MONASH
University


NIMS


SPring-8


SINAP


UNSW
THE UNIVERSITY OF NEW SOUTH WALES


THE UNIVERSITY OF
SYDNEY


東京大学
THE UNIVERSITY OF TOKYO


筑波大学
University of Tsukuba


UNIVERSITY OF
WOLLONGONG

Awards and achievements

Professor Andrew Scott AM

Order of Australia Award (AM)

In January 2017, ANSTO Board member Professor Andrew Scott was admitted as a member of the Order of Australia for his significant service to nuclear medicine and cancer research as an academic, and to professional organisations.

As a renowned medical specialist, Professor Scott holds several prestigious positions including President of the World Federation of Nuclear Medicine and Biology, Scientific Director of PET at the Department of Molecular Imaging and Therapy, Austin Health and Laboratory Head at the Olivia Newton-John Cancer Research Institute, Melbourne.

Professor Scott has been an ANSTO Board member since 2007.

Professor Margaret Sheil AO

Officer of the Order of Australia (AO)

Professor Margaret Sheil was admitted as an Officer of the Order of Australia in the June 2017 Queen's Birthday honours for distinguished service to science and higher education as an academic and administrator, through significant contributions to the national research landscape, and to performance standards.

Professor Sheil has been University of Melbourne Provost since 2012 and was previously CEO of the Australian Research Council (ARC), 2007–2012, and University of Wollongong Deputy Vice-Chancellor (Research), 2005–2007 and Pro Vice-Chancellor 2002–2005.

Professor Sheil is an ATSE Director and has served on the Prime Minister's Science Engineering and Innovation Council; the National Research Infrastructure Council and the Co-operative Research Centres Committee.

Dr Adi Paterson

Honorary Doctor of Science by the University of Wollongong

In April 2017, ANSTO CEO Dr Adi Paterson was awarded an Honorary Doctor of Science by the University of Wollongong at the University's autumn graduation ceremony.

Dr Paterson, who has a PhD in Engineering, was recognised for his extensive national and international experience and impact in science, innovation, energy policy and the nuclear fuel cycle.

Professor Andrew Peele

President of the Australian Institute of Physics

In February 2017, the Director of the Australian Synchrotron, Professor Andrew Peele was appointed President of the Australian Institute of Physics.

The Australian Institute of Physics is dedicated to ensuring that the broader community understands the important and enduring role physics has in our world.

Dr Richard Garrett

2016 ANSTO NUCLEAR SCIENCE AND TECHNOLOGY AWARD-

Award for Sustained Contribution

ANSTO's Dr Richard Garrett received the 2016 ANSTO Nuclear Science and Technology Award – Award for Sustained Contribution for his leading role in the development, construction and operation of the world-class Australian Synchrotron.

Dr Garrett was instrumental in the Australian Synchrotron from its earliest stages, and continues to guide its national and international success.

MILGAa team and SAXS/WAXS beamline team

2016 ANSTO NUCLEAR SCIENCE AND TECHNOLOGY AWARD-

George Collins Award for Innovation

The MILGAa and SAXS/WAXS beamline teams shared the 2016 ANSTO Nuclear Science and Technology Award – George Collins Award for Innovation.

The MILGa team consisting of Nigel Lengkeek, Maxine Roberts, Tien Pham, Rajeev Sheth, Angus Bowan, Andrew Hawes, Mark Calvi, Andrew Winthrope, Edward Wan and Tim Boyle, delivered their first clinical dose of a novel nuclear medicine agent for the development of diagnostic and therapeutic tools for prostate cancer, which are being supplied for clinical trial testing

The SAXS/WAXS Beamline team consisting of Nigel Kirby, Stephen Mudie, Adrian Hawley, Vesna Samardzic-Boban and Tim Ryan, developed a new way of using high-intensity X-ray beamlines to analyse proteins and liquid samples, to overcome past limitations associated with such experiments and open new research frontiers.

MILGa team members who shared Innovation Award (Front row: left to right) Nigel Lengkeek, Maxine Roberts and Tien Pham (Back row: left to right) Andrew Winthorpe, Angus Bowan and Mark Calvin

Dr Helen Maynard-Casely and Dr Helen Brand

Dr Maynard-Casely and Dr Brand were awarded the 2016 ANSTO Nuclear Science and Technology Award – Early Career Award for their planetary materials research. The two have reinvigorated the use of scattering methods in planetary materials in Australia, to obtain structural data from materials under conditions that mimic the conditions on other planets.

2016 ANSTO NUCLEAR SCIENCE AND TECHNOLOGY AWARD-

Early Career Award

Patricia Gadd

In August 2016, ITRAX Facility Officer Patricia Gadd, was announced as the national winner of the Australian Academy of Science's people's choice 'On the Job' competition. The competition recognised Australia's laboratory and field technicians, support staff and machine operators who keep Australian science moving ahead.

Matt Bell from the ACNS was also one of seven finalists chosen from across Australia.

AUSTRALIAN ACADEMY OF SCIENCE-

People's choice 'On the Job' competition

Comcare Work Health and Safety Awards

ANSTO received the Prevention Award at the 2016 Comcare Work Health and Safety Awards for its innovative Change Management Toolkit, which assists managers in designing, planning, implementing and reviewing change.

The Change Management Toolkit was developed in 2015 by ANSTO's Human Resources and Workplace Health and Safety in consultation with ANSTO's Communications and Community Relations team.

2016 COMCARE WORK HEALTH AND SAFETY AWARD -

Prevention Award

Australian HR Awards

ANSTO's Leadership Development Centre (LDC) was one of nine finalists chosen from across Australia.

The LDC is an Executive Leadership Team initiative for 'Putting people first'. It helps prepare individuals to embark on behavioural and personal change to develop leadership potential.

2017 AUSTRALIAN HR AWARDS -

Best Leadership Development Program

ANNUAL PERFORMANCE STATEMENT

Annual Performance Statement

Introductory statement

We, the Australian Nuclear Science and Technology Organisation (ANSTO) Board, as the accountable authority of ANSTO, present the 2016–2017 Annual Performance Statement of ANSTO, as required under paragraph 39(1)(a) of the *Public Governance, Performance and Accountability Act 2013* (*PGPA Act*). In our opinion, this Annual Performance Statement is based on properly maintained records, accurately reflects the performance of the entity, and complies with subsection 39 (2) of the *PGPA Act*.

Entity Purpose

ANSTO's purpose is set by the following core functions, as provided by the *Australian Nuclear Science and Technology Organisation Act 1987*:

- conduct research and development in relation to nuclear science and technology;
- produce and use radioisotopes, isotopic techniques and nuclear radiation for medicine, science, industry, commerce and agriculture;
- encourage and facilitate the application and use of the results from research and development;
- manage radioactive materials and waste arising from various prescribed activities;
- provide goods and services related to core activities;
- provide advice to government and undertake international liaison in nuclear-related matters;
- make available (on a commercial basis where appropriate) facilities, equipment and expertise for research in nuclear science and technology;
- publish scientific and technical reports, periodicals and papers, and provide public information and advice;
- facilitate education and training in nuclear science and technology, including through granting scientific research studentships and fellowships, in cooperation with universities, professional bodies and other education and research institutions.

Outcome:
Improved knowledge, innovative capacity and healthcare through nuclear-based facilities, research, training, products, services and advice to government, industry, the education sector and the Australian population.

PERFORMANCE CRITERION 1 *Full utilisation of our landmark infrastructure*	**Criteria***	**Result**
Total availability of OPAL: % of days at power	77%	84%
Planned availability of OPAL: % of actual operating days scheduled	96%	100%
Accelerators: average % of days operated per available time	65%	70%
Neutron Beam Instruments: average % of days operated per available time	85%	84%
Australian Synchrotron: % of machine availability based on 16-week rolling average	95%	99%
PERFORMANCE CRITERION 2 *Human health products*	**Criteria***	**Result**
Supply vital medicines and diagnostics: potential doses	2,958,651	3,530,869

* Criteria Source: ANSTO's 2016–2017 Corporate Plan and ANSTO Budget Statements, Program 1.1, Portfolio Budget Statements 2016–2017, Budget Related Paper No. 1.12, Industry, Innovation and Science Portfolio

ANSTO is the custodian of most of Australia's landmark and national research infrastructure — the OPAL reactor and its associated suite of neutron beam instruments, the Australian Synchrotron, CAS and the NDF. Consistent with the purposes set out in the *ANSTO Act*, ANSTO makes its research infrastructure and expertise available to researchers and industry users from across Australia and around the world. Approximately 6000 national and international researchers and industry users depend on the availability of ANSTO's infrastructure each year. This infrastructure has particular importance in sustaining Australia's research competitiveness, innovation and support for Australian industry. Its unique capabilities are instrumental for research that aligns with the National Science and Research Priorities and innovation in major economic sectors, including mining, manufacturing, agriculture and healthcare.

In 2016–2017, availability of ANSTO's landmark research infrastructure was high, exceeding nearly all performance criteria. This result is testament to ANSTO's focus on continuous improvement and its proactive maintenance program of the organisation's scientific infrastructure.

ANSTO's OPAL reactor set a new performance benchmark in 2016–2017, recording 305 days at power and achieving 99% reliability, making it the hardest-working and most reliable multi-purpose reactor in the world. This was the second time in three years that OPAL exceeded the 300 days at power mark during a financial year. Importantly, the reliable operation of OPAL ensures that ANSTO maintains a competitive edge in the supply of critical life-saving radiopharmaceuticals to the Australian public and to the world. It also provides for a reliable source of neutrons for the ACNS neutron beam instruments, and helps Australia maintain its reputation as a global leader in neutron science.

Strategic maintenance coupled with a risk-based decision making framework are the core of ANSTO's Asset Management Program for OPAL. Importantly, this enables the safe and sustainable operation of the reactor, with a focus on delivering for the needs of users, customers and the broader Australian community.

Along with the right processes, much of OPAL's success is due to a highly competent, knowledgeable and dedicated team of people who are amongst the best in the world in their respective fields. The Reactor Operations group at ANSTO comprises a large team from a variety of disciplines, who manage all aspects of the reactor. It includes staff who are responsible for reactor operations and reactor utilisation, instrumentation and control, logistics support, engineering, technical support, regulation and licensing, fuel procurement and management, nuclear analysis, health physics and maintenance.

The average utilisation of the 14 commissioned neutron beam instruments was slightly less than the target, due to extended maintenance and repair requirements on one of the neutron beam instruments.

The four world-class ion accelerators at ANSTO's CAS exceeded their performance target by five per cent this year. Significantly, available time was up by six per cent from last year. Again, the increase in the operation of the accelerators can be attributed to the dedicated team of staff at CAS, who worked tirelessly to ensure maximum availability of the accelerators for ANSTO researchers and its extensive Australian and international user base.

At the Australian Synchrotron, the federal government's $520 million investment to secure operations at the facility to 30 June 2026 has been key to the continued success of the facility. Critically, the funding has enabled an ongoing program of maintenance on the facility's existing beamlines, allowing the facility to continue to deliver world-best reliability.

During 2016–2017, ANSTO committed $75 million in capital investment to build the first tranche of new beamlines at the Australian Synchrotron. Contributors include the New Zealand Synchrotron Group, the Defence Science and Technology Group and various universities. The additional beamlines will affirm the Australian Synchrotron's status as a world-class synchrotron facility, and meet the growing and evolving needs of the research community.

ANSTO also invested significant effort during 2016–2017 to ramp up production of the world's most important nuclear medicine, Molybdenum-99 (Mo-99), ahead of the new ANSTO Nuclear Medicine (ANM) facility coming on line in late 2017. The increase in output was facilitated by an upgrade to ANSTO's existing Mo-99 production facility. The number of doses of life-saving Mo-99 produced by ANSTO has increased by almost 20 per cent compared with 2015–2016.

Australian National Audit Office

INDEPENDENT AUDITOR'S REPORT

To the Minister for Industry, Innovation and Science

Opinion

In my opinion, the financial statements of the Australian Nuclear Science and Technology Organisation and its subsidiaries (together the Australian Nuclear Science and Technology Organisation) for the year ended 30 June 2017:

(a) comply with Australian Accounting Standards – Reduced Disclosure Requirements and the *Public Governance, Performance and Accountability (Financial Reporting) Rule 2015*; and

(b) present fairly the financial position of the consolidated entity as at 30 June 2017 and its financial performance and cash flows for the year then ended.

The financial statements of the Australian Nuclear Science and Technology Organisation, which I have audited, comprise the following statements as at 30 June 2017 and for the year then ended:

- Statement by the Accountable Authority, Chief Executive Officer and Chief Financial Officer;
- Consolidated Statement of Comprehensive Income;
- Consolidated Statement of Financial Position;
- Consolidated Statement of Changes in Equity;
- Consolidated Statement of Cash Flows; and
- Notes to the financial statements comprising of a summary of significant accounting policies and other explanatory information.

Basis for Opinion

I conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. My responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of my report. I am independent of the consolidated entity in accordance with the relevant ethical requirements for financial statement audits conducted by the Auditor-General and his delegates. These include the relevant independence requirements of the Accounting Professional and Ethical Standards Board's APES 110 *Code of Ethics for Professional Accountants* to the extent that they are not in conflict with the *Auditor-General Act 1997* (the Code). I have also fulfilled my other responsibilities in accordance with the Code. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

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19 National Circuit BARTON ACT
Phone (02) 6203 7300 Fax (02) 6203 7777

Accountable Authority's Responsibility for the Financial Statements

As the Accountable Authority of the Australian Nuclear Science and Technology Organisation the directors are responsible under the *Public Governance, Performance and Accountability Act 2013* for the preparation and fair presentation of annual financial statements that comply with Australian Accounting Standards – Reduced Disclosure Requirements and the rules made under that Act. The directors are also responsible for such internal control as the directors determine is necessary to enable the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the directors are responsible for assessing the Australian Nuclear Science and Technology Organisation's ability to continue as a going concern, taking into account whether the entity's operations will cease as a result of an administrative restructure or for any other reason. The directors are also responsible for disclosing matters related to going concern as applicable and using the going concern basis of accounting unless the assessment indicates that it is not appropriate.

Auditor's Responsibilities for the Audit of the Financial Statements

My objective is to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the Australian National Audit Office Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements.

As part of an audit in accordance with the Australian National Audit Office Auditing Standards, I exercise professional judgement and maintain professional scepticism throughout the audit. I also:

- identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control;
- obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Australian Nuclear Science and Technology Organisation's internal control;
- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Accountable Authority;

- conclude on the appropriateness of the Accountable Authority's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Australian Nuclear Science and Technology Organisation's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my auditor's report. However, future events or conditions may cause the Australian Nuclear Science and Technology Organisation to cease to continue as a going concern;
- evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation; and
- obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Australian Nuclear Science and Technology Organisation to express an opinion on the financial report. I am responsible for the direction, supervision and performance of the Australian Nuclear Science and Technology Organisation audit. I remain solely responsible for my audit opinion.

I communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

Australian National Audit Office

Lesa Craswell
Acting Executive Director

Delegate of the Auditor-General

Canberra
10 August 2017

Statement by Accountable Authority, Chief Executive and Chief Financial Officer

Australian Government

Nuclear-based science benefiting all Australians

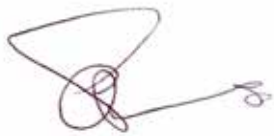
In our opinion, the attached financial statements for the year ended 30 June 2017 comply with subsection 42(2) of the *Public Governance, Performance and Accountability Act 2013 (PGPA Act)*, and are based on properly maintained financial records as per subsection 41(2) of the *PGPA Act*.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Australian Nuclear Science and Technology Organisation will be able to pay its debts as and when they fall due.

Signed in accordance with a resolution of the Board of Directors.

James McDowell
Accountable Authority - Chairman

10 August 2017



Adi Paterson
Accountable Authority - Chief Executive Officer

10 August 2017

Peter Arambatzis
Group Chief Financial Officer

10 August 2017

AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION

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Consolidated Statement of Comprehensive Income

For the year ended 30 June 2017

	Note	Budget 2017 $'000	Actual 2017 $'000	Actual 2016 $'000
NET COST OF SERVICES				
Expenses				
Employee	1.1A	150,229	150,043	144,422
Suppliers	1.1B	84,647	85,992	89,465
Depreciation/amortisation and impairment losses	2.2A	75,178	84,300	73,382
Write-down of assets	1.1C	-	48,297	3,242
Grants		5,500	3,639	2,518
Finance costs	1.1D	20,358	18,366	16,247
Foreign currency exchange losses		-	671	1,696
Losses from asset sales		-	-	24
Total expenses		335,912	391,308	330,996
Own-source revenue				
Sales of goods and rendering of services	1.2A	82,491	91,494	75,481
Interest	5.2b	2,500	3,665	5,207
Grants		26,842	29,697	35,429
Total own-source revenue		111,833	124,856	116,117
Other income				
Assets free of charge	3.4	-	191,119	-
Foreign currency exchange gains		-	1,023	1,536
Gains from asset sales		-	407	352
Other revenue		-	46	-
Total other income		-	192,595	1,888
Total own-source income		111,833	317,451	118,005
Net cost of services		(224,079)	(73,857)	(212,991)
Revenue from Government		183,334	183,334	156,700
Surplus/(deficit) for the year before income tax		(40,745)	109,477	(56,291)
Income tax benefit	1.1E	-	156	261
Surplus/(deficit) for the year after income tax		(40,745)	109,633	(56,030)
Other comprehensive income				
Items that will not be subsequently reclassified to net cost of services				
Changes in asset revaluation reserve	2.4A	-	13,643	(3,631)
Items that may be subsequently reclassified to net cost of services				
Exchange differences on translation of foreign operations	2.4A	-	(1)	6
Total other comprehensive income/(expense) for the year		-	13,642	(3,625)
Total comprehensive surplus/(deficit) for the year		**(40,745)**	**123,275**	**(59,655)**

Consolidated Statement of Financial Position

As at 30 June 2017

	Note	Budget 2017 $'000	Actual 2017 $'000	Actual 2016 $'000
Assets				
Financial assets				
Cash and cash equivalents	2.1A	6,680	10,154	4,398
Trade and other receivables	2.1B	15,704	15,331	14,527
Investments	2.1C	241,092	126,578	154,797
Total financial assets		263,476	152,063	173,722
Non-financial assets				
Property, plant and equipment	2.2A	1,012,227	1,267,463	1,078,542
Intangible assets	2.2A/B	82,598	86,847	89,659
Inventories	2.2C	18,072	21,539	20,445
Deferred tax asset	1.1E	1,250	1,089	1,181
Prepayments		8,108	10,950	13,004
Total non-financial assets		1,122,255	1,387,888	1,202,831
Total assets		1,385,731	1,539,951	1,376,553
Liabilities				
Payables				
Suppliers		17,486	16,896	17,102
Employee	4.1	2,500	4,853	2,656
Grants		135	24	86
Other payables	2.3A	17,995	4,045	2,694
Total payables		38,116	25,818	22,538
Provisions				
Employee provisions	4.2	44,911	43,560	40,463
Decommissioning	2.3B	315,392	313,421	311,625
Intellectual property payment	2.3B	53,284	51,152	58,348
Other provisions	2.3B	-	10,352	47
Total provisions		413,587	418,485	410,483
Total liabilities		451,703	444,303	433,021
Net assets		**934,028**	**1,095,648**	**943,532**
Equity				
Contributed equity		770,177	770,177	741,336
Reserves	2.4A	500,118	510,135	496,493
Accumulated deficit	2.4B	(336,267)	(184,664)	(294,297)
Total equity		**934,028**	**1,095,648**	**943,532**

The above statement should be read in conjunction with the accompanying notes.

Consolidated Statement of Changes in Equity

For the year ended 30 June 2017

	Accumulated deficit		Asset revaluation reserve	
	Actual	Budget	Actual	Budget
	$'000	$'000	$'000	$'000
Balance at 30 June 2015	**(238,267)**		**490,112**	
Net results for the year				
Deficit for the year	(56,030)		-	
Other comprehensive income				
Foreign currency translation	-		-	
Revaluation increment	-		(3,631)	
Total comprehensive (deficit)/surplus for the year	(56,030)		(3,631)	
Transactions with owners				
Government equity injection	-		-	
Transfer between equity components	-		-	
Balance at 30 June 2016	**(294,297)**	**(295,522)**	**486,481**	**490,112**
Surplus/(deficit) for the year	109,633	(40,745)	-	-
Other comprehensive income				
Foreign currency translation	-	-	-	-
Revaluation increment	-	-	13,643	-
Total comprehensive (deficit)/surplus for the year	**109,633**	**(40,745)**	**13,643**	-
Transactions with owners				
Government equity injection	-	-	-	-
Balance at 30 June 2017	**(184,664)**	**(336,267)**	**500,124**	**490,112**

The above statement should be read in conjunction with the accompanying notes.

Other reserves		Contributed equity		Total	
Actual	Budget	Actual	Budget	Actual	Budget
$'000	$'000	$'000	$'000	$'000	$'000
10,006		**705,420**		**967,271**	
-		-		(56,030)	
6		-		6	
-		-		(3,631)	
6		-		(59,655)	
-		35,916		35,916	
-		-		-	
10,012	**10,006**	**741,336**	**741,336**	**943,532**	**945,932**
-	-	-	-	109,633	(40,745)
(1)	-	-	-	(1)	-
-	-	-	-	13,643	-
(1)	**-**	**-**	**-**	**123,275**	**(40,745)**
-	-	28,841	28,841	28,841	28,841
10,011	**10,006**	**770,177**	**770,177**	**1,095,648**	**934,028**

Consolidated Statement of Cash Flows

For the year ended 30 June 2017

	Note	Budget 2017 $'000	Actual 2017 $'000	Actual 2016 $'000
Cash flows from operating activities				
Sales of goods and rendering of services		82,491	90,425	61,116
Grants received		26,842	29,635	35,429
Interest received		2,500	3,652	5,324
Receipts from Government		183,334	183,334	156,700
Payments to employees		(150,229)	(144,749)	(146,214)
Payments to suppliers		(100,452)	(108,236)	(97,568)
Other payments		(5,500)	-	-
Net cash from operating activities	3.2	38,986	54,061	14,787
Cash flows from investing activities				
Proceeds from sale of property plant and equipment		-	433	420
Proceeds from investment sales/maturity		580,000	490,310	505,000
Purchase of property, plant and equipment		(73,725)	(105,797)	(95,641)
Purchase of investments		(574,102)	(462,091)	(462,772)
Net cash used in investing activities		(67,827)	(77,145)	(52,993)
Cash flows from financing activities				
Government equity injection		28,841	28,841	35,916
Net cash from financing activities		28,841	28,841	35,916
Net increase/(decrease) in cash and cash equivalents		-	5,757	(2,290)
Effect of exchange changes on the balance of cash and cash equivalents held in foreign currencies		-	(1)	6
Cash and cash equivalents at the beginning of the reporting year		6,680	4,398	6,682
Cash and cash equivalents at the end of the reporting year	2.1A	**6,680**	**10,154**	**4,398**

The above statement should be read in conjunction with the accompanying notes.

Overview

Objectives of Australian Nuclear Science and Technology Organisation

Australian Nuclear Science and Technology Organisation (ANSTO) is a not-for-profit Australian Government Corporate Commonwealth Entity. ANSTO's strategic priorities, as set out in its current Corporate Plan, are:

- World class research outcomes and partnerships in nuclear science and technology
- Full utilisation of our landmark infrastructure: realising new opportunities, serving users and creating value
- Nuclear business and specialised services that respond to the needs of government, industry and the people of Australia
- Build responsiveness to create opportunities with our people and partners to meet the growing nuclear science and technology needs of Australia and the planet.

In the 2016-17 Portfolio Budget Statement ANSTO has only one outcome as reflected below:

Outcome 1: Improved knowledge, innovative capacity and healthcare through nuclear based facilities, research, training, products, services and advice to Government, industry, the education sector and the Australian population.

ANSTO's activities contributing towards the outcome are classified as departmental. Departmental activities involve the use of assets, liabilities, income and expenses controlled or incurred by ANSTO in its own right.

The continued existence of ANSTO in its present form and with its present programs is dependent on Government policy and on continuing funding by Parliament for the entity's administration and programs.

Reference to ANSTO means ANSTO and its controlled entities except in notes 1.1E and 6.2.

Basis of Preparation of the Financial Statements

The financial statements are general purpose financial statements and are required by section 42 of the *Public Governance, Performance and Accountability Act 2013*.

The financial statements have been prepared:

a) having regard to the provisions of the *Australian Nuclear Science and Technology Organisation (ANSTO) Act 1987* (as amended); and
b) in accordance with:
   i. *Public Governance, Performance and Accountability (Financial Reporting) Rule 2015* (FRR) (as amended) for reporting periods ending on or after 1 July 2016; and
   ii. Australian Accounting Standards and Interpretations – Reduced Disclosure Requirements issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The financial statements have been prepared on an accrual basis and in accordance with the historical cost convention, except for certain assets and liabilities at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position.

The financial statements are presented in Australian dollars and values are rounded to the nearest thousand dollars unless otherwise specified.

Where necessary the comparative information for the preceding financial year has been reclassified to achieve consistency in disclosure with current financial year amounts.

Overview (continued)

Foreign currency

Transactions denominated in a foreign currency are converted to Australian currency at the rate of exchange prevailing at the date of the transaction. At reporting date, amounts receivable and payable in foreign currency are translated to Australian currency at the exchange rate prevailing at that date and any exchange differences are brought to account in the Statement of Comprehensive Income. ANSTO does not enter into speculative forward exchange contracts.

Principles of consolidation

The consolidated financial statements incorporate the financial statements of ANSTO and the entities it controls. Control is achieved when ANSTO has all of the following:

- power over the investee;
- is exposed, or has rights, to variable returns from its involvement with the investee; and
- the ability to use its power to affect its returns.

Consolidation of a subsidiary begins when ANSTO obtains control over the subsidiary and ceases when they lose control of the subsidiary. All intragroup assets and liabilities, equity, income, expenses and cash flows relating to transactions between members of the Group are eliminated in full on consolidation. Profit or loss and each component of other comprehensive income are attributed to the owners of the entity and to the non-controlling interests. Total comprehensive income of subsidiaries attributed to the owners of the entity and to the non-controlling interests even if this results in the non-controlling interests having a deficit balance. Changes in the Group's ownership interests in subsidiaries that do not result in the Group losing control over the subsidiaries are accounted for as equity transactions. The carrying amounts of the Group's interests and the non-controlling interests are adjusted to reflect the changes in their relative interests in the subsidiaries. Any difference between the amount by which the non-controlling interests are adjusted and the fair value of the consideration paid or received is recognised directly in equity and attributed to ANSTO.

Significant accounting judgements and estimates

In the process of applying the accounting policies listed in this note, the judgements made that have the most significant impact on the amounts recorded in the financial statements are:

- The fair value of property, plant and equipment and their useful lives;
- Decommissioning provision; and
- Recoverable amount of the intangible asset relating to intellectual property and fair value of the associated liability.

Apart from these assumptions and estimates no other accounting assumptions or estimates have been identified that have a significant risk of causing a material adjustment to carrying amounts of assets and liabilities within the next accounting period.

Adoption of new Australian Accounting Standard requirements

No accounting standard has been adopted earlier than the application date as stated in the standard.

At the date of authorisation of the financial statements, the Standards and Interpretations listed below were on issue but not yet effective. These new or revised standards will be adopted and their implementation is not expected to have a material financial impact on the entity in future reporting periods, though they will require enhanced disclosure.

Standard/Interpretation	Effective for annual reporting periods beginning on or after	Expected to be initially applied in the financial year ending
AASB 9 'Financial Instruments', and the relevant amending standards	1 January 2018	30 June 2019
AASB 15 'Revenue from Contracts with Customers and AASB 2014-5 'Amendments to Australian Accounting Standards arising from AASB 15'	1 January 2018	30 June 2019
AASB 16 'Leases'	1 January 2019	30 June 2020

1. Financial Performance

This section details the financial performance of ANSTO.

1.1 Expenses

1.1A Employee

	2017	2016
	$'000	$'000
Wages and salaries	114,510	110,609
Superannuation	20,559	20,331
Leave and other entitlements	14,745	13,420
Separation and redundancies	229	62
Total employee expenses	**150,043**	**144,422**

Accounting Policy
Liabilities for 'short-term employee benefits' (as defined in AASB 119 *Employee Benefits*) and termination benefits expected within twelve months of the end of reporting period are measured at their nominal amounts.

Other long-term employee benefits are measured as the total net present value of the defined benefit obligation at the end of the reporting period minus the fair value at the end of the reporting period of plan assets (if any) out of which the obligations are to be settled directly.

Leave
The provision for employee entitlements encompasses annual leave and long service leave that ANSTO has a present obligation to pay resulting from employee services provided up to reporting date. The leave liabilities are calculated on the basis of employees' remuneration at the estimated salary rates that will be applied when leave is taken, including employer superannuation contribution rates to the extent that the leave is likely to be taken during service rather than paid out on termination.

The Enterprise Agreement provides under the heading General Leave for an employee entitlement which combines sick leave, 'carer's leave and leave for 'other' prescribed purposes. No provision has been made for general leave as all such leave is 'non-vesting'.

The estimate of the present value of the liability takes into account attrition rates and pay increases through promotion and inflation.

Separation and redundancy
Provision is made for separation and redundancy benefit payments. ANSTO recognises a provision for termination when it has developed a detailed formal plan for the termination and has informed those employees affected that it will carry out the termination.

Superannuation
ANSTO's staff are members of the Commonwealth Superannuation Scheme (CSS) and the Public Sector Superannuation Scheme (PSS) or the PSS accumulation plan (PSSap), or other superannuation funds held outside of the Australian Government that provide retirement, death and disability benefits to employees. The CSS and PSS are defined benefit schemes for the Australian Government. The PSSap is a defined contribution scheme.

The liability for defined benefits is recognised in the financial statements of the Australian Government and is settled by the Australian Government in due course. This liability is reported in the Department of Finance's administered schedules and notes.

ANSTO makes employer contributions to the employees' superannuation scheme at rates determined by an actuary to be sufficient to meet the current cost to the Government. ANSTO accounts for contributions as if they are contributions to defined contribution plans.

The staff of the subsidiaries are members of various defined contribution schemes and receive the Superannuation Contribution Charge.

The liability for superannuation recognised as at 30 June represents outstanding contributions for the final fortnight of the year.

1. Financial Performance (continued)

1.1B Suppliers

	2017	2016
	$'000	$'000
Goods from external entities	25,244	31,037
Services from related entities	23,800	27,055
Workers compensation premiums – related	940	752
Service from external entities	36,008	30,621
Total supplier expenses	**85,992**	**89,465**
Commitments for minimum lease payments in relation to non-cancellable operating leases are payable as follows:		
One year or less	151	151
From one to five years	603	603
Over five years	389	540
Total operating lease commitments	**1,143**	**1,294**

1.1C Write-down of assets

Financial assets:		
Write-down of receivables/(reversal of write-down)	-	316
Non-financial assets:		
Materials – write-off obsolete stock	1	158
Property, plant and equipment write-down	25,771	2,768
Intangibles write-down	22,525	-
Total write-down of assets expenses	**48,297**	**3,242**

1.1D Finance costs

Unwinding of discount on decommissioning and royalty costs	18,366	16,247
Total finance costs	**18,366**	**16,247**

1.1E Income tax benefit

Prima facie tax on results of taxable subsidiaries	177	262
Over provision in respect of prior years	(21)	(1)
Total income tax benefit	**156**	**261**

1.1E Income tax benefit (continued)

ANSTO is exempt from income tax. Synchrotron Light Source Australia Pty Ltd (SLSA) and Australian Synchrotron Holding Company Pty Ltd (ASHCo) were exempt from income tax until 28 February 2017. Unbooked deferred tax assets in relation to un-recouped tax losses including timing difference in ANSTO Inc., is $1,154,906 (2016: $1,168,261). The total deferred tax assets recognised as at 30 June 2017 in relation to controlled entities are: $1,088,509 (2016: $1,180,562), from PETTECH Solutions Pty Ltd (formerly PETNET Australia Pty Ltd) at $526,485 (2016: $852,620) and ANSTO Nuclear Medicine Pty Ltd at $562,024 (2016: $327,942).

Accounting Policy

ANSTO is exempt from all forms of Australian taxation except fringe benefits tax (FBT) and the goods and services tax (GST). ANSTO is not exempt from any foreign taxation laws relative to its overseas operations.

Revenues, expenses and assets are recognised net of GST except:

- where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- for receivables and payables.

Subsidiaries

ANSTO's subsidiaries are subject to normal taxation except for Synchrotron Light Source Australia Pty Ltd and Australian Synchrotron Holding Company Pty Ltd which are tax exempt entities for the period they are charitable institutions.

ANSTO Inc. is a USA company and is subject to US tax laws. No deferred tax asset has been recognised at 30 June 2017 (2016: nil) in relation to ANSTO Inc. as the directors do not believe it is probable that sufficient profits will be generated to utilise the tax losses.

In respect of the subsidiaries, current tax assets and liabilities for the current and prior periods are measured at the amount expected to be recovered from or paid to the taxation authorities based on the current period's taxable income. The tax rates and tax laws used to compute the amount are those that are enacted or substantively enacted by reporting date.

Deferred income tax is provided on all temporary differences at reporting date between the tax bases of assets and liabilities and their carrying amounts for financial reporting purposes.

Deferred income tax liabilities are recognised for all taxable temporary differences except:

- when the deferred income tax liability arises from the initial recognition of goodwill or of an asset or liability in a transaction that is not a business combination and that, at the time of the transaction, affects neither the accounting profit nor taxable profit or loss; or
- when the taxable temporary difference is associated with investments in subsidiaries, associates or interests in joint ventures, and the timing of the reversal of the temporary difference can be controlled and it is probable that the temporary difference will not reverse in the foreseeable future.

1. Financial Performance (continued)

1.1E Income tax benefit (continued)

Deferred income tax assets are recognised for all deductible temporary differences, carry forward of unused tax credits and unused tax losses, to the extent that it is probable that taxable profit will be available against which the deductible temporary differences and the carry forward of unused tax credits and unused tax losses can be utilised, except:

- when the deferred income tax asset relating to the deductible temporary difference arises from the initial recognition of an asset or liability in a transaction that is not a business combination and, at the time of the transaction, affects neither the accounting profit nor taxable profit or loss; or
- when the deductible temporary difference is associated with investments in subsidiaries, associates or interests in joint ventures, in which case a deferred tax asset is only recognised to the extent that it is probable that the temporary difference will reverse in the foreseeable future and taxable profit will be available against which the temporary difference can be utilised.

Unrecognised deferred income tax assets are reassessed at each reporting date and are recognised to the extent that it has become probable that future taxable profit will allow the deferred tax asset to be recovered.

Deferred income tax assets and liabilities are measured at the tax rates that are expected to apply to the year when the asset is realised or the liability is settled, based on tax rates (and tax laws) that have been enacted or substantively enacted at reporting date. Deferred tax assets and deferred tax liabilities are offset only if a legally enforceable right exists to set off current tax assets against current tax liabilities and the deferred tax assets and liabilities relate to the same taxable entity and the same taxation authority.

1.2 Revenue

1.2A Sales of goods and rendering of services

	2017	2016
	$'000	$'000
Sales of goods		
Radioisotope sales	62,905	48,318
Total sales of goods	62,905	48,318
Rendering of services		
Service and contract research	16,678	16,403
Silicon irradiation	6,791	5,634
CSIRO site support	1,194	1,122
Training courses	262	274
Land management	3,664	3,692
AINSE interactions	-	38
Total rendering of services	28,589	27,163
Total sales of goods and rendering of services	**91,494**	**75,481**

Accounting Policy

Funding received or receivable from the Department of Industry, Innovation and Science (DIIS) (appropriated to ANSTO as a Corporate Commonwealth Entity payment item for payment to ANSTO) is recognised as Revenue from Government when the entity gains control of the funding unless it is in the nature of an equity injection, such amounts are recognised directly in contributed equity in the year received.

Operating revenue from sale of goods and rendering of services
Revenue from the sale of goods and rendering of services is recognised when:

- The risks and rewards of ownership have been transferred to the buyer;
- ANSTO retains no managerial involvement nor effective control over the goods;
- The revenue, stage of completion and transaction costs incurred can be reliably measured; and
- It is probable that the economic benefits associated with the transaction will flow to ANSTO.

Receivables for goods and services are recognised at the nominal amounts due less any impairment allowance. Collectability of debts is reviewed at reporting date. Allowance is made when collectability of the debt is no longer probable.

Grant revenue
Government grants and funding are recognised when ANSTO obtains control over the contribution. There are two types of grants being reciprocal grants and non-reciprocal grants.

For reciprocal grants, this is recognised in profit or loss on a systematic basis over the periods in which ANSTO recognises as expenses the related costs for which the grants are intended to compensate. Where the grants also include funds that relate to future related costs for which the grants are intended to compensate, this portion is recognised as deferred revenue.

For non-reciprocal grants, ANSTO is deemed to have assumed control when the grant is receivable or received. Government grants that are receivable as compensation for expenses or losses already incurred or for the purpose of giving immediate financial support to ANSTO with future related costs are recognised in profit or loss in the period in which they become receivable. Conditional grants may be reciprocal or non-reciprocal depending on the terms of the grant.

Resources received free of charge
Resources received free of charge are recognised as revenue when and only when a fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense.

Resources received free of charge are recorded as either revenue or gains depending on their nature i.e. whether they have been generated in the course of the ordinary activities of ANSTO.

Contributions of assets at no cost or for nominal consideration are recognised as gains at their fair value when the asset qualifies for recognition.

2. Financial Position

This section details the financial position of ANSTO.

2.1 Financial assets

2.1A Cash and cash equivalents

Accounting Policy
Cash is recognised at its nominal amount. Cash and cash equivalents include:

- Cash on hand; and
- Demand deposits in bank accounts with an original maturity of 3 months or less that are readily convertible to known amounts of cash and subject to insignificant risk of changes in value.

2.1B Trade and other receivables

	2017	2016
	$'000	$'000
Goods and services		
Related entities	328	189
External entities	12,387	11,685
Total receivables for goods and services	**12,715**	**11,874**
Less impairment allowance	-	364
Net receivables for goods and services	**12,715**	**11,510**
Other receivables		
Interest accrued	483	470
GST receivable from the Australian Taxation Office	1,090	885
Other	1,043	1,662
Total other receivables	**2,616**	**3,017**
Total net trade and other receivables	**15,331**	**14,527**

Trade and other receivables are expected to be received within 12 months.

a) Net receivables are aged as follows:

Overdue but not impaired:		
Less than 31 days	11,921	13,536
31 to 60 days	3,301	173
61 to 90 days	-	63
More than 90 days	109	755
Total net trade and other receivables	**15,331**	**14,527**

b) No allowance for doubtful debts has been deemed necessary as at 30 June 2017 (2016: $364,000 for balances aged more than 90 days).

Reconciliation of the impairment allowance account:		
Opening balance	364	66
Additional provision	-	316
Amount reversed	(364)	(18)
Closing balance	**-**	**364**

2.1C Investments

		2017	2016
		$'000	$'000
Term Deposits – held to maturity		126,483	149,781
Investment in Australian Synchrotron Holding Company Pty Limited		-	5,000
Southern Radioisotopes Alliance Inc	2.1D	-	-
Clarity Pharmaceuticals Pty Ltd	2.1E	95	16
Total investments		**126,578**	**154,797**

2.1D Investment in joint venture

			2017	2016
Name	**Place of incorporation**	**%**	**$**	**$**
Southern Radioisotopes Alliance Inc.	USA	100	625	625
Total investment in joint venture			**625**	**625**

Investment is USD 600 (2016: USD 600). This company has yet to commence trading.

2.1E Investment – other

Name	**Place of incorporation**	**%**	**$**	**$**
Clarity Pharmaceuticals Pty Ltd	Australia	2.4	95,144	15,806
Total investment – other			**95,144**	**15,806**

Clarity Pharmaceuticals Pty Ltd. was incorporated in New South Wales, Australia on 17 September 2010. The current shareholding is 135,087 shares (2016 107,903), 2.4% (2016: 2.4%).

2. Financial Position (continued)

2.2 Non-financial assets

2.2A Property, plant and equipment and intangible assets

Movement summary 2016-2017 for all consolidated assets irrespective of valuation basis

	Land $'000	Buildings $'000	Plant and equipment $'000
Gross value as at 30 June 2016	97,200	232,656	969,609
Business combination – Australian Synchrotron as at 1 July 2016	-	87,866	99,558
Additions - new assets	-	-	-
Revaluation increment	18,488	(7,602)	2,757
Transfer of depreciation on revaluation	-	(41,148)	(268,296)
Transfers/reclassifications	-	11,764	17,673
Assets written-off	-	(5,649)	(16,107)
Disposals	-	-	(407)
Gross value as at 30 June 2017	**115,688**	**277,887**	**804,787**
Accumulated depreciation/amortisation and impairment losses 1 July 2016	-	45,064	331,425
Depreciation/amortisation	-	9,948	71,707
Transfer of depreciation on revaluation	-	(41,148)	(268,296)
Accumulated depreciation/amortisation and impairment losses 30 June 2017	**-**	**13,864**	**134,836**
Net book value as at 30 June 2017	**115,688**	**264,023**	**669,951**
Property, plant and equipment	**115,688**	**264,023**	**669,951**
Intangibles	**-**	**-**	**-**

There were no impairment indicators in relation to the intangible assets in 2017. No intangible assets are expected to be disposed of within the next 12 months.

Intellectual property $'000	Software $'000	Other intangibles $'000	Assets under construction $'000	Total $'000
51,210	39,942	8,104	183,677	1,582,398
-	-	-	3,865	191,289
-	-	-	114,181	114,181
-	-	-	-	13,643
-	(34,928)	(5,425)	-	(349,797)
-	979	1,846	(32,262)	-
-	(3,973)	(358)	(22,210)	(48,297)
-	-	-	-	(407)
51,210	**2,020**	**4,167**	**247,251**	**1,503,010**
-	33,112	4,596	-	414,197
-	1,816	829	-	84,300
-	(34,928)	(5,425)	-	(349,797)
-	**-**	**-**	**-**	**148,700**
51,210	**2,020**	**4,167**	**247,251**	**1,354,310**
-	**-**	**-**	**217,801**	**1,267,463**
51,210	**2,020**	**4,167**	**29,450**	**86,847**

2. Financial Position (continued)

2.2A Property, plant and equipment and intangible assets (continued)

Accounting Policy

Asset recognition threshold

Items of buildings, infrastructure, plant and equipment and major facilities are recorded at cost of acquisition and depreciated as outlined below. Items of plant and equipment with a cost of less than $5,000 (2016: $3,000) are expensed in the year of acquisition (other than where they form part a group of similar items which are significant in total).

The initial cost of an asset includes an estimate of the cost of dismantling and removing the item and restoring the site on which it is located at the end of its useful life. This is particularly relevant to 'make good' or decommissioning provisions on buildings, infrastructure, plant and equipment and major facilities, taken up by ANSTO where there exists an obligation to restore the property to its original condition. These costs are included in the value of the asset it relates to with a corresponding provision for the 'make good' or decommissioning taken up.

Any changes to the initial decommissioning cost attributable to adjustments to the consumer price index (CPI) and discount rate at 30 June each year will be reflected as an adjustment to the provision for decommissioning and asset revaluation reserve.

The cost of assets constructed by the entity includes the cost of materials, direct labour and an appropriate proportion of fixed and variable overheads.

Revaluations

Following initial recognition at cost, buildings, infrastructure, plant and equipment and major facilities are carried at fair value less accumulated depreciation and accumulated impairment losses. Valuations are conducted with sufficient frequency to ensure that the carrying amounts of assets do not differ materially from the assets' fair values as at reporting date. The regularity of independent valuations depends upon the volatility of movements in market values for the relevant assets. Independent valuers are generally used to conduct these scheduled revaluations. Revaluation increases or decreases arise from differences between an asset's carrying value and fair value.

All the 30 June 2017 valuations have been carried out by qualified parties, independent of ANSTO. The independent valuations undertaken effective 30 June 2017 were performed by PP&E Valuations Pty Ltd in relation to the assets at ANSTO's Clayton site and Australian Valuation Solutions for the assets at ANSTO's Lucas Heights and Camperdown sites.

Revaluation adjustments are made on a class basis. Any revaluation increment is credited to equity under the heading of asset revaluation reserve except to the extent that it reverses a previous revaluation decrement of the same asset class that was previously recognised through profit and loss. Revaluation decrements for a class of assets are recognised directly through profit and loss except to the extent that they reverse a previous revaluation increment for that class.

Any accumulated depreciation as at the revaluation date is eliminated against the gross carrying amount of the asset and the asset restated to the revalued amount except for assets relating to decommissioning that are not subjected to revaluation.

Depreciation
Items of buildings, infrastructure, plant and equipment and major facilities, but excluding freehold land, are depreciated over their estimated useful lives to ANSTO using the straight-line method.

The depreciation rates (useful lives), residual values and methods are reviewed during each reporting date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate.

Depreciation and amortisation rates applying to each class of depreciable asset are based on the following useful lives:

	2017	2016
Buildings on freehold land	**5 to 50 years**	5 to 50 years
Plant and equipment	**2 to 30 years**	2 to 30 years
Infrastructure	**20 years**	20 years
Landmark, national and major research facilities	**5 to 40 years**	5 to 40 years

Impairment
All assets were assessed for indications of impairment at 30 June 2017. Where indications of impairment exist, the asset's recoverable amount is estimated and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

The recoverable amount of an asset is the higher of its fair value less costs to sell and its value in use. Value in use is the present value of the future cash flows expected to be derived from the asset. Where the future economic benefit of an asset is not primarily dependent on the asset's ability to generate future cash flows, and the asset would be replaced if the entity were deprived of the asset, its value in use is taken to be its depreciated replacement cost.

Derecognition
An item of property, plant and equipment is derecognised upon disposal or when no further future economic benefits are expected from its use or disposal.

2. Financial Position (continued)

2.2B Intangibles

The useful lives of intangible assets are assessed as either finite or indefinite.

Intangible assets with finite lives are amortised over the useful economic life and assessed for impairment whenever there is an indication that the intangible asset may be impaired. Intangible assets with indefinite useful lives are not amortised, but are tested for impairment annually, either individually or at the cash-generating unit level.

Software
Items of software are recorded at cost and amortised as outlined below. Items with a cost of less than $5,000 (2016: $3,000) are expensed in the year of acquisition. Software and licences are reported at cost. There is no material internal software development, though there are significant internal capitalised costs involved in the implementation of purchased software.

Intellectual property
ANSTO and NTP Radioisotopes (SOC) Limited (NTP) signed the Intellectual Property (IP) Licence Agreement on 15 May 2012 for the provision of NTP's IP to ANSTO to enable ANSTO to build a new Mo-99 manufacturing plant at Lucas Heights.

Under the terms of the IP Agreement NTP granted to ANSTO an exclusive, irrevocable, perpetual licence to use, exploit, reproduce and modify the current IP and the future IP.

ANSTO has recognised this IP as an intangible asset with an indefinite life in relation to the IP rights conveyed, at estimated net present value of $51,210,000 (2016: $51,210,000) and a financial liability for the future payments required in relation to the asset. The $51,512,000 liability (2016: $58,348,000) has been derived from calculating the estimated commission to be paid to NTP based on expected future sales and then discounted back at 4.22% (2016: 5.15%). This IP was initially recognised as its fair value and is subsequently at cost less impairment.

Amortisation
Intangibles are amortised over their estimated useful lives to ANSTO using the straight line method.

Amortisation rates applying to intangibles are as follows:

	2017	2016
Purchased software	**2 to 7 years**	2 to 7 years
Licences	**3 years**	3 years
Intellectual property	**Indefinite life**	Indefinite life

Impairment
All intangible assets were assessed for impairment at 30 June 2017. Where indications of impairment exist, the asset's recoverable amount is estimated and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

Patents
Due to the uncertain commercial value of patents and because benefits extending beyond one accounting period cannot be assured, the costs associated with the development and registration of patents are expensed in the year in which they are incurred, unless recoverability is assured beyond any reasonable doubt. At 30 June 2017 there were 146 patents (2016: 157) registered to ANSTO and no associated costs are recognised as an asset (2016: nil).

2.2C Inventories

	2017	2016
	$'000	$'000
Raw materials and stores – not held for resale		
Stores – at cost	16,754	15,675
Cobalt-60 sources – at net realisable value	98	111
Reactor fuel and heavy water – at average purchase price	2,657	2,646
	19,509	18,432
Work in progress – at cost	1,295	1,570
Finished goods – at cost	735	443
Total inventories	**21,539**	**20,445**
Inventories expected to be realised within		
No more than 12 months	18,784	17,704
More than 12 months	2,755	2,741
Total inventories	**21,539**	**20,445**

Accounting Policy

Inventories held for sale are valued at the lower of cost and net realisable value. Costs incurred in bringing each item of inventory to its present location and condition, are assigned as follows:

- Raw material and stores (with the exception of reactor fuel) - purchase cost on a first-in first-out basis;
- Reactor fuel - average purchase price; and
- Finished goods and work-in-progress - cost of direct materials and labour plus attributable costs that can be allocated on a reasonable basis.

2.2D Commitments

	2017	2016
	$'000	$'000
Infrastructure, plant and equipment	84,232	112,891
Fuel element purchase	5,707	2,808
Mo-99 plate purchase	9,216	16,531
Total commitments	**99,155**	**132,230**
One year or less	87,764	114,019
From one to five years	11,391	18,211
Total commitments	**99,155**	**132,230**

2. Financial Position (continued)

2.3 Liabilities

2.3A Other payables

	2017	2016
	$'000	$'000
Revenue received in advance	3,973	2,644
Other payables	72	50
Total other payables	**4,045**	**2,694**
Other payables expected to be settled within		
No more than 12 months	2,618	1,117
More than 12 months	1,427	1,577
Total other payables	**4,045**	**2,694**

Accounting Policy

Financial liabilities are classified other financial liabilities and are recognised and derecognised upon trade date.

Other financial liabilities, including borrowings, are initially measured at fair value, net of transaction costs. These liabilities are subsequently measured at amortised cost using the effective interest method, with interest expense recognised on an effective interest basis.

Supplier and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).

2.3B Provisions

		2017	2016
		$'000	$'000
Decommissioning	(a)	313,421	311,625
Intellectual property		51,152	58,348
Other claims		10,352	47
Total provisions		**374,925**	**370,020**
Provisions expected to be settled within			
No more than 12 months		30,412	34,957
More than 12 months		344,513	335,063
Total provisions		**374,925**	**370,020**

(a) This provision includes decommissioning costs relating to property, plant and equipment, and infrastructure and local and overseas legacy waste and current OPAL waste disposition.

Provisions movement reconciliation

	Decommissioning $'000	Intellectual Property Payment $'000	Other claims $'000
Carrying amount 30 June 2015	**286,136**	**57,686**	**67**
Additional provision made	13,098	-	-
Amounts used	(7,383)	(4,046)	(20)
Change in accounting estimate	3,612	4,623	-
Unwinding discount	16,162	85	-
Carrying amount 30 June 2016	**311,625**	**58,348**	**47**
Addition to/(reversal of) provision	(7,997)	-	10,297
Amounts used	(14,992)	(6,641)	-
Change in accounting estimate	6,607	(743)	8
Unwinding discount	18,178	188	-
Carrying amount 30 June 2017	**313,421**	**51,152**	**10,352**

2. Financial Position (continued)

2.4 Reserves

2.4A Reserves

		2017	2016
		$'000	$'000
Asset revaluation	(a)		
Opening balance		486,481	490,112
Revaluation		13,643	-
Revaluation – decommissioning		-	(3,631)
Closing balance		**500,124**	**486,481**
Other reserves			
OPAL depreciation	(b)	**9,061**	**9,061**
Intermediate low level waste (ILLW) return	(c)		
Opening balance		616	616
Closing balance		**616**	**616**
Foreign currency reserve	(d)		
Opening balance		335	329
Movement		(1)	6
Closing balance		**334**	**335**
Other reserves		**10,011**	**10,012**
Total Reserves		**510,135**	**496,493**

(a) Asset revaluation
This reserve represents the revaluation of property, plant and equipment.

(b) OPAL depreciation reserve
This reserve represents unused funding for OPAL depreciation. This was due to a delay in final commissioning of OPAL.

(c) Intermediate low level waste (ILLW) return
This reserve relates to unspent appropriation for ILLW return.

(d) Foreign currency reserve
This reserve relates to foreign currency translation at reporting date.

2.4B Accumulated deficit

	2017	2016
	$'000	$'000
Opening balance	(294,297)	(238,267)
Surplus/(deficit) for the year	109,633	(56,030)
Closing balance	**(184,664)**	**(294,297)**

3. Funding

This section identifies ANSTO funding structure.

3.1 Government funding

	2017	2016
	$'000	$'000
Revenue from Government	183,334	156,700
Government equity injection	28,841	35,916
Total government funding	**212,175**	**192,616**

Appropriations are made to the Department of Industry, Innovation and Science and then paid to ANSTO. ANSTO does not receive any Departmental Capital Budget.

3.2 Statement of Cash Flows reconciliation

	2017	2016
	$'000	$'000
Reconciliation of net cost of services to net cash from operating activities:		
Net cost of services	(73,857)	(212,991)
Revenue from Government	183,334	156,700
Income tax benefit	156	261
Adjustment for non-cash items		
Depreciation/amortisation and impairment losses	84,300	73,382
Net (gain)/loss in disposal of non-financial assets	(407)	2,441
Write-down and impairment of assets	48,297	3,242
Unrealised foreign exchange (gain)/loss	529	626
Unwinding of discount – decommissioning and royalty costs	18,366	16,247
Asset free of charge	(191,119)	-
Movement in assets and liabilities		
Assets		
Decrease in trade receivables	(1,734)	(3,297)
Increase in other receivables	619	232
Decrease in GST receivables	(205)	(279)
(Increase)/decrease in accrued interest	(13)	117
Decrease/(increase) in prepayments	2,054	(4,400)
Increase in inventories	(1,094)	(2,373)
Decrease/(increase) in deferred tax assets	92	(261)
Liabilities		
Decrease in payables	(209)	(2,951)
Increase/(decrease) in employee entitlements	5,294	(1,792)
Decrease in other payables	(5,352)	(15,301)
Increase in other provisions	2,921	642
(Decrease)/increase in decommissioning provision	(17,911)	4,542
Net cash from operating activities	**54,061**	**14,787**

3.3 Non-cash transactions

During the current year, the ANSTO acquired the shares of ASHCo on 1 July 2016 for no consideration. The fair value at the date of acquisition was $191,119,000.

3.4 Business combination

On 1 July 2016 ANSTO acquired 97.6% of the shares on issue in Australian Synchrotron Holding Company Pty Ltd (ASHCo) for no consideration. This transaction resulted in ASHCo becoming a wholly owned ANSTO subsidiary.

The fair value of the net assets acquired at the date of acquisition are:

	1 July 2016
	$'000
Assets	
Financial assets	
Cash and cash equivalents	4,894
Trade and other receivables	229
Total financial assets	5,123
Non-financial assets	
Buildings and leasehold improvements	87,866
Plant and equipment, furniture and IT equipment	99,558
Capital work in progress	3,865
Total non-financial assets	191,289
Total assets	196,412
Liabilities	
Trade and other payables	242
Provisions	51
Total liabilities	293
Net assets	**196,119**
Carrying value of previous investment	5,000
Revenue from asset free of charge	**191,119**

4. People and relationships

This section describes a range of employment and post-employment benefits provided to our people and our relationships with key people.

4.1 Employee liabilities

	2017	2016
	$'000	$'000
Accrued salaries and wages	700	393
Redundancy payments	229	62
Incentives	3,924	2,201
Total employee payables	**4,853**	**2,656**

All employee payables are expected to be settled within 12 months.

4.2 Employee provisions

	2017	2016
	$'000	$'000
Annual leave	13,191	12,344
Long service leave	30,369	28,119
Total employee provisions	**43,560**	**40,463**
Employee provisions expected to be settled within		
No more than 12 months	36,203	31,264
More than 12 months	7,357	9,199
Total employee provisions	**43,560**	**40,463**

4.3 Key management personnel remuneration

Key management personnel are those persons having authority and responsibility for planning, directing and controlling the activities of ANSTO, directly or indirectly, including any director (whether executive or otherwise) of ANSTO. ANSTO has determined the key management personnel to be the ANSTO Portfolio Minister, the Board and the Executive Leadership Team. Key management personnel remuneration is reported in the table below:

	2017	2016
	$'000	$'000
Short-term employee benefits:		
Salary	2,989	3,400
Performance bonuses	552	618
Motor vehicle and other allowances	-	33
Total short-term employee benefits	**3,541**	**4,051**
Post-employment benefits:		
Superannuation	429	447
Total post-employment benefits	**429**	**447**
Other long-term benefits:		
Annual leave accrued	180	248
Long-service leave	87	102
Total other long-term benefits	**267**	**350**
Termination benefits	-	-
Total key management personnel remuneration	**4,237**	**4,848**

The total number of key management personnel that are included is 16.29 (2016: 19). Represented by 8 non-executive board members (pro-rated) (2016: 7.28) and 8.29 full time equivalent (FTE) (2016: 9.76 FTE) members of the ANSTO Executive Leadership Team. The above key management personnel remuneration excludes the remuneration and other benefits of the Portfolio Minister. The Portfolio Minister's remuneration and other benefits are set by the Remuneration Tribunal and are not paid by the entity.

4.4 Related party transactions

ANSTO is an Australian Government controlled entity. Related parties to this entity are the Key Management Personnel, the Commonwealth cabinet, and other Australian Government entities.

Significant transactions with related parties or entities that they are associated with can include:

- the payments and receipt of grants;
- purchases of goods and services

Giving consideration to relationships with related parties, their associated entities, and transactions entered into during the reporting period by ANSTO, it has been determined that there are no related party transactions to be separately disclosed.

5. Managing uncertainties

This section analyses how ANSTO manages the financial risks within its operating environment.

5.1 Contingent assets and liabilities

Contingent assets and contingent liabilities are not recognised in the statement of financial position but are reported in the notes. They may arise from uncertainty as to the existence of a liability or asset or represent an asset or liability in respect of which the amount cannot be reliably measured. Contingent assets are disclosed when settlement is probable but not virtually certain and contingent liabilities are disclosed when settlement is greater than remote.

Unquantifiable Contingencies
At 30 June 2017, ANSTO still has the likelihood of claims in relation to asbestos related diseases. It is not possible to estimate the amounts of any eventual payments that may be required in relation to these claims. Such claims however are, covered by the Department of Finance provision dealing with asbestos related claims against any Commonwealth Authorities including ANSTO in the event of any litigation or claim for compensation.

5.2 Financial instruments

a) Categories of financial instruments

	Note	Carrying amount 2017	Fair Value 2017	Carrying amount 2016	Fair Value 2016
Financial assets		**$'000**	**$'000**	**$'000**	**$'000**
Loans and receivables					
Cash and cash equivalents		10,154	10,154	4,398	4,398
Receivables for goods and services	2.1B	12,715	12,715	11,510	11,510
Interest accrued	2.1B	483	483	470	470
Other	2.1B	1,043	1,043	1,662	1,662
Investments held to maturity	2.1C	126,483	126,483	149,781	149,781
Investments	2.1C	95	95	5,016	5,016
Total financial assets (recognised)		**150,973**	**150,973**	**172,837**	**172,837**
Total financial liabilities					
Amortised cost					
Suppliers		16,896	16,896	17,102	17,102
Employees	4.1	4,853	4,853	2,656	2,656
Grants received in advance		24	24	86	86
Other	2.3A	4,045	4,045	2,694	2,694
Total financial liabilities (recognised)		**25,818**	**25,818**	**22,538**	**22,538**

b) Interest revenue from financial assets

	2017	2016
	$'000	$'000
Loans and receivables		
Cash and cash equivalents	113	60
Investment held to maturity	3,552	5,147
Net income from financial assets	**3,665**	**5,207**

Interest revenue
Interest revenue is recognised using the effective interest method as set out in AASB 139 *Financial Instruments: Recognition and Measurement*.

c) Net expenses from financial liabilities

There were no expenses from financial liabilities for 2017 (2016: $0).

Financial assets
The net fair values of cash, deposits on call and non-interest-bearing monetary financial assets are in accord with their carrying amounts. Loans receivable are carried at cost, which is above their net fair value, because it is intended to hold them to maturity.

Financial liabilities
The net fair values for trade creditors and grants received in advance, all of which are short-term in nature, are in accord with their carrying amounts.

Accounting Policy

ANSTO classifies its financial assets in the following categories:

- Financial assets at fair value through profit or loss;
- Held-to-maturity investments; and
- Loans and receivables.

The classification depends on the nature and purpose of the financial assets and is determined at the time of initial recognition. Financial assets are recognised and derecognised upon trade date.

Effective interest method
The effective interest method is a method of calculating the amortised cost of a financial asset or a financial liability and of allocating interest income over the relevant period. The effective interest rate is the rate that discounts estimated future cash receipts through the expected life of the financial asset, or, where appropriate, a shorter period.

Income is recognised on an effective interest rate basis except for financial assets at fair value through profit or loss.

5. Managing uncertainties (continued)

Financial assets at fair value through profit or loss
Financial assets are classified as financial assets at fair value through profit or loss where the financial assets have been acquired principally for the purpose of selling in the near future. Assets in this category are classified as current assets.

Financial assets at fair value through profit or loss are stated at fair value, with any resultant gain or loss recognised in the profit or loss. The net gain or loss recognised in the profit or loss incorporates any interest earned on the financial assets.

Where a reliable fair value cannot be established for unlisted investments in equity instruments, cost is used less impairment if applicable.

Held-to-maturity investments
Non-derivative financial assets with fixed or determinable payments and fixed maturity dates that the group has the positive intent and ability to hold to maturity are classified as held-to-maturity investments. Held-to-maturity investments are recorded at amortised cost using the effective interest method less impairment, with revenue recognised on an effective yield basis.

Loans and receivables
Trade receivables, loans and other receivables that have fixed or determinable payments that are not quoted in an active market are classified as 'loans and receivables'. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest is recognised by applying the effective interest rate.

Impairment of financial assets
Financial assets are assessed for impairment at each reporting date.

- Financial assets held at amortised cost - If there is objective evidence that an impairment loss has been incurred for loans and receivables or held to maturity investments held at amortised cost, the amount of the loss is measured as the difference between the asset's carrying amount and the present value of estimated future cash flows discounted at the asset's original effective interest rate. The carrying amount is reduced by way of an allowance account. The loss is recognised in the Statement of Comprehensive Income.

- Financial assets held at cost - If there is objective evidence that an impairment loss has been incurred the amount of the impairment loss is the difference between the carrying amount of the asset and the present value of the estimated future cash flows discounted at the current market rate for similar assets. The net fair values of cash, deposits on call and non-interest-bearing monetary financial assets are in accord with their carrying amounts. Loans receivable are carried at cost, which is above their net fair value, because it is intended to hold them to maturity.

Financial liabilities
Financial liabilities are classified other financial liabilities and are recognised and derecognised upon trade date.

Other financial liabilities
Other financial liabilities, including borrowings, are initially measured at fair value, net of transaction costs. These liabilities are subsequently measured at amortised cost using the effective interest method, with interest expense recognised on an effective interest basis.

Supplier and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).

5.3 Fair value measurement

The following tables provide an analysis of assets and liabilities that are measured at fair value. The different levels of the fair value hierarchy are defined below.

Level 1: Quoted prices (unadjusted) in active markets for identical assets or liabilities that the entity can access at measurement date.
Level 2: Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly.
Level 3: Unobservable inputs for the asset or liability.

Non-financial assets	Category	Fair value 2017 $'000	Fair value 2016 $'000	Valuation technique[1]	Inputs used[1]
Land	**3**	**115,688**	97,200	Market approach	Adjusted market transactions (zoning, access, existing use, size, topography, location)
Buildings	**3**	**348,033**	249,163	Depreciated replacement cost (DRC)	Replacement cost of a new/consumed economic benefit/ obsolescence of asset
Infrastructure, plant and equipment	**2**	**4,480**	15,349	Market approach	Adjusted market transactions
	3	**799,263**	716,830	Depreciated replacement cost (DRC)	Replacement cost of a new/consumed economic benefit/ obsolescence of asset

1. The valuation techniques and inputs used in 2016 and 2017 are consistent.

The highest and best use of all non-financial assets is the same as their current use. The valuation techniques and inputs used in 2017 and 2016 are consistent.

Accounting Policy

For assets that are recognised in the financial statements at fair value on a recurring basis, the determination is made whether transfers have occurred between levels in the hierarchy by re-assessing categorisation (based on the lowest level input that is significant to the fair value measurement as a whole) at the end of each reporting period.

Recurring and non-recurring Level 3 fair value measurements - valuation processes
The Australian Valuation Solutions (AVS) undertook a comprehensive valuation of all non-financial assets located at the Lucas Heights and Camperdown campuses effective 30 June 2017. PP&E Valuations undertook a comprehensive valuation of all non-financial assets located at the Clayton campus effective 30 June 2017. The entity tests the procedures of the valuation model as an internal management review at least once every 12 months (Valuations are conducted with sufficient frequency to ensure that the carrying amounts of assets do not differ materially from the assets' fair values as at reporting date). If a particular asset class experiences significant and volatile changes in fair value (i.e. where indicators suggest that the value of the class has changed materially since the previous reporting period), that class is subject to specific valuation in the reporting period, regardless of the timing of the last specific valuation.

Land, Infrastructure, Plant and Equipment
Assets that do not transact with enough frequency or transparency to develop objective opinions of value from observable market evidence have been measured utilising the depreciated replacement cost (DRC) approach. Under the DRC approach, the estimated cost to replace the asset is calculated and then adjusted to take into account its consumed economic benefit/asset obsolescence (accumulated depreciation). Consumed economic benefit/asset obsolescence has been determined based on professional judgment regarding physical, economic and external obsolescence factors relevant to the asset under consideration.

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken. Financial assets are initially measured at their fair value plus transaction costs where appropriate.

Assets acquired at no cost, or for nominal consideration, are initially recognised as assets and revenues at their fair value at the date of acquisition, unless acquired as a consequence of restructuring of administrative arrangements. In the latter case, assets are initially recognised as contributions by owners at the amounts at which they were recognised in the transferor's accounts immediately prior to the restructuring.

6. Other information

6.1 Deed of indemnity

A new Deed of Indemnity between the Commonwealth Government, ANSTO and ANSTO Nuclear Medicine Pty Ltd (ANM), under which the government has formally agreed to indemnify ANSTO and ANSTO Officers, and ANM and ANM Officers, from any loss or liability arising from claims caused by ionising radiation, was signed by the Minister for Industry, Innovation and Science in April 2016. It will remain in place until April 2026.

6.2 Information relating to ANSTO (the parent entity)

	2017	2016
	$'000	$'000
Current assets	173,871	180,537
Non-current assets	1,372,988	1,183,182
Total assets	**1,546,859**	**1,363,719**
Current liabilities	89,906	82,725
Non-current liabilities	351,879	343,924
Total liabilities	**441,785**	**426,649**
Net assets	**1,105,074**	**937,070**
Contributed equity	770,177	741,336
Asset revaluation reserve	497,919	486,204
Other reserves	9,677	9,677
Accumulated deficit	(172,699)	(300,147)
Total equity	**1,105,074**	**937,070**
Surplus/(deficit) of the parent entity	**127,448**	**(60,569)**
Other comprehensive income/(expense) of the parent entity	**11,715**	**(3,631)**
Total comprehensive income/(expense) of the parent entity	**139,163**	**(64,200)**

The lease commitments shown in note 1.1B only relate to ANSTO.

	Interest rate	Maturity date	2017	2016
			$	$
$15 million unsecured loan facility from ANSTO to ANM	CommSec Variable Rate 6.08% (2016: 5.80%)	31.12.20	1,842,638	1,047,234
Total unsecured loan from ANSTO to ANM			**1,842,638**	**1,047,234**
Interest on unsecured loan facility			**83,887**	**39,712**

Investment in subsidiaries

ANSTO's subsidiaries at 30 June 2017 are set out below. Unless otherwise stated, they have share capital consisting solely of ordinary shares that are held directly by ANSTO, and the proportion of ownership interests held equals the voting rights held by the group. The country of incorporation is also their principal place of business.

			2017	2016
Name	**Place of incorporation**	**%**	**$**	**$**
PETTECH Solutions Pty Ltd (a)	Australia	100	9,474,588	9,474,588
Synchrotron Light Source Australia Pty Ltd (b)	Australia	100	1	1
ANSTO Inc. (c)	USA	100	-	-
ANSTO Nuclear Medicine Pty Ltd (d)	Australia	99	100	100
Australian Synchrotron Holding Company Pty Ltd (e)	Australia	100	196,119,000	-
Total investment in subsidiaries			**205,593,689**	**9,474,689**

(a) ANSTO continues to own 100% of PETTECH Solutions Pty Ltd. Its principal activities are manufacturing, sale and distribution of FluoroDeoxyGlucose (FDG) and Fluorine 18 (F18) for use in the Australian market. FDG and F18 are used in PET scanning which has produced significant advances in the diagnosis of cancer and other medical conditions.

(b) ANSTO continues to own 100% of Synchrotron Light Source Australia Pty Ltd (SLSA) operated the Australian Synchrotron until 4 September 2016. During the year ANSTO funded the operations of SLSA until they were transferred to ANSTO as ANSTO received directly the government and external funding to operate the Australian Synchrotron. SLSA is being deregistered in financial year 2018.

(c) ANSTO continues to own 100% of ANSTO Inc. its principal activity is to promote the commercialisation of ANSTO Technology in the USA. For the financial year ended 30 June 2017 the financial statements of ANSTO Inc. were audited by Wipfli LLC.

(d) ANSTO owns 100% of the B class shares on issue of ANM. The B class shares are not entitled to any dividends but do have operational control. There was one A class share issued to the Minister of Industry, Innovation and Science on behalf of the Commonwealth. The A class share is entitled to dividends. ANM's principal activities are to own and operate the new Molybdenum 99 (Mo-99) and Synroc Waste Treatment facilities. The Mo-99 facility is currently under construction on the ANSTO Lucas Heights site on the outskirts of Sydney in the state of New South Wales. This facility is scheduled to be operational in financial year 2018.

(e) On 1 July 2016 ANSTO was transferred the remaining 97.6% of the shares in the Australian Synchrotron Holding Company Pty Ltd (ASHCo) for no consideration. ASHCo owns the Australian Synchrotron. ANSTO is in the process of transferring the operations and net assets of ASHCo to ANSTO.

6.3 Subsequent events

On 8 August 2017 ANSTO agreed to a negotiated settlement in relation to a commercial legal claim. The negotiation was concluded on a commercial-in-confidence basis and was fully accounted for in other provisions as at 30 June 2017.

6.4 Budgetary reports and explanations of major variances

The following tables provide a comparison between the 2016–17 Portfolio Budget Statements (PBS) budget and the final financial outcome in the 2016–17 financial statements. The Budget is not audited and does not reflect additional budget estimates provided in the 2016–17 Portfolio Additional Estimates Statements (PAES) or the revised budget provided as part of the 2017–18 Portfolio Budget Statements (PBS). However, major changes in budget have been explained as part of the variance analysis where relevant.

The ANSTO PBS does not include ANSTO Nuclear Medicine Pty Ltd (ANM), the $168.8M nuclear medicine initiative, as it is a Public Non-Financial Corporation (PNFC) but does contain ANSTO's other controlled entities. PNFC's do not form part of the General Government Sector (GGS) and are outside of the scope of AASB 1055 *Budgetary Reporting*. ANM is included in the Actual figures as it is controlled by ANSTO.

A budget has not been provided for in the PBS, for non-cash items such as asset revaluations, foreign exchange and sale/impairment of asset adjustments. Unless the variance is considered to be 'major', no explanation has been provided. The ASHCo transaction was not completed in time to be reflected in the 2016-17 PBS, except for the Department appropriation.

Explanation of major variances

Event impacting financial statements	Affected consolidated statements and line items
The ANM project is reported differently in the budget compared to the actual figures. ANM is a subsidiary of ANSTO, it is consolidated into the financial statements and the costs associated with the construction of the ANM facilities are reflected in property, plant and equipment. However, for budget purposes ANM does not form part of the Portfolio Budget Statements and is reflected as an investment. As at 30 June 2017 the value of the ANM facilities is $109.4M (2016: $92.7M).	**Statement of Financial Position:** Investments Property, plant and equipment
The transfer of 97.6% of the share capital of ASHCo to ANSTO for no consideration giving ANSTO 100% ownership was still being negotiated when the 2016-17 PBS was finalised. However, the government had committed operating funding for the 2016-17 year which was reflected in the PBS. The depreciation funding was included in suppliers expenses due to there being no agreement on the transfer of the asset. The details of the acquisition are in note 3.4.	**Statement of Financial Position:** Cash and cash equivalents Property, plant and equipment Other payables Accumulated deficit **Statement of Comprehensive Income:** Suppliers expenses Depreciation/amortisation and impairment losses Interest revenue Assets free of charge

Event impacting financial statements	Affected consolidated statements and line items
During the year ANSTO undertook a full review of property, plant and equipment, and intangible assets in conjunction with an independent valuation. While this review and valuation were planned, the outcomes could not be reliably forecast and were not reflected in the PBS.	**Statement of Financial Position:** Property, plant and equipment Reserves Accumulated deficit **Statement of Comprehensive Income:** Write-down of assets Changes in asset revaluation reserve
During the year ANSTO was subject to an unplanned commercial legal claim which is currently being negotiated on a commercial-in-confidence basis.	**Statement of Financial Position:** Other provisions **Statement of Comprehensive Income:** Suppliers expenses
In the lead up to the commissioning and operation of the ANM Mo-99 facility in 2017-18, addition inventory has been put in place.	**Statement of Financial Position:** Inventory **Statement of Comprehensive Income:** Suppliers expenses **Statement of Cash Flows:** Payments to suppliers
ANSTO's short and long term incentive program was renegotiated during the year. In addition ANSTO had a long term project deliver on 30 June 2017 resulting in a one off increase in employee incentives.	**Statement of Financial Position:** Employee payables
ANSTO production of Mo-99 increased to mitigate global demand prior to the transition of production to the new ANSTO Nuclear Medicine facility in 2017-18.	**Statement of Comprehensive Income:** Sales of goods and rendering of services revenue
ANSTO manages its cash through the use of term deposits. The term of each deposit is dependent on the cash needs of the business and the interest rates prevailing at the time. Changes in either the cash needs or the interest rates impact on the number of times a deposit is 'rolled' in the period. The 2016-17 PBS was completed in April 2016.	**Statement of Cash Flows:** Proceeds from investment sales/maturities Purchase of investments

CORPORATE GOVERNANCE

ANSTO Statement on Corporate Governance

ANSTO is an Australian Government Corporate Commonwealth entity with its own Board that is established and constituted under the provisions of the *Australian Nuclear Science and Technology Organisation Act 1987* (*ANSTO Act*). ANSTO forms part of the portfolio responsibilities of the Minister for Industry, Innovation and Science.

The *ANSTO Act* defines the organisation's functions and powers, details the responsibilities and duties of the ANSTO Board and the Chief Executive Officer to manage the organisation, and defines staffing, financial management and governance arrangements necessary for the efficient and effective management of the organisation.

As a Corporate Commonwealth entity, ANSTO's operations and governance arrangements are subject to the provisions of the *Public Governance, Performance and Accountability Act 2013* (*PGPA Act*) and the Rules issued pursuant to that Act.

The *PGPA Act* promotes and mandates high standards of governance, performance and public accountability and establishes a core set of obligations that apply to an entity's accountable authority (i.e. the governing Board) and 'officials' employed or otherwise engaged by a Corporate Commonwealth entity.

Over the 2016–2017 reporting period, ANSTO has continued to align its operational frameworks and corporate governance arrangements to meet the requirements of the *PGPA Act* and the associated Rules. These arrangements are underpinned by ANSTO's core values and Code of Ethics, which are reviewed and adapted to accommodate organisational change and to reflect national and international best practice.

Ministerial Oversight

In 2016–2017 the Minister responsible for ANSTO was the Minister for Industry, Innovation and Science.

Under the *ANSTO Act* and *PGPA Act*, the relevant Minister and the Finance Minister may provide the ANSTO Board with Directions with respect of the performance of the functions or the exercise of the powers of the Board or the organisation, including a need to comply with a specific Government Policy Order.

No Ministerial Directions, issued under either the *ANSTO Act* or *PGPA Act*, were received by the ANSTO Board in 2016–2017.

In June 2015, the Minister for Industry and Science provided the ANSTO Board with a Statement of Expectations (SOE) relative to the government's policy context; partnerships and collaboration; science assets and staff; and communication with the Minister's office and the Department. This SOE still applies. The ANSTO Board has provided a response to the SOE in the form of a Statement of Intent that sets out how the ANSTO Board will meet the Minister's expectations as articulated within the SOE.

Ministerial Oversight

Under section 19 of the *PGPA Act* and in accordance with the Minister's *SOE*, ANSTO is required to provide ANSTO's responsible Minister with written notification of specified events and, more generally, to keep the Minister informed of its operations and those of its subsidiaries.

During the period 2016–2017, three significant event notifications were provided to the Minister:

1. On 16 August 2016, ANSTO provided notice to the Minister of its acquisition of further shares in Clarity Pharmaceuticals Pty Ltd.
2. On 20 September 2016, ANSTO provided notice to the Minister that it had become the sole shareholder of the Australian Synchrotron Holding Company (ASHCo) as part of the process to transfer ownership of the Australian Synchrotron to ANSTO.
3. On 24 February 2017, ANSTO provided notice to the Minister of changes to its shareholding and rights in Clarity Pharmaceuticals Ltd as a result of the company converting from a proprietary company to an unlisted public company.

In addition, 55 briefs on ANSTO's operations were provided to the Minister.

ANSTO Board

ANSTO is governed by a Board which is the 'accountable authority' responsible to the Australian Government under the *PGPA Act* for the overall direction, performance and governance of the organisation. ANSTO's operational framework and corporate governance arrangements support the effective operation of the ANSTO Board in the execution of its statutory and fiduciary duties under relevant legislation, particularly the *ANSTO* and *PGPA Acts*.

The general functions of the Board, as set out in the *ANSTO Act*, are to ensure the proper and efficient performance of the functions of the organisation and to determine the policy of the organisation with respect to any matter, having regard to the current policies of the Commonwealth Government.

The responsibilities and duties of the Board and its relationship with Executive Management are set out in a Board Charter. These responsibilities reflect the mandatory duties that apply to accountable authorities under sections 15 to 19 of the *PGPA Act*.

The principal governance responsibilities of the Board are to:

- select, appoint and monitor the performance of the Chief Executive Officer (CEO);
- establish and monitor the strategic direction of the organisation;
- determine and approve 'major' policies of the organisation;
- oversee the operations of the organisation, ensuring the organisation operates in a safe, responsible and ethical manner, and is compliant with legal and regulatory obligations;
- monitor financial performance;
- ensure the establishment of effective organisational governance, risk management, compliance, and assurance mechanisms.

The effectiveness and performance of the Board and the individual members of the Board are evaluated regularly. During the period, the effectiveness and performance of the Board was discussed as part of the Board renewal process. The remuneration and allowances payable to members of the Board, including the Chief Executive Officer, are determined by the Australian Government Remuneration Tribunal.

Disclosure of Interests and Related Entity Transactions

Board members declare material interests in accordance with the *ANSTO Act* and *PGPA Act* as appropriate. The Board has processes for managing conflicts of interest including a requirement that members absent themselves from discussions and voting where a member has declared a material personal interest, or where a potential or actual conflict of interest or duty arises. For the reporting period 2016–2017 the Board is satisfied that it has discharged its duties and obligations in accordance with relevant requirements.

ANSTO follows the Government Procurement Guidelines and has a system of delegated powers for all transactions that enables transactions to be appropriately considered.

There have been 17 transactions above $10,000 which came to a total combined value of $27.9 million.

Composition of the Board

As of 30 June 2017, ANSTO's Board comprised the CEO and eight non-executive members drawn from the broader community who are not involved in the day-to-day management of the organisation. All non-executive members are appointed by the Governor-General in Council. The Chief Executive Officer is appointed by the ANSTO Board, in consultation with the Minister.

The CEO manages the affairs of ANSTO, subject to the directions of, and in accordance with, policies determined by the Board. Senior management attend Board meetings as required to report on matters relevant to their individual areas of responsibility. ANSTO has a Company Secretary who assists with the running of the Board and advises on governance matters. The Company Secretary attends Board meetings.

Each Board member brings complementary skills and experience to the Board relevant to the principal activities and operations of ANSTO.

Board members are able to seek independent professional advice in accordance with their duties, responsibilities and obligations as members of the Board. Newly appointed Board members are inducted in the organisation's operations and activities, and their duties and responsibilities as a member of the Board of a Corporate Commonwealth entity.

The Board meets regularly in accordance with a formally approved timetable and agenda. Seven Board meetings were held during the 2016–2017 financial year. Details of the number of Board meetings attended by each member during the financial year 2016–2017 are outlined in **Table 1**.

Table 1

Member	Eligible to attend	Attended
Mr Jim W McDowell (Chair)	7	6
Ms Erica Smyth (Deputy Chair)	7	7
Dr Adrian (Adi) Paterson (Chief Executive Officer)	7	7
Emeritus Professor Stephen Buckman, AM	7	7
Ms Penelope J Dobson	7	7
Professor Brigid Heywood	7	6
Ms Carol Holley	7	7
Professor Andrew M Scott, AM	7	7
Professor Margaret Sheil, AO	7	7

Board committees

The ANSTO Board delegates certain functions to a Risk and Audit Committee (RAC), in accordance with the *PGPA Act* and Rules and corporate governance best practice. It also operates a Remuneration and Nominations Committee and a Commercial Sub-Committee.

Risk and Audit Committee

The RAC assists the ANSTO Board in the discharge of its responsibilities by providing independent oversight, advice and assurance to the Board on the appropriateness of financial reporting processes, performance reporting arrangements, systems of risk oversight and management, and systems of internal control. The role, purpose and responsibilities of the RAC are set out in the RAC Charter.

The Board is responsible for the appointment of RAC members, including the RAC Chair. The RAC consists of at least three members drawn from the Board who are required to have appropriate qualifications, knowledge, skills or experience to assist the RAC to perform its functions, including but not limited to an appropriate level of understanding of systems of risk oversight and management and systems of internal control. At least one member is required to be a qualified accountant or other financial professional or with appropriate executive experience and understanding of financial reporting processes and performance reporting arrangements.

The Chair of the Board, the CEO, and the ANSTO Group Chief Financial Officer cannot be members of the RAC. However, the Chair of the Board and other Board members may attend RAC meetings, as observers. Members of the ANSTO management team (including the Group Chief Financial Officer, Head of Internal Audit and the Group Legal Counsel) attend meetings of the RAC as advisors and observers, by invitation of the RAC Chair. The Company Secretary is the secretary to the RAC and attends RAC meetings.

Representatives from the Australian National Audit Office (ANAO) and their contracted service provider (currently KPMG) also attend RAC meetings, by invitation of the RAC Chair.

The RAC meets four times a year. Details of the number of RAC meetings attended by each member during the financial year 2016–2017 are provided in **Table 2**.

Table 2

Member	Eligible to attend	Attended
Ms Erica Smyth (Chair)	4	4
Emeritus Professor Stephen Buckman, AM	4	4
Ms Penelope J Dobson	4	4
Professor Brigid Heywood[1]	3	2
Ms Carol Holley	4	4
Professor Andrew M Scott, AM	4	4
Professor Margaret Sheil, AO[1]	3	3

1. Appointed 11 August 2016

Remuneration and Nominations Committee

The Remuneration and Nominations Committee assists the Board in fulfilling its responsibilities with regard to remuneration policy and strategy, performance and remuneration of the CEO, statutory and regulatory compliance of remuneration policies; and succession planning and nominations for Board Members and the CEO.

The objectives, duties and responsibilities of the committee are set out in the Remuneration and Nominations Committee Charter.

The Remuneration and Nominations Committee consists of at least two non-executive members of the Board and the CEO. The Committee is chaired by a non-executive member nominated by the Board. The Group Executive – People, Culture, Safety and Security attends Committee meetings by invitation, as do other relevant parties by invitation of the Committee Chair. The Company Secretary is the secretary to the Committee and attends Committee meetings.

The committee met on three occasions during the 2016–2017 financial year. Details of the number of Remuneration and Nominations Committee meetings attended by each member during the financial year 2016–2017 are provided in **Table 3**.

Table 3

Member	Eligible to attend	Attended
Mr Jim W McDowell (Chair)	3	3
Dr Adrian (Adi) Paterson	3	3
Emeritus Professor Stephen Buckman, AM[1]	2	2
Ms Penelope J Dobson	3	3

1. Appointed 6 October 2016

Commercial Sub-Committee

The Commercial Sub-Committee provides independent oversight, review and evaluation of particular commercial activities. The objectives, duties and responsibilities of the Committee are set out in the Commercial Sub-Committee Charter.

The Commercial Sub-Committee consists of at least three non-executive members of the Board. The Chair of the Board is the Chair of the Committee unless the Chair delegates this role to another non-executive member. Senior Management attends Committee meetings by invitation, as do other relevant parties by invitation of the Committee Chair. The Company Secretary is the secretary to the Committee and attends Committee meetings.

The Committee met on one occasion during the 2016–2017 financial year. Details of the number of Commercial Sub-Committee meetings attended by each member during the financial year 2016–2017 are provided in **Table 4**.

Table 4

Member	Eligible to attend	Attended
Mr Jim W McDowell (Chair)	1	1
Ms Erica Smyth	1	1
Ms Penelope J Dobson	1	1

External Audit

The Commonwealth Auditor-General, through the Australian National Audit Office (ANAO), is the external auditor for ANSTO and its Australian based subsidiaries. The auditors of ANSTO's USA based subsidiary, ANSTO Inc is WIPFLi LLP. For the financial year 2016–2017, the ANAO contracted KPMG to assist with the ANSTO and Australian based subsidiaries external audits. Apart from hosting ANSTO's 'whistleblower' reporting service (FairCall), KPMG did not provide any other services to ANSTO during the financial year.

Risk Management

Under section 16 of the *PGPA Act*, the ANSTO Board is responsible for the establishment and maintenance of an appropriate system of risk oversight and management and an appropriate system of internal control.

Management is accountable to the ANSTO Board for designing, implementing and monitoring the risk management framework and its integration into the day-to-day activities of the organisation. ANSTO's risk management framework is based on the following key principles:

- adoption of a common risk management approach and language;
- positioning risk management as an integral part of all organisational processes, including decision-making processes;
- applying a systematic and structured risk management process that is responsive to change;
- establishing a comprehensive and effective internal control system that provides 'reasonable assurance' regarding the effectiveness and efficiency of operations, the reliability of financial and non-financial reporting, and compliance with applicable laws and regulations;
- the delegation of responsibility and accountability;
- promotion of an enterprise-wide philosophy that seeks to identify and exploit opportunity responsibly; and anticipate and treat risks before they occur.

The ANSTO Board determines the nature and extent of the risk it is willing to accept in achieving the organisation's strategic objectives, consistent with ANSTO's risk appetite and the prudent, proper and ethical use and management of public resources. The ANSTO Board has a particular interest in those risks that may negatively impact the sustainability and reputation of the organisation.

The RAC receives regular reports and briefings on ANSTO's top risks, risk management activities as well as the risk management maturity and risk culture of the organisation.

Internal Control

The ANSTO Board is ultimately responsible for the establishment and maintenance of a system of internal control that provides 'reasonable assurance' that ANSTO's objectives will be achieved relative to the effectiveness and efficiency of its operations, the reliability of financial and non-financial reporting and compliance with applicable laws and regulations.

During the 2016–2017 financial year, the ANSTO Internal Audit function evaluated ANSTO's systems of internal control at the 'enterprise level' against the *COSO Internal Control – Integrated Framework*. This review concluded that all five components of an effective system of internal control, as defined under the COSO framework and their respective control principles, are present and functioning within ANSTO. ANSTO's systems of internal control are further strengthen by the application of a 'combined assurance' (*Three Lines of Assurance Defence*) model that enhances understanding of risk management and control across the organisation by clarifying the roles, responsibilities and the organisational positioning of individuals and groups that play a key role in managing risk.

Fraud Control

Section 10 of the *PGPA Rule* places a legal obligation on the ANSTO Board to take all reasonable measures to prevent, detect and deal with fraud, including by:

- conducting fraud risk assessments;
- developing and implementing a fraud control plan;
- having an appropriate mechanism for preventing fraud;
- having an appropriate mechanism for detecting incidents of fraud or suspected fraud;
- having an appropriate mechanism for investigating or otherwise dealing with incidents of fraud or suspected fraud;
- having an appropriate mechanism for recording and reporting incidents of fraud or suspected fraud.

In accordance with the above obligations, ANSTO conducts risk assessments of its exposure to possible fraud, corrupt conduct and other forms of unacceptable behaviour, and is consistently strengthening its fraud control arrangements through the implementation of a comprehensive Fraud Control Plan. Within the context of this plan ANSTO has established or enhanced fraud control and ethics policies, standards and procedures that serve to minimise the incidence of fraud and other forms of unacceptable behaviour, including procedures and processes for fraud prevention, detection, reporting and investigation.

In addition, ANSTO operates a public interest disclosure scheme that meets the requirements of the *Public Interest Disclosure Act 2013*. Complementary to this scheme ANSTO has introduced a confidential, independent and externally hosted reporting service (FairCall) which provides another avenue for staff and contractors to report any concerns about unacceptable, unethical or illegal activities in the workplace.

All instances of fraud are to be reported to the RAC.

Business Ethics

ANSTO's Code of Ethics provides all ANSTO employees and contracted staff with a framework for ethical decision-making and articulates the standards of behaviour, values and actions expected of all individuals who work for or on behalf of ANSTO. The Code explains the principles covering appropriate conduct in a variety of contexts and informs employees on how to deal with their work colleagues, stakeholders, other organisations and the community in an appropriate manner.

The Code is supported by a range of policies, guidelines and instructions that specifically address matters canvassed within the Code, including managing conflicts of interest, harassment and bullying, gifts and benefits, hospitality, email and internet usage, and insider trading.

ANSTO's ethical values and standards are reinforced through various means, including training and awareness, staff engagement surveys, and the ANSTO Enterprise Agreement.

Business Resilience

The continuity of ANSTO's operations is critical and is a key focus area of the Board, the Chief Executive Officer and senior management. Many of the services delivered by ANSTO are critical to the economic and social well-being and health of the Australian community.

ANSTO regularly reviews and tests all aspects of its Business Resilience Framework to ensure its continued robustness, reliability and readiness. This includes response planning in relation to ANSTO's OPAL reactor and other critical infrastructure.

Legal and Regulatory Compliance

ANSTO operates within a complex and highly regulated business environment. In recognition of this environment, ANSTO has established a range of strategies, policies, systems and responsibility and accountability arrangements that mitigate the risk of non-compliance with relevant laws and regulations. The continuing development and improvement of ANSTO's compliance framework remains a key focus.

Internal Audit

The ANSTO Board has established an Internal Audit function as a key component of ANSTO's governance framework.

The primary purpose of Internal Audit is to provide the ANSTO Board and CEO with independent and objective assurance and advisory services that 'add value' and help improve operational performance.

The scope of Internal Audit's activities encompasses all financial and non-financial functions, systems, programs, projects, activities and processes, across the ANSTO Group. Internal Audit engagements generally involve:

- appraising the adequacy and effectiveness of the internal control environment;
- reviewing the adequacy and effectiveness of arrangements established by management to ensure compliance;
- assessing the adequacy of risk management activities as they relate to specific business functions, systems, programs, projects or activities;
- reviewing the means of safeguarding physical and intangible assets ;
- reviewing the reliability and integrity of financial and non-financial information;
- appraising the economy, efficiency and effectiveness with which resources are acquired and deployed relative to the achievement of business objectives.

The Head of Internal Audit prepares strategic and annual work plans that are risk based, and which reflect focus areas that may be highlighted by the RAC and executive management. These plans are updated, as appropriate, in line with ANSTO's dynamic business environment. The annual Internal Audit Plan is reviewed by the RAC and approved by the ANSTO Board.

Significant internal audit findings are presented to the RAC. Follow-up reviews are conducted to ensure that all internal audit recommendations are properly carried out.

In order to ensure the independence of the Internal Audit function, the Head of Internal Audit reports directly to the RAC and has unrestricted access to the RAC Chair and members, as well as the Chair of the

Board. The Head of Internal Audit reports for administrative purposes to the Group Chief Financial Officer and has access to Board and Committee minutes and submissions.

The role, purpose, scope and authority of the Internal Audit function is set out in the Internal Audit Charter. This Charter is reviewed by the RAC and approved by the ANSTO Board.

Judicial decisions and reviews by outside bodies

There were no judicial decisions or decisions of administrative tribunals that had a significant impact on the operations of ANSTO during the reporting year.

There were no specific reports issued by the Commonwealth Auditor-General, other than their report issued in relation to the 2015–2016 and 2016–2017 financial statements.

There were no reports on the operations of ANSTO by a Parliamentary Committee, the Commonwealth Ombudsman or the Office of the Australian Information Commissioner during the reporting year.

Amendments to the *Australian Nuclear Science and Technology Organisation Act 1987*

During the 2016–2017 reporting period, the Government introduced the *Australian Nuclear Science and Technology Organisation Amendment Bill 2017 (ANSTO Bill)* into the Senate. Debate on the *ANSTO Bill* was adjourned until the Spring 2017 sitting period. The purpose of the *ANSTO Bill* is to amend the *ANSTO Act* to provide greater flexibility to ANSTO in its activities, including the use of its property, facilities and resources for science, technology, innovation and training purposes. This includes enabling the establishment of an Innovation Precinct at ANSTO's Lucas Heights campus, and the potential establishment of similar precincts in association with other ANSTO campuses. More broadly, the *ANSTO Bill* will facilitate enhanced collaboration between industry, universities and ANSTO across all its sites. The *ANSTO Bill* also seeks to update and expand the constitutional references in the *ANSTO Act* to better reflect ANSTO's current and proposed activities.

Indemnities and insurance premiums for officers

ANSTO's insurance coverage with Comcover includes professional indemnity and directors' and officers' liability. Certain sections of the *PGPA Act* contain prohibitions against ANSTO giving indemnities and paying insurance premiums relating to liabilities arising from conduct involving a lack of good faith by officers. There have been no exceptions to these provisions and no claims were made against ANSTO in respect of such liability that required a claim on ANSTO's insurer, Comcover. It should be noted that ANSTO subsidiaries are fully covered under ANSTO's overarching Comcover policies. Workers compensation coverage is dependent on whether employees of a subsidiary are Commonwealth Government employees or employed under State labour legislation.

Nuclear liability

ANSTO has a Deed of Indemnity with the Commonwealth until April 2026 which commits the Government to meeting any damages awarded against ANSTO and ANSTO Nuclear Medicine Pty Ltd, their employees and their contractors for damage caused by ionising radiation. This provides comfort to the local community and to ANSTO's suppliers, who cannot be covered by ANSTO's normal insurance arrangements and are not accustomed to being exposed to risks of this nature. Any claim would first attach to the general $50 million nuclear cover that ANSTO has with Comcover to the extent that it was insured under that policy, with the remainder covered by this indemnity agreement.

APPENDIX 1

Equality of employment opportunity

Gender Equity and Diversity at ANSTO

ANSTO has a commitment to achieve greater diversity and gender equity by 2030. Our Gender Equity Committee aims to make ANSTO an effective leader in gender equity globally along with creating employment opportunities for all staff.

ANSTO is a member of the Science in Australia Gender Equity (SAGE) program, which is designed to improve gender equity and diversity in STEMM, and we are developing an action plan to achieve a bronze level Athena SWAN rating by 2018. This includes the development of the Next Gen STEMM 'Girls in the Lab' program which invited 25 female students to come and work hands-on with our scientists.

Equality of employment opportunity for 2016–2017

	Number Employed	% of Total Staff	Average Salary
Female	358	30%	$88,565
Male	849	70%	$105,310
People with disabilities	7	1%	$95,204
Aboriginal and Torres Strait Islanders	7	1%	$88,190
Non-English-speaking background	253	21%	$107,564

Career paths for research and technical staff

ANSTO is committed to providing a high quality learning environment through the Enterprise Agreement which facilitates both personal and organisational growth.

To secure strong career progression for future generations of scientists and engineers, we operate a number of early career programs through paid Vacation and Year in Industry programs at the under-graduate level and Graduate and Post-Doctoral Fellowship Programs at the post-graduate level; additionally ANSTO engages trade apprenticeships and professional traineeships in corporate areas like IT and Human Resources.

In addition:

- 42 per cent of the study support for formal qualifications currently offered to employees is aligned to science and eight percent was aligned to engineering. The qualifications being undertake range from Certificate level to PhD;
- 80 per cent of training requests have been received for external operational and technical training courses over the last financial year.

Careers in STEMM

In addition to establishing formalised early career pathways, ANSTO's Discovery Centre supplies a number of programs designed to promote careers in STEMM disciplines through student engagement and teacher development.

Industry training and engagement

ANSTO has undertaken a number of activities to increase industry relevant training and increase engagement between researchers and business including:

- establishment of a Graduate Institute at Lucas Heights aimed at fostering improved industry engagement and research training;

- long term support of AINSE and its programs;
- a neutron scattering industry engagement plan is operational and the proposed structure is being evaluated;
- research accounts to encourage and incentivise researchers;
- the establishment of a research ombudsman office to examine research ethics and governance issues;
- a 'Developing Your Commercial Acumen' program.

Benefits and performance

ANSTO provides a flexible, supportive and diverse working environment for employees to effectively manage work to balance work demands with personal life through initiatives such as individual flexible agreements, part-time, job share, phased retirement, purchased leave, and working from home. ANSTO also encourages employees to pursue development opportunities, secondments both internal and external and to take opportunities to learn different organisational skills and follow different career paths through our Learn and Leap Program.

Health and Wellbeing Programs

ANSTO's Health and Wellbeing Programs offer annual flu vaccines, bowel screening programs, and men's and women's health screenings, and lunchtime seminars covering issues such as 'Managing staff with Mental Health issues' were presented to managers by ANSTO's Employee Assistance Program.

ANSTO continues to provide a site physiotherapy service as part of early intervention for injury management and return to work programs as well as a fully functioning health centre with a registered nurse and fully functioning treatment room (Monday to Friday).

Disability Strategy

ANSTO supports employees with disabilities and is committed to providing a safe and equitable working environment.

ANSTO assists people with disabilities by providing workplace modifications or reasonable adjustments to help them perform their job, including:

- changing work hours;
- ergonomic or specialist equipment;
- accessibility parking permits and spaces.

All new buildings and areas being renovated at ANSTO must comply with the *Disability Discrimination Act 1992*. Improvements include widening footpaths and equipping meeting rooms (100m^2) with hearing loops.

In the event that a work place design has excluded facilities for people with disabilities or the work environment is unsafe for people with disabilities to fulfil their duties, ANSTO reviews to determine if the work environment can be modified.

ANSTO's policies and procedures align with the requirements of the *Equal Employment Opportunity (Commonwealth Authorities) Act 1987* and *Disability Discrimination Act 1992*, intended to ensure employees with disabilities working at ANSTO and applicants for recruitment who have a disability are not discriminated against.

ANSTO also has procedures and support in place to handle complaints and grievances which may be raised by employees and visitors.

APPENDIX 2

Functions and powers of the organisation under the *ANSTO Act 1987*

This appendix describes the functions and powers of the organisation under the *Australian Nuclear Science and Technology Organisation Act 1987 (ANSTO Act)*, which is ANSTO's enabling legislation. In the text below, 'Organisation' means the Australian Nuclear Science and Technology Organisation.

Section 5: Functions of the Organisation

(1) The functions of the Organisation are:

(a) to undertake research and development in relation to:

(i) nuclear science and nuclear technology; and

(ia) the application and use of nuclear science and nuclear technology; and

(ii) the production and use of radioisotopes, and the use of isotopic techniques and nuclear radiation, for medicine, science, industry, commerce and agriculture; and

(iii) such other matters as the Minister directs; and

(b) to encourage and facilitate the application and use of the results of such research and development; and

(ba) to condition, manage and store radioactive materials and radioactive waste, arising from:

(i) the Organisation's activities (including the production of radioactive materials for other persons); or

(ii) the activities of companies in which the Organisation holds a controlling interest (including the production of radioactive materials for other persons); or

(iii) the use by other persons of radioactive materials produced by the Organisation or such companies; or

(iv) the activities of other persons who are specified in the regulations; and

(bb) to condition, manage and store radioactive materials and radioactive waste generated, possessed or controlled by the Commonwealth or a Commonwealth entity; and

(bc) to condition, manage and store radioactive materials and radioactive waste at the request of:

(i) a law enforcement agency; or

(ii) a Commonwealth, State or Territory agency responsible for the management of emergencies or disasters; including, but not limited to, radioactive materials or radioactive waste involved in, or arising out of, a radiological incident or a radiological emergency; and

(bd) to condition, manage and store radioactive waste that has been, or is to be, sent to Australia under contractual arrangements relating to the conditioning or reprocessing of ANSTO spent nuclear fuel; and

(c) to produce, acquire, provide and sell goods, and to provide services, that are:

(i) in connection with the production and use of radioisotopes, and the use of isotopic techniques and nuclear radiation, for medicine, science, industry, commerce and agriculture; or

(ia) in connection with the conditioning, management and storage of radioactive materials or radioactive waste; or

(ib) in connection with nuclear science and nuclear technology; or

(ic) in connection with the application and use of nuclear science and nuclear technology; or

(ii) otherwise in connection with matters related to its activities; and

(d) to act as a means of liaison between Australia and other countries in matters related to its activities; and

(e) to provide advice on aspects of:

(i) nuclear science and nuclear technology; and

(ii) the application and use of nuclear science and nuclear technology; and

(iii) other matters related to its activities; and

(ea) to make available to other persons, on a commercial basis, the knowledge, expertise, equipment, facilities, resources and property of the Organisation by:

(i) providing training and management expertise; or

(ii) selling or leasing equipment; or

(iii) leasing land, buildings and facilities; or

(iv) taking any other action that the Organisation thinks appropriate; and

(f) to cooperate with appropriate authorities of the Commonwealth, the States and the Territories, and with other organisations and institutions in Australia or elsewhere, in matters related to its activities; and

(g) to publish scientific and technical reports, periodicals and papers on matters related to its activities; and

(h) to collect and sell or distribute, as appropriate, information and advice on matters related to its activities; and

APPENDIX 2

Functions and powers of the organisation under the *ANSTO Act 1987*

(j) to arrange for training, and the establishment and award of scientific research studentships and fellowships, in matters related to its activities; and

(k) to make grants in aid of research into matters related to its activities; and

(m) to make arrangements with universities and other educational research institutions, professional bodies and other persons for the conduct of research or of other activities in matters related to its activities.

(1A) A regulation made for the purposes of subparagraph (1)(ba)(iv) must not have the effect of authorising the premises on which the Lucas Heights Research Laboratories are situated to become a national nuclear waste repository.

(1B) In subsection (1A):

national nuclear waste repository means a site chosen by the Commonwealth, after the commencement of this subsection, for the storage of nuclear waste with a view to it never being moved to another site.

(1C) Without limiting paragraph 5(1)(bb):

(a) radioactive materials and radioactive waste generated by a Commonwealth contractor under a contract between the Commonwealth contractor and the Commonwealth or a Commonwealth entity are taken to be generated by the Commonwealth or the Commonwealth entity, as the case requires; and

(b) radioactive materials and radioactive waste possessed or controlled by a Commonwealth contractor under a contract between the Commonwealth contractor and the Commonwealth or a Commonwealth entity are taken to be possessed or controlled by the Commonwealth or the Commonwealth entity, as the case requires.

(2) The Organisation shall not undertake research or development into the design or production of nuclear weapons or other nuclear explosive devices.

(3) In undertaking its functions, the Organisation is to have regard to:

(a) the Commonwealth Government's national science, technology and energy policy objectives; and

(b) the Commonwealth Government's commercialisation objectives for public research institutions.

(4) The Minister shall not give a direction under subparagraph (1)(a)(iii) to the Organisation to undertake research or development in relation to a matter unless the Minister is satisfied that research or development by the Organisation in relation to that matter would be an effective use of the staff of the Organisation, and would not duplicate unnecessarily any activity being carried on, or proposed to be carried on, by any other agency or authority of the Commonwealth.

(5) The Organisation may perform its functions to the extent only that they are not in excess of the functions that may be conferred on it by virtue of any of the legislative powers of the Parliament, and, in particular, may perform its functions:

(a) in so far as it is appropriate for those functions to be performed by the Organisation on behalf of the Government of the Commonwealth as the national Government of Australia; and

(b) for purposes for which it is appropriate for the Parliament as the national Parliament of Australia to authorise the Organisation to perform functions; and

(c) by way of expenditure of money that is available for the purposes of the Organisation in accordance with an appropriation made by the Parliament; and

(d) in the course of, or in relation to, trade and commerce with other countries, among the States, between Territories or between a Territory and a State; and

(e) for purposes related to external affairs; and

(f) for purposes in or in relation to a Territory; and

(g) for purposes related to the defence of the Commonwealth.

Section 6: General powers of Organisation

(1) Subject to this Act, the Organisation has power to do all things necessary or convenient to be done for or in connection with the performance of its functions and, in particular, has power:

(a) to enter into contracts;

(b) to acquire, hold and dispose of real or personal property;

(c) to occupy, use and control any land or building owned or held under lease by the Commonwealth and made available for the purposes of the Organisation;

(d) to erect buildings and structures and carry out works;

(e) to form, or participate in the formation of, a company or partnership;

(f) to appoint agents and attorneys, and to act as an agent for other persons;

(g) to engage persons to perform services for the Organisation;

(h) to design, produce, construct and operate equipment and facilities; and

(j) to do anything incidental to any of its powers.

(2) The powers of the Organisation may be exercised within or outside Australia.

(3) To avoid doubt, the Organisation has the power to construct buildings and facilities for the sole purpose of performing the function referred to in paragraph 5(1)(ea).

APPENDIX 3

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), section 516A

Environmental Protection

ANSTO undertakes education, research and innovation to enhance scientific understanding of the environment and to provide solutions for a sustainable planet.

ANSTO's commitment to environmental protection and sustainability principles is defined in its Corporate strategic plans, Environmental Policy and Organisational core values. We are committed to effective stewardship, the sustainability of our operations and responsible interaction with, and protection of, the local ecology and biosphere. We minimise our environmental footprint through continuing to apply the principles of Ecologically Sustainable Development (ESD) and by the prevention, minimisation and control of pollution.

These values are integral to ANSTO's Business Management System – the framework that defines how business is conducted to deliver outcomes to our customers and stakeholders in a safe, consistent and environmentally responsible manner. Objectives and targets for safe, secure and sustainable operations are implemented through documented operational and business plans at all levels of the organisation.

Environmental protection is mandated when planning and undertaking major capital works and any proposed activities which may fall under the *EPBC Act* are assessed for referral to the Department of the Environment and Energy. Proposals for new (or modifications to existing) facilities or activities also undergo a rigorous internal safety, regulatory and environmental assurance process with independent oversight.

Environmental awareness is promoted throughout the organisation through site inductions, training and communication programs.

Environmental and Quality Management Systems

To provide assurance that ANSTO is maintaining sound environmental protection practices, we maintain an environmental management system (EMS) that is certified to the International Standard ISO 14001. In April 2017, the Australian Synchrotron EMS was integrated into the wider ANSTO EMS which was subsequently certified and upgraded to the 2015 version of the Standard. This new standard requires that:

- the environmental context of the organisation and its operations is defined;
- its environmental impacts and compliance obligations are identified, with the risks managed and mitigated;
- an effective measurement and review system is in operation;
- there is organisational commitment to continual improvement.

Our extensive environmental monitoring program also operates within a quality framework that is certified to the ISO 9001 standard for Quality Management Systems.

In 2017, ANSTO reviewed its six-year Environmental Management System Strategy and established new key performance indicators (KPI's), targets and action plans to ensure the remaining objectives of the Strategy are fulfilled by FY2019. The *Executive Committee for Workplace Health & Safety and Environment* supports the implementation of this strategy and provides oversight of the environmental management system.

Environmental Performance

ANSTO aims to reduce its environmental footprint by minimising the generation of waste, monitoring the consumption of resources such as hydrocarbon fuels, electricity and water, and by recycling consumables. We also monitor and annually report our carbon footprint through the National Greenhouse and Energy Reporting (NGER) Scheme and have participated in the Sustainability Advantage Program run by the NSW Office of Environment and Heritage. ANSTO has commenced a program to assess its impact on the biodiversity within thez Lucas Heights Bushland Perimeter that will inform environmental planning for this area.

The performance indicators in Table 1 (now incorporating ANSTO Clayton where practicable), show that over the past 3 years ANSTO's electricity consumption has steadily decreased at each of the three campuses. This has been supported by an electricity savings program introduced in FY17. The initial staff awareness and engagement component will continue throughout the program. The second component is a systematic infrastructure upgrade to reduce high demand services and equipment, eg replacing mercury halide lights with LEDs and improving the efficiency of HVAC systems. The third component comprises feasibility assessments to investigate potential improvements to electrical infrastructure resilience and medium-scale renewable electricity generation.

Table 1. Environmental performance indicators for ANSTO sites

Resource Usage[1]	Units	FY 2015	FY 2016	Current year FY 2017[1]	Change on previous year
Electricity	GWh	69.0	67.8	67.3	-0.7%
Water	m^3	346,146	315,694	320,369	+1.5%
Passenger vehicle petrol and diesel[2]	L/100km	9.40	8.98	8.65	-3.7%
Waste Water[2]					
Wastewater discharged to sewer	m^3	100,342	89,235	103,024	+15.5%
Landfill and Recycled Waste[2]					
Waste sent to landfill	tonnes	232	226	237	+4.8%
Cardboard + Paper	tonnes	33.4	22.3	85.5	+283.4%
Co-mingled containers	tonnes	5.77	5.94	16.7	+181.1%
Other recycle streams (batteries, ferrous and non-ferrous metal, gardening, E-waste)	tonnes	33.1	19.8	12.9	-34.8%
Landfill diversion rate	%	23.8	17.5	32.7	+86.9%

1. Resource usage data for Lucas Heights, Camperdown and Clayton sites (excluding all tenants); previously reported excluding ANSTO Clayton.
2. Data for the Lucas Heights site only (includes tenants); paper and cardboard recycling were reported separately in previous years.

APPENDIX 3

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), section 516A

ANSTO continues to invest and plan for the use of renewable energy through small-scale solar photovoltaic (PV) and evacuated tube technologies. During the period, ANSTO commissioned a ~110 kW solar hot water array servicing the air conditioning system within the OPAL Reactor building and Lucas Heights installed an 18 kW evacuated tube array that will largely meet the hot water requirements of the active laundry. There has also been an upgrade to a number of pathway and street lights across the Lucas Heights campus to standalone integrated solar PV/battery storage systems. Together with existing solar hot water installations at the Lucas Heights campus and ~33 kW of solar hot water and PV electricity currently installed at Clayton, ANSTO's renewable energy facilities have the potential to produce up to 235 MWh annually.

Water consumption for the three campuses increased slightly over the FY17 period, however this was primarily due to the increased consumption of potable water at the Lucas Heights campus of ~7,000 kL. ANSTO Clayton has also installed moisture sensors throughout its landscaped areas that only allow for irrigation when needed. Analysing against average monthly maximum daily temperatures throughout the financial year, there is no discernible correlation of increased water consumption to ambient temperature. The number of days that OPAL was critical was similar to the previous year, therefore the increase in water consumption is not likely due to increased cooling water demand. This is supported by an identical volumetric increase of trade waste discharge to the sewer. Further analysis to identify a specific source of the increased water consumption is being conducted. To support future water savings, ANSTO is evaluating options to utilise rainwater for the OPAL cooling towers.

ANSTO's landfill diversion rate has significantly improved in the last financial year, with over 32% now diverted from landfill. The increase of ~5% in waste to landfill is attributed to construction activity (ANM facility and the intermediate level solid waste (ILSW) store). ANSTO continues to recycle ferrous metals, garden waste, concrete, batteries, toner cartridges, mobile phones and redundant computer equipment. Many business units within ANSTO have set up recycling stations for alternative reuse/recyclable waste streams such as soft plastics and compostable food scraps.

ANSTO has recently secured a long-term multi-function printer lease plan that should see significant electricity savings through the replacement of inefficient legacy printers. Reductions in paper and toner consumption are also expected through improved printer efficiency and a new 'user ID swipe access' print function. The new multi-function printers have been manufactured using the highest sustainability standards.

Environmental monitoring program

ANSTO conducts an extensive environmental monitoring program that measures radioactivity in authorised emissions to air and liquid effluent discharges to the sewer; and in samples of air, surface water, ground water, sediment and biota from the local environment. Local environmental radiation and weather conditions are reported online via the ANSTO webpage. Many of the monitoring results are independently verified.

Results of environmental monitoring in 2016–2017 demonstrate that ANSTO's authorised releases of radioactive material to the air and sewer continue to be effectively controlled, complied with regulatory limits and had minimal impact on humans or the environment.

Good water quality

Stormwater runoff from the Lucas Heights site does not contribute to any public drinking water supply, however ANSTO regularly monitors stormwater leaving the site, as well as sampling the nearby Woronora River. Results show that concentrations of tritium in water in the local environment have decreased since the HIFAR reactor closed in 2007, and are well below the level considered safe for drinking water by the World Health Organisation. Gross alpha and beta measurements were below the radiological levels set for surface waters under the previous NSW *Protection of the Environment Operations Act 1997*. In fact, the majority of results were below the screening levels for alpha and beta radioactivity set in the Australian Drinking Water Guidelines.

An extensive network of shallow and deep groundwater wells is designed to monitor potential sources of contamination to groundwater, water quality and groundwater movement. Groundwater from the Lucas Heights site contains only naturally-occurring radionuclides and low levels of tritium. Groundwater near fuel storage tanks is also analysed for petroleum hydrocarbons to check for evidence of leaks from tanks, however none have been detected to date.

Authorised discharges within limits

Liquid effluent discharged from ANSTO sites into the sewer system complied with the acceptable limits for trade wastewater set by the Sydney Water Corporation. Compliance with these limits, together with effluent dilution studies, ensures that water at the Cronulla wastewater treatment plant meets World Health Organisation drinking water standards for radioactivity.

Air ventilated from laboratories and facilities that handle radioactive materials is treated and/or filtered prior to discharge and continuously monitored. ARPANSA sets limits for airborne radioactive discharges from licenced ANSTO facilities and all airborne emissions were within the annual operating compliance limits.

Detailed reporting

Reports on airborne and liquid effluent discharges are submitted to the relevant regulatory authorities on a quarterly basis. Details of our environmental monitoring program are on the ANSTO website and the results and findings are available on request. In addition, ANSTO reports real-time environmental radiation dose-rates recorded in the nearby suburb of Engadine via the ANSTO webpage. The Lucas Heights weather data are also available on ANSTO's website and published by the Bureau of Meteorology.

ANSTO reports annually to the Energy Efficiency in Government Operations (EEGO) and National Greenhouse and Energy Reporting (NGER) programs; both of these reports are available on the ANSTO website.

All staff are encouraged to report early and often on any potential or actual safety and environmental incidents. All events are subsequently investigated, actioned and mitigation controls evaluated for effectiveness via ANSTO's event management system.

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Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), section 516A

Safe waste management

ANSTO has maintained safe and effective management of its radioactive waste for many years. There is minimal environmental impact from the storage of solid radioactive waste since there are no ongoing emissions or energy requirements, apart from the packaging process and building footprint. One of the waste minimisation strategies involves concentration of intermediate level liquid waste using a drum dryer; the electricity consumption is offset by the reduction of packaging, handling & space required.

Liquid wastewater comprising trade waste and sewage is treated and tested for compliance within limits for radioactivity before being discharged to the sewer. Concentration limits for non-radioactive materials such as ammonia, zinc and total dissolved solids were also met. Sydney Water conducts independent testing of ANSTO's liquid effluent discharges and the Trade Waste Agreement is periodically reviewed to provide assurance that ANSTO's discharges are fully characterised, remain within authorised limits and pose no threat to the environment. Effluent from the Sutherland Shire undergoes tertiary treatment at the Cronulla wastewater treatment plant and is ultimately discharged to the ocean at Potter Point. Analyses of marine biota (fish, seaweed and barnacles) from Potter Point confirmed that wastewater from ANSTO has a negligible effect on the local marine environment.

Little Forest Legacy Site

ANSTO is responsible for the Little Forest Legacy Site (LFLS) located within the 1.6km buffer zone. This site, formerly known as the Little Forest Burial Ground (LFBG), was used by the Australian Atomic Energy Commission and other government agencies during the 1960's to dispose of waste containing low levels of radioactivity and non-radioactive beryllium oxide, in a series of shallow trenches. There has been ongoing monitoring, maintenance and management of the site since 1966 including routine air, soil and groundwater testing, results of which are publically available and confirm that the site is being safely managed.

The site is subject to a licence issued by ARPANSA and is managed by ANSTO on behalf of the Government. ANSTO has established a steering committee for the ongoing management of LFLS and continues to conduct detailed scientific studies of the site, in order to investigate options for the final disposition of the radioactive material and to ensure the continued safe management of the site.

Dose levels low

Environmental gamma radiation levels measured at the Lucas Heights site, in surrounding suburbs and at the Cronulla wastewater treatment plant, are all at normal background levels, averaging 1.31 mSv for 2016–2017.

Studies carried out for ANSTO's liquid effluent discharges have confirmed that the radiological risk to the environment or humans (working at the Cronulla wastewater treatment plant or swimming in the sea near the Potter Point ocean outfall) is negligible.

Computer modelling is used to estimate the potential radiation dose to people from operations at the Lucas Heights site. The model inputs include the quarterly stack emission results, local weather data and conservative assumptions about environmental exposure pathways. The maximum potential dose to local residents from ANSTO's airborne emissions in 2016–2017 was 0.0018 millisievert (mSv). This is less than 0.2 per cent of the annual public dose limit of 1 mSv established by ARPANSA.

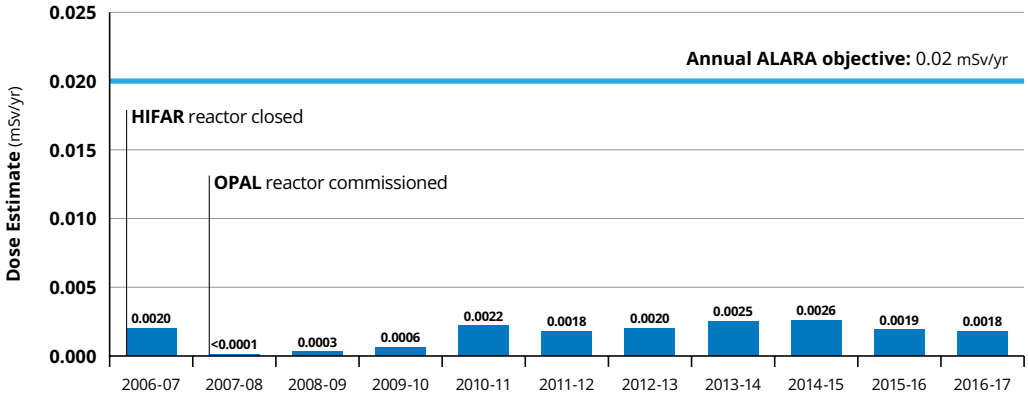


Figure 1:

Maximum annual effective dose from LHSTC airborne discharges at the boundary of ANSTO's 1.6 km buffer zone, July 2006 to June 2017.

Doses from ANSTO's airborne emissions in 2016–2017 remained well below the 0.02 mSv ALARA performance objective despite increased production of beneficial medical isotopes (see Figure 1). For its closest neighbours, ANSTO's activities added less than 0.2 per cent to the 1.5 mSv dose that every Australian receives from natural background radiation each year, as shown in Figure 2.

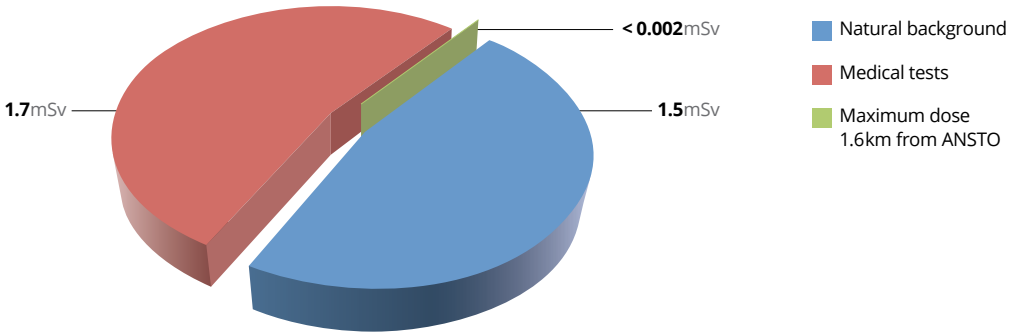


Figure 2:

The average annual dose received by Australians from various sources compared to the maximum potential airborne dose to ANSTO's nearest residents in 2016–2017.

*Source: ARPANSA Fact Sheet www.arpansa.gov.au/pubs/factsheets/IonisingRadiationandHealth.pdf

APPENDIX 3

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), section 516A

Managing the ANSTO Bushland Perimeter

ANSTO manages a section of land with an area over ~450 ha within the 1.6 km buffer zone centred on the existing HIFAR reactor. This area comprises the Lucas Heights Science and Technology Centre, a number of legacy waste disposal sites and ~350 ha of undeveloped native bushland and riparian zones. A qualitative assessment of the biodiversity potential of the ANSTO Bushland Perimeter was performed in late 2016 that assessed 110 sample sites against benchmark criteria for the different vegetation communities, such as native species diversity and density, connectivity, soil exposure and weediness. The results of this assessment are being used to prioritise management actions for the *ANSTO Buffer Zone Plan of Management* including: revegetation and rehabilitation works, stormwater system upgrades, and weed management programs. This assessment will form the baseline for future assessments utilising the same benchmark criteria to evaluate improvement programs and any ongoing impact of ANSTO's operations on the surrounding environment.

The area has numerous bush walking trails, and is actively managed through a program of regular inspections, maintenance, culling of feral animals and weed reduction programs. An ANSTO staff bush care group has been meeting monthly for a number of years to target high risk locations. The work of this group has seen the eradication of noxious weed species such as Crofton Weed, Cotton Bush, African Love Grass and Cassia from over two hectares of riparian vegetation within the ANSTO Bushland Perimeter. ANSTO has also been engaging with the local Dharawal Indigenous Group to identify areas of cultural importance within the ANSTO Bushland Perimeter.

Referrals under the *EPBC Act*

A referral relating to the proposed expansion of ANSTO's solid intermediate level and solid low level waste facilities was submitted in June 2016. The Department of Environment and Energy determined in September 2016 that the projects are not construed as controlled actions provided that the extension, upgrade and use of the waste management facilities, are undertaken in accordance with ANSTO's procedures for handling and storage of radioactive materials and the ARPANSA licences issued for the proposed facilities.

Within this period, the construction activities for the expansion to the solid intermediate level waste facility were completed and an internal audit performed to evaluate conformance with the commitments made by ANSTO in the referral and the measures to be met as stated above by the Department. There were no non-conformances raised.

Mitigating environmental impacts

ANSTO encourages staff to cycle, carpool or take public transport to get to work and to walk rather than drive around the site. ANSTO provides staff with a carpooling website and regular shuttle-bus services to and from the local railway station. Numerous paths, tracks, bike racks, lockers and shower facilities are available for use by the avid walker/cyclist.

The ANSTO online 'swap shop' continues to provide a forum for staff to pass on unwanted goods. From furniture to chemicals to analytical equipment, by exchanging useful products staff can help save time, money and the environment by reducing waste going to landfill. The online Equipment Database tool also allows staff to share resources and knowledge whilst minimising the procurement of new equipment.

ANSTO has implemented a new chemical management system that has enabled a more effective means for staff in different business areas to share and track chemical resources which will reduce the need to procure new chemicals. This is also enabling ANSTO to better determine its reporting requirements to the National Pollution Inventory and improved identification (and subsequent control implementation) of environmentally hazardous chemicals on-site.

In line with ANSTO's focus on the digitisation of records, the implementation of the ANSTO Enterprise (Ae) SAP upgrade project and the continued facilitation of the ANSTO Content Server is progressing our transition to a paperless office environment by providing a secure platform for electronic record control and storage. Many functions such as budgeting, business planning, procurement, maintenance, recruitment, on-boarding, training and waste transfers are now managed through online user interfaces.

Organisational Excellence (OE) is a model for integrated planning and decision making that ANSTO is deploying across the business, to optimise the management of all that we do. By managing our people, resources, and infrastructure more effectively, we aim to increase productivity thereby enhancing the environmental sustainability of our operations.

Overall, ANSTO commits significant resources to effectively monitor, manage and report on its environmental impacts and responsibilities.

Accordance with ecologically sustainable development (ESD) principles

Ecologically sustainable development (ESD) is embedded into ANSTO's core values. The ANSTO Building Code (ABC) provides the minimum standard that new buildings and facilities at ANSTO must conform with. Within the ABC, the principles of ESD are mandated through the requirement for all new and refurbished buildings to have an independent ESD consultant involved in the design, achieve a target minimum 4.5 star NABERS rating and comply with the requirements for the Energy Efficiency in Government Operations (EEGO) Policy. Furthermore, minimum standards for the efficient use of water in offices and laboratories, installation of rainwater tanks, re-use of waste water and sub-metering are enforced within the ABC.

ANSTO is integrating environmental protection into management processes by requiring project/construction environmental management plans (P/CEMP) at the project planning phase. All capital projects such as construction of buildings, infrastructure and support facilities must have P/CEMP in place to prevent environmental impacts such as soil erosion, dust, noise and discharges to stormwater. Independent oversight of these projects includes the approval of P/CEMP, ad-hoc inspections and formal audits.

Other ANSTO activities that contribute to improved social, environmental and economic outcomes include our research into significant environmental issues such as air quality, soil erosion, water resource management, wetland health, biodiversity, climate variability and global warming impacts such as rising sea levels and temperatures on marine ecosystems. ANSTO staff are also involved with the development of environmental management plans for other organisations where specific expertise is required.

ANSTO's support of nuclear non-proliferation ideals and the development of nuclear safeguards also accords with ESD principles; we contribute to the global non-proliferation agenda through the Global Initiative to Combat Nuclear Terrorism and collaborate with bodies such as the International Atomic Energy Agency and the Comprehensive Test Ban Treaty Organisation.

ANSTO continues to support a national approach to safe waste management, including the establishment of a National Radioactive Waste Management Facility.

Finally, ANSTO's commitment to environmental protection means that special emphasis is placed on reducing our environmental footprint by minimising waste and the consumption of resources and by recycling consumables. Our scientific research provides practical, science-based advice to inform decision makers, creating opportunities to conserve resources and sustain our fragile environment. It also ensures that we manage our past and current waste in a manner that protects human health and the environment, now and in the future.

APPENDIX 4

Work Health and Safety Act 2011

Work, Health and Safety Act 2011

ANSTO remains committed to the target of 'towards zero harm' to its workers and ensures that senior leadership in Work, Health and Safety (WH&S) is an important aspect in achieving continuous WH&S improvement. The Executive Work, Health and Safety and Environment (WHSE) Committee provides continued leadership and oversight by monitoring site wide risks and learning from events that had the potential of a major impact to people, plant/equipment and environment and by endorsing key safety related projects and foci.

During 2016–2017 the WHSE Committee endorsed the top WH&S priorities for the organisation including; chemical management systems, hygiene and health programs, and the consolidation of the safety reporting systems.

The importance of an agile and flexible workforce in supporting the business' WH&S and HR requirements is recognised in the new approach in recruiting candidates for roles within Human Resources and Work Health and Safety (HR&WHS). New candidates are required to show competencies and experience in both HR and WH&S, with a level of expertise in one of the fields. This has led to a reduction in both recruiting and employment costs for ANSTO.

ANSTO worked closely with Comcare during 2016–2017 through a joint Connecting Locally Plan. The program was of mutual benefit, with Comcare gaining a thorough understanding of the ANSTO WHS System and hazards, while ANSTO had access to industry best practice and gained a better understanding of the role of the regulator. This resulted in improved work health and safety outcomes for the business and key projects. Key deliverables in the program included Review of construction safety and familiarisation with the ANSTO WHS processes and emergency response capabilities. Comcare continued to provide support to ANSTO's Work Health and Safety (WH&S) team, information and guidance regarding WH&S legislative requirements.

ANSTO was recognised for its innovative Change Management Tool kit at the 2016 Comcare Work Health and Safety Awards as the winner of the injury Prevention Award. This Tool kit has subsequently been shared with other organisations.

A comprehensive occupational hygiene monitoring program has been implemented to identify, assess and control potential exposures to hazardous agents in line with the legislative requirements. This function provides support across ANSTO operations and projects by characterising these hazards.

The Globally Harmonised System of Classification and Labelling of Chemicals (GHS) came into effect in 2017. Supported by the ANSTO WHS Executive Committee a critical review was conducted of the existing chemical management processes. A new chemical database was implemented to allow improved; inventory management, legislative reporting, compliant labelling and Safety Data Sheet (SDS) and access via mobile devices.

HR and WH&S explored opportunities to integrate similar and complementary ANSTO functions during FY17. The Emergency Response function is an example of this which was merged with the WHS team. This alignment is a logical fit with the WHS team, Health Centre and the legislative requirements. Synergies include a more integrated approach to First Aid and injury management with the ANSTO Health Centre.

A key element of ANSTO's proactive approach to WHS is the review and implementation of the WHS Policy and WHS Strategy. The 2016–2022 Safety Strategy has been developed and the seven national actions identified in the Australian Work Health and Safety Strategy 2012–2022 have been incorporated.

The strategy also identifies priority areas and disorders that are ANSTO specific. The strategy will be finalised through the WHSE committee with the identified actions to meet the requirements of the strategy being monitored by this Committee.

ANSTO continues with the update, development, review and implementation of key WHSE Standards and Practices. Over the next two years, ANSTO intends to develop a common Work Health and Safety management system for certification to the new international standard, ISO 45001. As the new standard shares a common structure with existing management standards a higher degree of integration can be achieved. Focus will be to have a work health and safety management system that exceeds the latest standards and provides practical guidance to workers.

The WH&S group provided safety advice and oversight of the construction and demolition projects across site including the ANSTO Nuclear Medicine (ANM) facility and extension to the Intermediate Low Level Solid Waste (ILSW) repository. All projects were completed without serious injury.

WH&S communication to all workers continued by providing a risk based WH&S focus program combined with safety alerts. Targeted safety topics included event reporting system, nominated ANSTO roles (WH&S), Occupational Hygiene and the Top 5 WH&S hazards. Key WH&S alerts during 2016–2017 included; electrical, inorganic lead, chromium and the radiological clearance and removal of items.

The early intervention strategies implemented by the ANSTO Health Centre continue to support the timely return of workers to pre-injury duties and keep the workers engaged with ANSTO during the treatment and rehabilitation processes. The program focuses on providing early assessment and treatment to reduce the consequences of injuries. This has proved successful in meeting ANSTO's goal of returning workers to normal duties, as productive team members as soon as possible. The ANSTO rehabilitation program continues to be compliant with the requirements of the *SRC Act* demonstrating effective procedures and programs are in place. The overall impact of the physiotherapy interventions along with other initiatives continue to have an overall reduction in ANSTO's Workers Compensation Insurance premiums.

Actual premium for FY 16/17 was $826,655 (increase due to Australian Synchrotron and overall scheme performance) compared to FY15/16 $723,360. Comcare has advised ANSTO of the FY 17/18 premium, $736,528. This premium is dependent on the aggregate premium pool (the total premium to be charged across all Commonwealth agencies) and ANSTO's claim performance.

Accidents and incidents

ANSTO continued to monitor and report on key WH&S performance indicators which included; total number of recorded events, number of Opportunities for Improvement, Lost Time Injury Frequency Rate (LTIFR), Lost Shift Injury Frequency Rate (LSIFR) and rehabilitation and return to work indicators. The monthly WHS reporting now utilises a visual dashboard format which has been used as an exemplar in a recent Safe Work Australia publication, ie 'Measuring and Reporting on Work Health & Safety.' March 2017, to which ANSTO staff made a significant contribution.

WH&S event reporting has been consolidated into a single event management system. This will also improve the trending and data analysis for safety related events supporting evidence based decision making. The ANSTO investigation process has ensured that appropriate response and controls have been adopted in each case. A revised investigation training program has been implemented. All Comcare reportable events have been closed by the regulator with no further action or information required.

APPENDIX 4

Work Health and Safety Act 2011

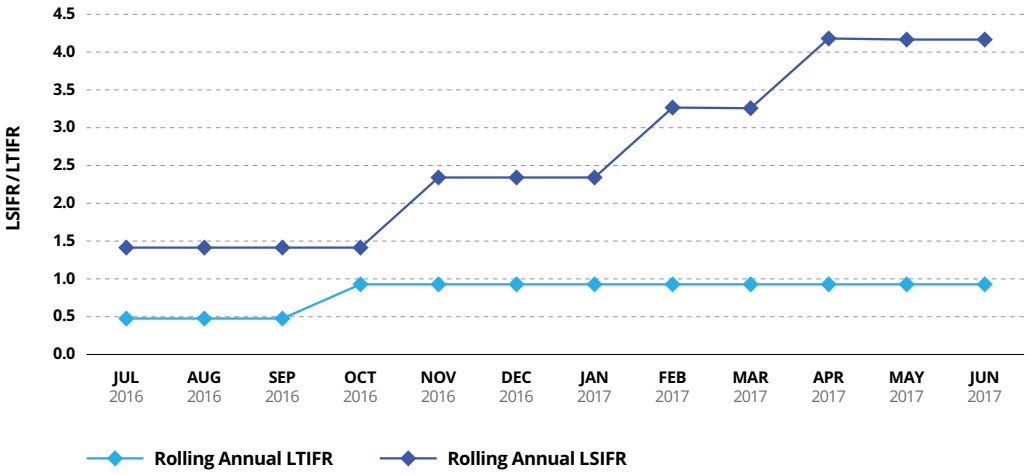
Recorded events

Workers are encouraged to report all events within ANSTO's 'No Blame – Full disclosure' principle. ANSTO continues to promote the reporting of all event types. In 2016–2017 a total of 933 events were reported, compared to 938 (2015–2016), 1128 (2014–2015), 952 (2013–2014), 795 (2012–2013) and 761 (2011–2012). Event reporting data is being tracked and analysed to identify trends, areas of improvement and areas of best practice. The majority of events reported continue to be Opportunities for Improvements (OFIs), a key measure of ANSTO's reporting culture. In 2016–2017 80% of events were OFI, compared to 82.5% (2015–2016). ANSTO staff continue to report all types of events including near hits and events relating to plant and equipment. The majority of reported events we minor or low significance 76%, 23% of events were rated as moderate and less than 1% rated as major, no severe events were reported during the period. The high reporting rate of low significant and minor events supports an ongoing positive reporting culture.

Lost shift and lost time injuries

LSIFR and LTIFR are a safety performance measure at ANSTO. These classifications are used to separate serious injuries (LTI) from less serious injuries (LSI). In 2016–2017 the LSIFR increased to 4.2 compared to 1.0 (2015–2016) and 3.4 (2014–2015). The LTIFR has remained relatively stable over the period with a slight increase to 1.0, compared to 0.5 (2015–2016) and 2.9 (2014–2015). In FY17 nine Lost Shift Injuries and two Lost Time Injuries were recorded. Lost Shift injuries are injuries where workers required less than five days off work; Lost Time injuries are injuries that required five or more days off work. Even though there was an increase in the number of LSI recorded, the total time taken off for the nine injuries was limited to 11 days. The early intervention program managed by the ANSTO Health Centre, minimised the time taken off for these injuries and allowed the workers to return to work as early as possible. The two LTI each accrued nine days off work and both workers returned to normal duties. These events have been investigated and the causes determined to be random and isolated.

Rolling annual lost shift/time injury frequency rate



Australian Radiation Protection and Nuclear Safety Regulations 1999, Statutory Rules 1999 No. 37 as amended

Everyone in the world is exposed to ionising radiation from natural sources. People may also be exposed to radiation from non-natural sources, including nuclear medical procedures for diagnosis and treatment of certain illnesses. Personal radiation exposure ('dose') is measured in sieverts (Sv), however, typical annual exposures are so small that they are usually expressed in units of one thousandth of a sievert, known as a millisievert (mSv).

According to the most recent data from ARPANSA, the average dose an Australian receives from natural background radiation (excluding medical sources) is 1.5 mSv per year. Federal and State regulations require that a member of the public should receive no more than 1 mSv per year from radiation sources in addition to background radiation and medical procedures.

The regulatory limit for radiation workers is 20 mSv per year, averaged over five years, with no more than 50 mSv in any one year.

This is derived from recommendations made by the International Commission on Radiation Protection (ICRP) that have specified three basic principles for radiation protection, which are applied at ANSTO:

1. All exposures to ionising radiation shall have a positive net benefit
2. All exposures shall be maintained as low as reasonably achievable (ALARA), accounting for social and economic factors
3. All exposures shall be less than the relevant statutory limit.

The application of these principles requires us to ensure that our occupational exposures are not just less than the statutory dose limit(s), but are as far below them as we can reasonably achieve.

The radiation exposure of ANSTO's workers, who are routinely engaged in working with ionising radiation, is monitored by our specialist dosimetry service, with records of all exposures maintained.

Monitoring results for calendar year 2016 show that the radiation doses received by ANSTO workers remain significantly below regulatory limits. In 2016 the average effective dose across all ANSTO workers was 0.5mSv, as shown in Table 1.

APPENDIX 4

Work Health and Safety Act 2011

Table 1. Effective dose

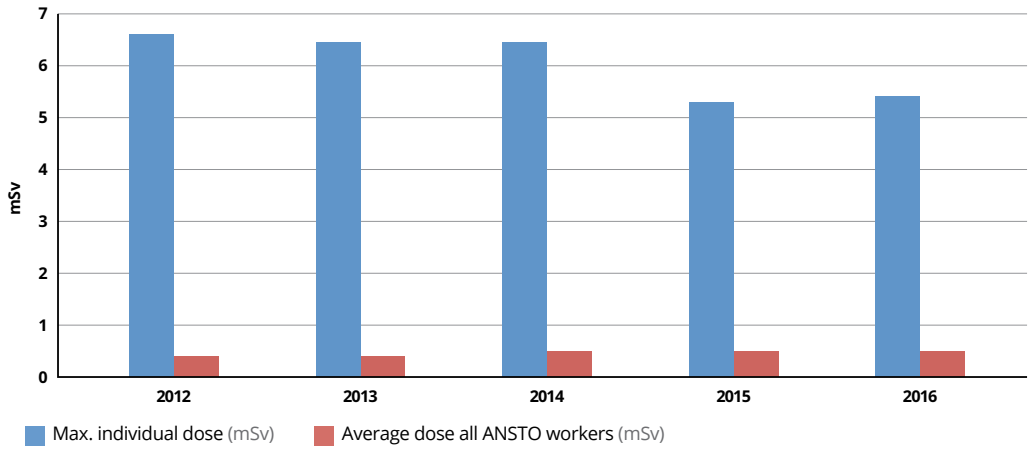
	Calendar Year				
Effective Dose	**2012**	**2013**	**2014**	**2015**	**2016**
Max. Individual Dose (mSv)	6.6	6.44	6.44	5.3	5.4
Average Dose All ANSTO Workers (mSv)	0.4	0.4	0.5	0.5	0.5
Collective Effective (Person-mSv)	407.7	416.4	447	463	529

Table 2 shows the distribution of individual effective doses over the same period. The graph in Figure 1 compares maximum effective dose to a single worker and the average effective dose across all relevant ANSTO workers.

Table 2. Distribution of individual effective dose

	Calendar Year				
Effective Dose Range	**2012**	**2013**	**2014**	**2015**	**2016**
0 to O.99mSv	914	893	894	890	902
1 to 1.99mSv	32	40	47	59	78
2 to 4.99mSv	18	20	21	23	19
5 to 9.99mSv	4	2	4	1	3
>10mSv	0	0	0	0	0

Figure 1: Comparison of Maximum and Average Effective Doses.



Exposures to ANSTO workers for the last year have all been well below all statutory dose limits.

APPENDIX 5

Freedom of Information Act 1982, subsection 8

The *Freedom of Information Act 1982 (FOI Act)* provides the public with a general right of access to documents held by Australian Government agencies, by requiring agencies, such as ANSTO, to publish the information and provide a right of access to the documents.

This general right, is limited by exception, to protect essential public interests, including the privacy of individuals and the business affairs of those who give information to the agency.

In the reporting year to 30 June 2017, ANSTO has received 13 requests for information under section 15 of the *FOI Act*.

ANSTO is required to publish information to the public as part of the Information Publication Scheme (IPS). The IPS is designed to promote open and transparent communication of government information.

Set out below is the information required to be published by ANSTO under Part II of the *FOI Act*.

1. ANSTO's Agency Plan

ANSTO's Information Publication Scheme plan is currently available on the ANSTO website at:
www.ansto.gov.au/AboutANSTO/About/AccesstoInformation/IPS

2. Details of the structure of the Agency's organisation

An organisational chart detailing the structure of ANSTO can be found on ANSTO's website at:
www.ansto.gov.au/AboutANSTO/About/AccesstoInformation/IPS

3. Details of ANSTO's functions, including its decision making powers and other powers affecting members of the public

Information in relation to ANSTO's powers and functions can be found at page 118-121 of this report. Information about ANSTO's purpose and Values, Board Composition, Corporate Plan and Service Charters can be found on ANSTO's website at:
www.ansto.gov.au/AboutANSTO/About

4. Details of officer appointments at ANSTO

Details of officer appointments can be found at page 8-9 of this report and a link to this information can also be found on ANSTO's website at:
www.ansto.gov.au/AboutANSTO/About

5. ANSTO's Annual Report

A link to this annual report and annual reports of previous years can be found on ANSTO's website at:
www.ansto.gov.au/Resources/Publications/AnnualReports

APPENDIX 5

Freedom of Information Act 1982, subsection 8

6. Details of arrangements for members of the public to comment on specific policy proposals for which ANSTO is responsible

ANSTO regularly communicates with its stakeholders, which includes the local community and councils, relevant federal ministers and other government-related personnel, both state and federal, to ensure that they are kept up to date about what is happening at ANSTO. The community is kept informed of ANSTO's operations via the website which publishes news updates such as media releases. A link to this information can be found on ANSTO's website at:
www.ansto.gov.au/AboutANSTO

7. Information which ANSTO routinely gives access to in response to requests for access under the *FOI Act* (excluding documents exempt from production under the *FOI Act*)

During 2016–2017 there was no requested documentation falling within this category.

8. ANSTO's FOI Disclosure Log

The FOI Disclosure Log lists information which has been released in response to a FOI access request. The disclosure log requirement does not apply to:

- personal information about any person if publication of that information would be 'unreasonable';
- information about the business, commercial, financial or professional affairs of any person if publication of that information would be 'unreasonable';
- other information covered by a determination made by the Australian Information Commissioner if publication of that information would be 'unreasonable';
- any information if it is not reasonably practicable to publish the information because of the extent of modification that would need to be made to delete the information listed in the above dot points.

A link to ANSTO's disclosure log can be found on ANSTO's website at
www.ansto.gov.au/AboutANSTO/About/AccesstoInformation/FOIdisclosurelog

9. Information held by ANSTO which is provided to Parliament

A link to the information which ANSTO provides to parliament can be found on ANSTO's website at:
www.ansto.gov.au/AboutANSTO/About/AccesstoInformation/SenateFileList

10. Contact details of ANSTO officers who can be contacted about access to information or documents under the FOI Act

Direct enquiries in relation to FOI process to the:

Mail:
FOI Coordinator
ANSTO
Locked Bag 2001
Kirrawee DC NSW 2232

Email:
foi@ansto.gov.au

Telephone:
+61 2 9717 3111

(request to be directed to the FOI Coordinator)

These contact details can be found on ANSTO's website.

11. Operational information required under section 8 of the *FOI Act*, that is, information held by ANSTO to assist in the performance or exercise of ANSTO's functions or powers in making decisions or recommendations affecting members of the public.

ANSTO has a range of publications, reports and information available for the public, including our annual reports, information on safety, research reports, educational books and leaflets, and DVDs.

ANSTO also provides access to a searchable database of all of ANSTO's science publications, as well as an online archive for older publications.

APPENDIX 6

Index of compliance with reporting guidelines

Index of compliance with reporting guidelines under various Acts, Regulations and Orders applicable to ANSTO as a Commonwealth authority.

ANSTO Act 1987

Public Governance, Performance and Accountability Act 2013 (PGPA Act)

The accountable authority of the entity must prepare and give an annual report to the entity's responsible Minister, for presentation to the Parliament, on the entity's activities during the period, by 15 October; or the end of any further period granted under subsection 34C(5) of the *Acts Interpretation Act 1901*. The annual report must comply with any requirements prescribed by the PGPA Rule. (Section 46)

Includes a copy of the annual performance statements in the entity's annual report that is tabled in the Parliament.

The annual performance statements must:

a. provide information about the entity's performance in achieving its purposes; and

b. comply with any requirements prescribed by the rules Section 39 (1) and (2)

Includes a copy of the annual financial statements and the Auditor General's report must be included in the Commonwealth entity's annual report that is tabled in the Parliament.

The annual financial statements and the audit report must comply, and must state whether, in the accountable authority's and the Auditor-General's opinion respectively whether, they:

a. comply with the accounting standards and any other requirements prescribed by the rules; and

b. present fairly the entity's financial position, financial performance and cash flows.

If the financial statements do not comply, the accountable authority of the entity must add the information and explanations required to present fairly those matters.

Similarly for the audit report, the Auditor-General must state the reasons, quantify the financial effect and state the amount if possible. Section 42 and 43

Public Governance, Performance and Accountability Amendment (Corporate Commonwealth Entity Annual Reporting) Rule 2016

Section 17BB **i**

The annual report must be approved and signed by the accountable authority, and include details of how and when approval was given. It must state that the accountable authority is responsible for preparing and delivering the annual report in accordance with the section 46 of the *PGPA Act*.

Section 17BC **i,4**

The annual report complies with the guidelines for presenting documents to the Parliament.

Section 17BD **i-153**

The annual report uses plain English and clear design.

Section 17BE (a)-(b) **4,106,118-121**

The annual report must specify the entity's enabling legislation, including a summary of the entity's objects and functions and the purposes of the entity as included in the entity's corporate plan.

Section 17BE (c) **5**

The responsible Minister is specified.

Section 17BE (d)-(f) **106-107**

The annual report provides details of:

- any direction issued by any Minister under an Act or instrument during the period
- any government policy orders that applied to the entity under section 22 of the *PGPA Act*
- particulars of non-compliance with any of the above directions or orders.

Section 17BE (g) **59-61**

The annual report must include the annual performance statements for the entity for the period in accordance with paragraph 39(1)(b) of the Act and section 16F of this rule.

Section 17BE (h)-(i) **107**

The annual report must include a statement of any significant issue reported to the responsible Minister under paragraph 19(1)(e) of the Act that relates to non-compliance with the finance law in relation to the entity.

If such a statement is included, the annual report must include an outline of the action that has been taken to remedy non-compliance.

APPENDIX 6

Index of compliance with reporting guidelines

Section 17BE (j) **8-9,108-109**

Information about directors is provided, including names, qualifications, experience, attendance at Board meetings and whether the director is an executive or non-executive member.

Section 17BE (k)-(l) **6-7,102,106, 153**

The annual report provides an outline of:

- the organisational structure (including subsidiaries);
- the location of major activities and facilities and provides a statement on governance practices.

Section 17BE (m) **109-111**

The annual report provides an outline of:

- board committees and their responsibilities;
- education and performance review processes for directors;
- ethics and risk management policies.

Section 17BE (n)-(o) **108**

The annual report discloses the decision-making process undertaken by the accountable authority for making a decision if:

- the decision is to approve the entity paying for a good or service from another Commonwealth entity or a company, or providing a grant to another Commonwealth entity or a company;
- the entity, and the other Commonwealth entity or the company, are related entities;
- the value of the transaction, or if there is more than one transaction, the aggregate value of those transactions, is more than $10 000 (inclusive of GST);

If the annual report includes any of the above information:

- if there is only one transaction—the value of the transaction must be included;
- if there is more than one transaction—the number of transactions and the aggregate of value of the transactions must be included.

Section 17BE (p) **107,115**

The annual report details any key activities and changes that affected the operations or structure, which may include:

- significant events, such as forming or participating in the formation of a company, partnership etc.;
- operational and financial results;
- key changes to its status of affairs or principal activities;
- amendments to enabling legislation or any other legislation directly relevant to its operation.

Section 17BE (q)-(r) **115**

The annual report includes particulars of:

- judicial reviews and decisions of tribunals that have had or may have a significant effect on its operations;
- reports about the authority made by the Auditor-General (other than one made under section 43 of the *PGPA Act*), a Parliamentary committee, the Commonwealth Ombudsman, or the Office of the Australian Information Commissioner.

Section 17BE (s) **103-104**

The annual report includes an explanation if information is missing from a subsidiary that is required to be included in the annual report and states the effect of not having the information in the annual report.

Section 17BE (t) **115**

The annual report includes details of any indemnity that applied during the period given to an officer against a liability, including premiums paid, or agreed to be paid, for insurance against the officer's liability for legal costs.

Section 17BE (u) **138-143**

The annual report provides an index of annual report requirements identifying where relevant information can be found in the annual report.

APPENDIX 6

Index of compliance with reporting guidelines

Minister's Statement of Expectations June 2015

Policy context

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ACRONYMS

ACAS	Australian Collaboration for Accelerator Science
ACNS	Australian Centre for Neutron Scattering
ACRF	Australian Cancer Research Foundation
AINSE	Australian Institute of Nuclear Science and Engineering
AM	Order of Australia Award
AMS	Accelerator mass spectroscopy
ANAO	Australian National Audit Office
ANSTO	Australian Nuclear Science and Technology Organisation
ANM	ANSTO Nuclear Medicine
ANU	Australian National University
AO	Officer of the Order of Australia
AOFSRR	Asia Oceania Forum for Synchrotron Radiation Research
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ATSE	Australian Academy of Technological Sciences and Engineering
BOSTES	Board of Studies, Teaching and Educational Standards
CAS	Centre for Accelerator Science
CEA	French Commissariat à l'énergie atomique et aux énergies alternatives or French Atomic Energy Agency
CEO	Chief Executive Officer
CERN	European Organization for Nuclear Research
CKDu	Chronic kidney disease of unknown aetiology
CRC-P	Cooperative Research Centre for Polymers
CRP	Cooperative Research Project
DST	Defence Science and Technology
EIF	Education Investment Fund
EPA	Environment Protection Agency
FNCA	Forum for Nuclear Cooperation in Asia
FOI Act	*Freedom of Information Act 1982*
GIF	Generation IV International Forum
HIFAR	High Flux Australian Reactor
HZB	Helmholtz-Zentrum Berlin
I-124	Iodine-124
IAEA	International Atomic Energy Agency
ILW	Intermediate level waste
IRM	Infrared Microspectroscopy beamline

ISSP	Institute of Solid State Physics (University of Tokyo)
J-PARC	Japan Proton Accelerator Research Complex
JAEA	Japan Atomic Energy Agency
LEU	Low enriched uranium
Lu-177	Lutetium-177
Mo-99	Molybdenum-99
MOU	Memorandum of understanding
MSRs	Molten salt reactors
MS	Mass spectrometry
MX	Macromolecular crystallography beamline
MX2	Micro Crystallography beamline
NATO	North Atlantic Treaty Organisation
NCRIS	National Collaborative Research Infrastructure Strategy
NDF	National Deuteration Facility
NIF	National Imaging Facility
NIMS	National Institute of Materials Science
NORM	Managing naturally occurring radioactivity
NPT	Non-proliferation treaty
NRWMF	National Radioactive Waste Management Facility
NTD	Neutron transmutation doping
OPAL	Open Pool Australian Light-water
PET	Positron emission tomography
PGPA Act	*Public Governance, Performance and Accountability Act 2013*
RCA	Regional Collaborative Agreement
SAXS	Small angle X-ray scattering
SAXS/WAXS	Small and wide angle X-ray scattering
SINAP	Shanghai Institute of Applied Physics
SPECT	Single-photon emission computed tomography
STEMM	Science, technology, mathematics and medicine
TC	Technical cooperation
Tc-99m	Technetium-99m
TGA	Therapeutic Goods Administration
UNSW	University of New South Wales
UoW	University of Wollongong

INDEX

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Clayton, Victoria, Australia 3168

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+61 3 8540 4100

Website
www.synchrotron.org.au

Public information

ANSTO produces regular updates on its science and technology, has available a range of publications and conducts free tours of its site. For bookings, information or to get on our database, call +61 2 9717 3111 or email enquiries@ansto.gov.au

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Cover images

Top left
Instrument scienstist Dr Anna Sokolova using the Bilby instrument at ANSTO's Australian Centre for Neutron Scattering.

Top right
Adella Silitonga (front) and Sangeeth Thiruvoth (back) changing samples on an alpha spectrometer.

Bottom left
Dr Vladimir Levchenko takes micro-photographs of an oxlate crust on rock art at a site in western Arnhem Land, that was later used for dating.

Bottom middle
The core of ANSTO's OPAL multi-purpose nuclear reactor with its distinctive blue Cherenkov radiation glow.

Bottom right
The Australian Synchrotron building in Clayton, Victoria.

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Locations

Lucas Heights | Camperdown | Clayton

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