Australian Government

Ansto

Nuclear-based science benefiting all Australians

Annual Report

2015-16

AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION

CHAIRPERSON'S LETTER

Australian Government | ansto
Nuclear-based science benefiting all Australians

30 September 2016

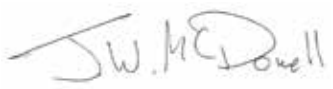
The Hon Greg Hunt MP
Minister for Industry, Innovation and Science
Parliament House
CANBERRA ACT 2601

I am pleased to present the Annual Report of the Australian Nuclear Science and Technology Organisation (ANSTO) for the period 1 July 2015 to 30 June 2016.

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 6 October 2016.

Yours sincerely



James (Jim) McDowell
Chairperson

AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION
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ABOUT ANSTO

The Australian Nuclear Science and Technology Organisation (ANSTO) is one of Australia's largest public research organisations and custodian of much of our country's landmark and national research infrastructure, including the Open Pool Australian Light-water (OPAL) multi-purpose research reactor, the Australian Synchrotron, the Centre for Accelerator Science (CAS), the Australian Centre for Neutron Scattering and the National Deuteration Facility.

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

ANSTO's strategic international collaborations ensure Australian scientists are connected to a global network of experts and important global research projects. ANSTO's partnerships include agreements with the European Organization for Nuclear Research (CERN); Research Centre Juelich (Germany); Helmholtz-Zentrum Berlin; Japan Atomic Energy Agency (JAEA); Japan Proton Accelerator Research Complex (J-PARC); and the Generation IV International Forum (GIF) charter. 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 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 across three locations – Lucas Heights and Camperdown in Sydney, and Clayton in Melbourne. At the heart of ANSTO's research capabilities is the OPAL research reactor, which is one of the world's most effective multi-purpose research reactors. OPAL is used for scientific research, the

ANSTO operates research facilities across three locations - Lucas Heights and Camperdown (pictured) in Sydney, and Clayton in Melbourne.

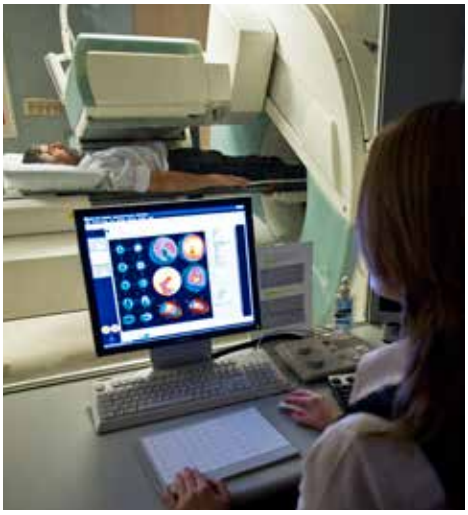
production of medical radioisotopes, and the irradiation of silicon for use in microelectronics and other specialised irradiations for research and industry.

OPAL facilitates specialised research using a suite of 13 neutron beam instruments that comprise CAS, where scientists apply neutron scattering techniques to solve complex research and industrial problems. Neutron scattering enables scientists to see what X-rays cannot. Neutrons are used 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.

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 new 1MV low energy multi-isotope accelerator (Vega) and a new 6MV tandem accelerator (Sirius). These facilities provide researchers with access to a suite of tools in one location that can be used across isotopic dating, air pollution, climate science, modification of materials for future nuclear reactors, radiation damage studies, forensic science, nuclear detector characterisation, and microbiological studies.

The ANSTO-run Australian Synchrotron is 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.

The facility has nine different experimental stations, or 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



On average, one in two Australians will benefit from the nuclear medicines that originate at ANSTO.

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

ANSTO is central to Australia's nuclear medicine manufacturing capabilities. Each week ANSTO delivers over 10,000 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.

Construction of the $168 million ANSTO Nuclear Medicine (ANM) facility is expected to be completed by the end of 2016. ANM 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 approvals, the facility will be operational in 2017.

ABOUT ANSTO

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

Low-enriched uranium, used to power Australia's OPAL research reactor, 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 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.

Strategic priorities

ANSTO's strategic priorities for 2016-20 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.
- Nuclear 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, nuclear expertise and landmark infrastructure.

Our Corporate Plan 2016-2020

ANSTO's Corporate Plan 2016-2020 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 *Public Governance, Performance and Accountability Act 2013 (PGPA Act).*

Responsible Ministers

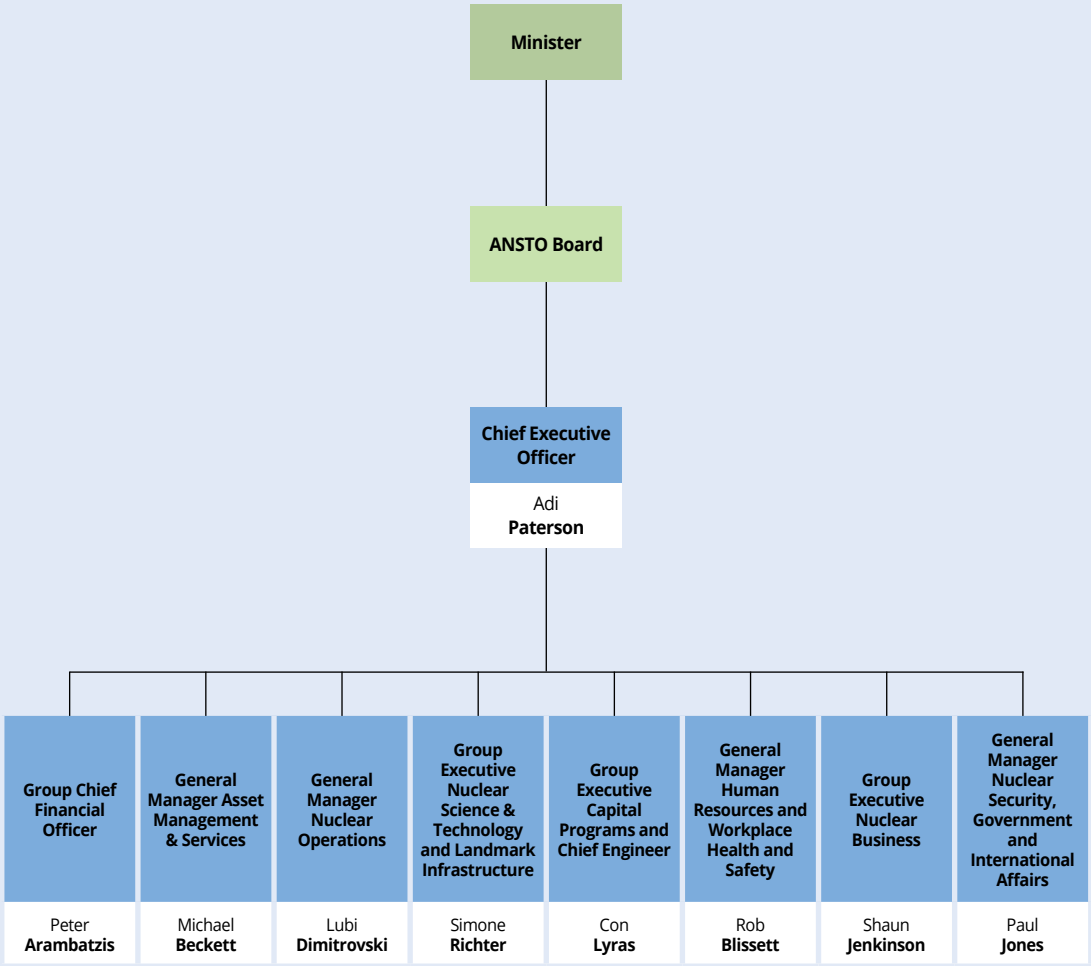
1 July 2015 to 21 September 2015

- The Hon Ian Macfarlane MP, Minister for Industry and Science
- The Hon Karen Andrews MP, Parliamentary Secretary to the Minister for Industry and Science

21 September 2015 to 30 June 2016

- The Hon Christopher Pyne MP, Minister for Industry, Innovation and Science
- The Hon Karen Andrews MP, Assistant Minister for Science

ORGANISATIONAL CHART



MEMBERS OF THE BOARD

Mr James (Jim) McDowell (Chairperson)

LL.B (Hons)

Independent business person with 35 years' experience in aerospace and defence, was CEO BAE Systems Saudi Arabia; Current Chancellor University of South Australia.

Appointed
12 December 2013

Appointed Chairperson
21 August 2014

Term concludes
11 December 2018

Ms Erica Smyth (Deputy Chair)

MSc, FAICD, FTSE

Scientist and business person.

Chair of ANSTO's Risk and Audit Committee.

Appointed
12 December 2008

Reappointed
14 March 2013

Appointed Deputy Chair
21 August 2014

Term concludes
13 March 2018

Dr Adrian (Adi) Paterson (Chief Executive Officer)

BSc, PhD, Chief Executive Officer

Chemical engineer.

Appointed
1 March 2009

Reappointed
1 March 2014

Reappointed effective
1 March 2017

Term concludes
28 February 2022

Emeritus Professor Stephen Buckman, AM

PhD, FAPS, FAIP, FinstP

Academic and researcher at Australian National University.

Appointed
23 July 2015

Term concludes
22 July 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 various Audit and Risk Management Committees for the NSW Government, Chair of the Audit and Risk Committee for the National Health Funding Body.

Appointed
25 February 2016

Term concludes
24 February 2021

Professor Andrew Scott

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

Nuclear Medicine Physician, Scientist and Academic.

Appointed
26 September 2007

Reappointed effective
29 September 2011
22 March 2016

Term concludes
22 March 2021

Professor Margaret Sheil

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

Professor David Copolov OAM

MBBS, PhD, FRACP, FRANZCP, MPM, DPM

Pro Vice-Chancellor, Office of the Vice-Chancellor and Professor of Psychiatry, Monash University.

Appointed
1 May 2008

Reappointed
28 June 2012

Term concluded
27 June 2016

Professor Judy A Raper

BE (Hons), PhD

Deputy Vice-Chancellor (Research) University of Wollongong.

Appointed
28 June 2012

Term concluded
27 June 2016

ANSTO EXECUTIVE LEADERSHIP TEAM

Dr Adrian (Adi) Paterson
Chief Executive Officer

Mr Peter Arambatzis
Group Chief Financial Officer

Mr Michael Beckett
General Manager, Asset Management & Services

Mr Robert (Rob) Blissett
General Manager, Human Resources and Workplace Health and Safety

Mr Lubi Dimitrovski
General Manager, Nuclear Operations

Mr Shaun Jenkinson
Group Executive, Nuclear Business

Mr Paul Jones
General Manager, Nuclear Security, Government and International Affairs

Mr Con Lyras
Group Executive, Capital Programs and Chief Engineer

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

CHAIRPERSON'S REPORT

ANSTO once again demonstrated its ability to deliver on key objectives over the past 12 months. In the financial arena, the organisation achieved baseline targets, grew commercial operations, had a strong balance sheet and maintained positive cash-flow during a period of significant fiscal constraints at a whole of government level. This strong fiscal position will help ANSTO deliver national research priorities into the future.

Work on key projects progressed with the ANSTO Nuclear Medicine facility nearing completion. ANSTO has an important role in the production of nuclear medicine both in Australia and globally. The already significant world demand for Mo-99 is growing. With the reactors responsible for seventy per cent of the world's current Mo-99 production due to cease production in the next few years, the facility will greatly enhance the production of molybdenum-99 to potentially supply up to 20 per cent of the world market while meeting domestic demand.

On behalf of Australia, ANSTO safely and securely managed the return of intermediate level waste from the reprocessing of spent fuel to Australia from France. The waste is a by-product of nearly 50 years of nuclear medicine production and scientific research. The intermediate level waste will temporarily remain at ANSTO until a National Radioactive Waste Management Facility is sited and constructed. ANSTO has actively assisted the Federal Government in pursuing different alternatives for the facility.

ANSTO plays a leading role in innovating for Australia's future as evidenced by the appointment of CEO Adi Paterson to the Australian Government's Expert Working Group on the future of the country's research infrastructure. The Group will develop a five to 10 year roadmap for Australia's long term research infrastructure needs, ensuring Australia maintains

excellence in research for the benefit of the nation and continues to address many of the world's major scientific challenges.

Significant progress was made in advancing and defining ANSTO's contribution to the Australian research and technology landscape. In particular, in March 2016 the Australian Government agreed to support the transfer of ownership of the Australian Synchrotron to ANSTO. The decision was preceded by the Australian Government's commitment of just over half a billion dollars in funding to operate the Synchrotron over the next ten years.

The Synchrotron complements ANSTO's suite of national and landmark infrastructure which includes the OPAL multi-purpose reactor, the Australian Centre for Neutron Scattering, the Centre for Accelerator Science, and the National Deuteration Facility.

Another key advance was the establishment of the new operating model for ANSTO's nuclear science and technology function, which better positions ANSTO to contribute to the National Innovation and Science Agenda. The CEO's Report addresses this important change.

Due to ANSTO's expertise, Australia was invited to join the Generation IV International Forum (GIF) for long term research on nuclear technologies to develop reactors that use fuel more efficiently, with less radioactive waste production, while maintaining high levels of safety and proliferation resistance. Australia can benefit from the global learnings and developments from this forum.

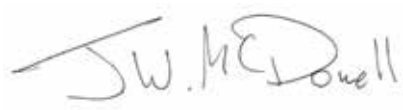
ANSTO's expertise was also called upon by the South Australian Royal Commission into the Nuclear Fuel Cycle when it asked ANSTO to provide expert witness testimony. The Commission issued its Final Report in mid-2016, which included recommendations to deepen South Australia's involvement in the nuclear fuel cycle.

The Board renewal process which occurred during the year places ANSTO in a strong position to face the future. The Board was strengthened by the additions of Ms Carol Holley, Professor Stephen Buckman AO, Professor Brigid Heywood and Professor Margaret Sheil. The exceptional and varied experience of the new members will bring invaluable expertise to ANSTO. In addition, Andrew Scott's tenure was renewed for another 5 year term. His extensive nuclear medicine and medical imaging expertise provides key support to the ANSTO Nuclear Medicine project.

The appointments also bolstered the gender balance on the Board and I am pleased to note that now more than 50 per cent of the Board is female.

I would also like to thank Professor Judy Raper and Professor David Copolov, whose terms ended during the year, for their valuable contribution during their time on the Board.

The reappointment of Dr Adi Paterson as CEO for a further five years also helps position ANSTO to continue to deliver outcomes for Australia. Dr Paterson has a strong vision for ANSTO's future and the Board is confident in his continued leadership.



James (Jim) McDowell
Chairperson

CHIEF EXECUTIVE OFFICER'S REPORT

ANSTO operates landmark and national research facilities as a core function for users across Australia and from overseas. These are multi-disciplinary, multi-user and multi-decadal platforms that serve research and industry sectors and are essential for ensuring our country's competitive advantage and position in the international community.

At present Australia is determining future requirements for research and innovation capabilities through an update of our National Research Infrastructure Roadmap. This process is led by the Chief Scientist Dr Alan Finkel AO. ANSTO has continued to strengthen our management of our platforms to ensure that the long-range planning and predicable operations are transparent to our stakeholders and funded on a sustainable basis.

Over the past year we have achieved a number of important milestones on our journey to enhance ANSTO's contribution to achieving Australia's research priorities and building Australia's reputation in the global setting for nuclear science and technology. Changes to the operating model for Nuclear Science and Technology (NST) within our organisation ensure our research, mainly undertaken in partnerships and collaborations is aligned with priorities and objects such as the National Innovation and Science Agenda.

I would like to thank our staff and the leadership group that undertook this process of review and the restructuring that followed. The new model is already showing benefits for staff, users and partners. The new structure and improved process are designed to achieve a more responsive and dynamic approach that will facilitate the full utilisation of our landmark scientific infrastructure, open up new opportunities for our users and partners, and drive Australian innovation.

The Australian Government's decision to support transfer of ownership of the Australian Synchrotron to ANSTO and the associated commitment of operational resources for 10 years bring certainty and continuity to this essential component of Australia's landmark research infrastructure. The Australian Synchrotron began as a true partnership with co-investment to build the first suite of beamlines, and it is important that this model continues for the next phase of development, with benefits of alignment of investment with national capabilities, and in the context of assured operational funding.

During the year ANSTO has refined our relationship with the Australian Institute of Nuclear Science and Engineering (AINSE). AINSE is a membership based organisation representing nearly all Universities in Australia and New Zealand as well as ANSTO, CSIRO and a number of other organisations. During the course of the year the AINSE Council has refined its strategy to give greater support to early career researchers and expanded its membership options. This change gives confidence that larger numbers of researchers will access ANSTO (and other nuclear science and engineering facilities) through AINSE programs.

ANSTO uses its unique expertise in the nuclear fuel cycle to support a range of Government initiatives. ANSTO undertook the repatriation of 10 tonnes of reprocessed radioactive waste from France in December 2015. That waste arose from the reprocessing of around half the spent fuel generated through nearly 50 years of operation of Australia's HIFAR reactor. There were many years of preparation and a large number of people from ANSTO and external organisations and authorities involved. I would like to pay tribute to the teamwork, planning and final realisation of this project. It demonstrates Australia's ability to manage the repatriation and interim storage of intermediate level waste well within the safety standards required. The waste is stored on an interim basis at the Lucas Heights campus until the Federal Government determines a location and builds a National Radioactive Waste Management Facility.

ANSTO has provided expert input to the South Australian Royal Commission into the Nuclear Fuel Cycle during this reporting period. In June 2016, following a multinational process, ANSTO signed the Generation IV International Forum (GIF) charter. This is a consortium of 14 countries committed to working together in long-term research on advanced nuclear technologies. Generation IV reactors represent the next step in nuclear technology. The designs are being developed to use fuel more efficiently with less radioactive waste production, enabling them to be economically competitive while meeting stringent standards on safety and proliferation resistance. Australia's successful bid to join the GIF was based on ANSTO and the ability of local partners to contribute to GIF research and innovation goals.

ANSTO continues to expanded access to the benefits of nuclear science and technology. In the area of nuclear medicine, there was considerable progress on the construction of the new ANSTO Nuclear Medicine facility and readiness activities for an increase in the production molybdenum-99 which underpins the availability of technetium-99m, the most important diagnostic radioisotope globally.

ANSTO received the go ahead from the Therapeutic Goods Administration (TGA) to manufacture Lutetium-177. This is a therapeutic isotope which will initially be available for use in cancer clinical trials and the TGA compassionate use scheme. Over the next period we will engage stakeholders to develop the most effective means of expanding the opportunities and benefits of local production of this isotope.

ANSTO is engaged in discussions with a range of stakeholders interested in the development of particle therapy (using carbon or protons) capabilities and facilities in Australia. ANSTO will continue to explore and support opportunities for a carbon-ion therapy centre in Australia over the coming years and assist other projects to ensure, that to the greatest extent possible, a national approach to particle therapy investments can be achieved.

We continue our efforts to inform the wider community of the benefits of the peaceful uses of nuclear techniques through our outreach initiatives. ANSTO welcomed 29,592 visitors to our Lucas Heights campus and expanded services to schools through achieving BOSTES accreditation for our teacher professional development training courses. Our school holiday science workshops continue to develop, attracting a growing number of young people eager to engage with STEMM.

At ANSTO, we are committed to putting our people first. ANSTO is a partner and member of the Science and Gender Equity initiative (SAGE). This project will underpin a more systemic approach to address gender equity in the STEMM sector in Australia.

I wish to thank our talented people and the ANSTO senior leadership team for their commitment in the last year to achieving these important results. We have a highly qualified Board. I would like to thank them for their guidance and support to myself, the Executive and staff of ANSTO.

We look forward to continuing to meet the science and technology needs of Australia and the peaceful use and application of nuclear science and technology in the global setting.

Dr Adrian (Adi) Paterson
Chief Executive Officer

2015-16 HIGHLIGHTS

In the 2015-16 financial year 5400 researchers visited the Australian Synchrotron.

ANSTO becomes official owner of the Australian Synchrotron

In March, the Australian Government agreed to support ANSTO in becoming official owner of the Australian Synchrotron. The inclusion of the Australian Synchrotron cements ANSTO's position as custodian of Australia's most significant landmark and national infrastructure for research.

The change of ownership followed the Australian Government announcement in December of a $520 million financial commitment under the Australian Government's National Innovation and Science Agenda to fund operations at the Synchrotron over the next ten years.

Officially taking place in July 2016, the inclusion of the Australian Synchrotron into ANSTO's suite of facilities means it is now better placed than it has ever been before to develop its beamline infrastructure, and commit to longer-term research.

Waste repatriation from France

ANSTO successfully completed the planned repatriation of Australian radioactive reprocessed spent fuel waste from France.

The Australian waste was a by-product of the production of generations of potentially life-saving nuclear medicine, as well as nuclear research techniques to assist our environment, medical and mining industries. Along with these benefits from Australia's nuclear program comes a responsibility to safely manage the by-products.

ANSTO worked together with State and Federal Government agencies, in particular the NSW Police and Australian Federal Police.

The shipment of repatriated waste left France on 15 October, arrived in Port Kembla on 5 December, and was safely transported to the interim storage facility at Lucas Heights the following day. The waste will be stored at Lucas Heights until it is moved to the National Radioactive Waste Management Facility, once established.

Radioactive waste is currently stored at more than 100 locations across Australia, including hospitals, mining sites and research centres, and a single national facility is in line with international best practice.

The shipment of repatriated waste left France on 15 October, arrived in Port Kembla on 5 December (pictured), and was safely transported to the interim storage facility at Lucas Heights the following day.

2015-16 HIGHLIGHTS

Board expertise strengthened by new appointments

During the year, four new Board members – atomic physics researcher and academic Emeritus Professor Stephen Buckman, chartered accountant Carol Holley, Professor Brigid Heywood and Professor Margaret Sheil – were appointed to the ANSTO Board.

Professor Buckman's skills, knowledge and expertise in nuclear science, and his extensive national and international networks are highly relevant to ANSTO, particularly to the organisation's high-tech nuclear medicine facility.

Ms Holley has extensive experience as a board member and Chair of audit and risk committees. She offers strong finance, risk management and audit skills plus related industry knowledge. She plays an important role in reinforcing ANSTO's strong financial management, as well as providing commercial expertise.

Professor Sheil has been the Provost at the University of Melbourne since April 2012, and has previously held significant positions across numerous committees, advisory boards, and organisations including being CEO of the Australian Research Council for five years. Prior to that he was Deputy Vice Chancellor (Research), Dean of Science and a Professor of Chemistry at the University of Wollongong.

Professor Brigid Heywood is the Deputy Vice Chancellor (Research) at the University of Tasmania, and is responsible for the University's research and innovation strategy, its research institutes, students and infrastructure, and commercialisation services. A trail blazer in many respects, she was the first woman in the United Kingdom to hold an established Chair in Inorganic Chemistry.

The appointments have ensured that the Board continues to have high quality members with specialised skills, knowledge and expertise.

New members of the ANSTO board (from left to right) Ms Carol Holley, Emeritus Professor Stephen Buckman, AM, Professor Margaret Sheil, Professor Brigid Heywood.




ANSTO confirmed the appointment of four outstanding scientists (above left to right) Dr Simone Richter, Dr Miles Apperley, Dr Suzanne Hollins and Dr Paul Di Pietro to newly created senior positions.

Nuclear science and technology operating model review

ANSTO undertook a year-long review of its nuclear science and technology operating model in order to ensure Australia is well placed to take advantage of the developments that nuclear science and technology can deliver over the next generation.

The outcome is that ANSTO will sharpen its focus on:

- Driving innovation;
- The interconnectedness between research conducted both within and external to ANSTO and our landmark and national research infrastructure; and
- Achieving research outcomes to support health, the environment and advances in the nuclear fuel cycle.

As part of the review, ANSTO confirmed the appointment of four outstanding scientists – Dr Simone Richter, Dr Miles Apperley, Dr Suzanne Hollins and Dr Paul Di Pietro – to newly created senior positions.

Dr Richter is overseeing the research and infrastructure program accessed by hundreds of national and international scientists and industry partners every year.

The role will specifically see Dr Richter focus on fostering innovation in research, as well as the development of future science infrastructure and capabilities.

Dr Apperley is overseeing the hundreds of millions of dollars' worth of science infrastructure managed by ANSTO. His responsibility will be to monitor the existing operations, and also further develop the infrastructure portfolio to benefit research, industry and academic users and partners, and the community.

Dr Hollins is leading the delivery of world-class applied and translational research programs – driving ideas from research and ultimately to products.

Dr Paul Di Pietro is leading and driving the design and implementation of strategies, incorporating innovation and service delivery transformation.

The changes will help us to position ANSTO and Australia to take advantage of opportunities in the sciences that will deliver benefits to the people of Australia, and the world.

2015-16 HIGHLIGHTS

Director General of the International Atomic Energy Agency (IAEA), Yukiya Amano (left) with ANSTO CEO Dr Adi Paterson.

New IAEA agreement

In March 2016, ANSTO CEO Adi Paterson met with IAEA Director General, Yukiya Amano, in Washington DC during the 2016 Nuclear Industry Summit to sign a new Collaborating Centre Agreement with the IAEA.

The Agreement recognises ANSTO's international excellence in 'Multi-analytical Techniques for Materials Research, Environmental Studies and Industrial Applications' and sets out how ANSTO can support the IAEA in this important area.

The Agreement, which runs for four years, expands on a similar agreement on neutron scattering, which concluded in 2013 and featured 16 international workshops, meetings and conferences. In addition to neutron scattering techniques, the new Agreement will also enable cooperation with ANSTO's other facilities such as the Centre for Accelerator Science, the Australian Synchrotron and materials research facilities.

There will be a particular focus on human capacity building and promotion of nuclear science and technology through cooperation with scientists from other IAEA Member States, especially from the Asia-Pacific region.

This Agreement will continue the active cooperation ANSTO has with the IAEA to help in the promotion of peaceful uses of nuclear science and technology.

New Electron Microscopy Facility opened

In July, the Hon Karen Andrews, then Parliamentary Secretary to the Minister for Industry and Science, opened ANSTO's recently-completed world-class Electron Microscopy Facility at the Lucas Heights campus.

The Hon Karen Andrews, who is a mechanical engineer and a strong advocate for the applied sciences and engineering, applauded the completion of the new $6 million facility.

The purpose-built facility uses advanced architectural design features to allow ANSTO's electron microscopes to operate at their full performance capabilities by mitigating external influences which can detract from the quality and performance of highly-sensitive electron microscopes.

Amongst many applications, Electron Microscopy assists in maintaining the safety and reliability of the world class OPAL research reactor, which is vital to ANSTO's production of nuclear medicines.

While electron microscopes are found in many universities and science labs, what is unique here is the environment in which they are housed. ANSTO has created a shielded laboratory that maximises microscope performance. Already electron microscopy has played a major role in ANSTO's research and development of high-tech materials for industrial and medical applications.

The Hon Karen Andrews being shown around ANSTO's world-class facilities by Professor David Cohen.

The new building will enable ANSTO to conduct world-class research into nuclear materials and radiation, particularly the behaviour of materials for use in extreme environments.

The building won the best 'Engineered Timber Products' category in the 2015 Australian Timber Design Awards.

Solutions for Australian industry

Explaining superconductivity

Superconductors that can transport electricity without a loss of energy would save billions of dollars and have a considerably smaller environmental impact than other options. Scientists are a step closer to understanding superconductivity that could make electricity transmission more efficient.

In a paper published in the prestigious journal *Nature Materials* in 2015, a research team from Japan, China and Australia, including ANSTO, identified a new iron-based compound that demonstrates superconductivity on one dimensional ladders of iron atoms.

Until recently, superconductivity in iron-based compounds had only been observed in iron pnictides on two-dimensional square lattices. The discovery of superconductivity in the ladder-type barium iron sulphide ($BaFe_2S_3$) affords a new platform for studying the fundamentals of iron-based superconductivity.

ANSTO's Dr Max Avdeev is using neutron scattering techniques to better understand superconductivity to help make electricity transmission more efficient.

Demonstrating significant advantages of new laser-bonding methods

Sydney-based LaserBond Limited accessed the Australian Synchrotron through the NSW Industry Synchrotron Access Scheme to conduct a detailed comparative analysis of both an established and a new method of laser-bonding.

Samples of industrial equipment coated in LaserBond's metallic repair product – one coated using its standard method, and a second using its newly-developed method – were analysed using the X-ray Fluorescence Microscopy beamline (XFM). The XFM analysis confirmed that the new method provided a higher quality, wear-resistant deposit, making the overall product more efficient and durable for long-term performance. LaserBond has used the highly-detailed images produced by the XFM beamline to demonstrate the superiority of the new method to customers.

Due to the dramatic cost savings achieved by the new method, the company forecast they will be triple their current size in the next five years.

Improving the properties of sodium-ion batteries

In collaboration with the Institute of Physics at the Chinese Academy of Sciences, ANSTO researchers have manipulated the electrochemical properties of a material that could improve the capacity and life of sodium-ion batteries.

Sodium-ion batteries have shown great promise for large-scale storage of renewable energy. The exploding market of handheld electronic devices powered by lithium batteries is raising the cost of lithium raw materials to the extent that providers of large-scale grid energy storage solutions are looking for alternative battery solutions.

Sodium-ion batteries have shown great promise as a cheaper alternative because sodium is one of the most abundant elements on earth.

Although the concept of rechargeable sodium-ion batteries for energy storage

ANSTO's Jessica Veliscek Carolan radiochemical separations research is helping improve environmental remediation, and mining and industrial processing.

dates back to the 1980s, progress has been stalled by the need to increase energy density and rate performance, lengthen the cycle life, and find better electrode materials.

In a 2015 Nature Communications paper, the researchers proposed a way to improve the properties of a class of electrode materials to be used in sodium-ion (Na+) batteries by manipulating their electronic structure.

The approach proposed opens up a way to design other materials of this type with long lifecycles.

Promising new waste solutions

Radiochemical research is undertaken to develop advanced materials that have the capacity to separate target elements from complex, multi-element radioactive solutions created in the nuclear industry. Selective elemental separation is also a challenging but important step in the context of environmental remediation, mining and industrial processing.

Radiochemical separations have an added layer of complexity over traditional separations due to the presence of radiation.

ANSTO research is investigating how to treat solutions of spent nuclear fuel and recycle actinide elements, such as uranium, that can be re-used as fuel. Recycling of used nuclear fuel is of benefit both in terms of increasing the number of years that nuclear power could be a viable option for power generation as well as decreasing the radiotoxicity, long half-life and volume of waste.

By selectively separating the actinides (uranium, plutonium, americium, curium and neptunium), the time required for waste to return to the safe radiotoxicity level of naturally occurring uranium is reduced from 130,000 years to 270 years.

Currently, most treatment of used nuclear fuel is performed using liquid-liquid extraction. However, ANSTO is researching the use of solid materials to sorb radioactive elements. This has many advantages, such as avoiding the production of organic solvent wastes during processing. ANSTO's research could lead to a method of separation that will reduce the radiotoxicity and long half-life of nuclear waste.

Improving the health of Australia

Better management of diabetes

In a study carried out in collaboration with the University of New South Wales, and the University of Sydney – Brain and Mind Centre, ANSTO researchers have used Positron Emission Tomography (PET) imaging and mathematical modelling capabilities to provide insight into dynamic in vivo glucose metabolism in skeletal muscle with relevance for the treatment of diabetes, an illness considered a global epidemic.

Using 18F-FDG (18F-fluorodeoxyglucose), which is a radiolabelled sugar (glucose) molecule, in dynamic in vivo PET imaging, the researchers were able to quantitatively measure how much glucose uptake was in skeletal muscle from circulating blood plasma following treatment with apoA-1 and insulin, alone and in combination.

Dynamic imaging using PET-CT provides an insight into biological interactions which take place from the moment of injection of the radiotracer. The methodology involved a mathematical analysis of the glucose utilisation rate (kinetics) in muscle. The researchers then used the data in mathematical models (kinetic modelling) to understand the treatment effect, extending the principle to other organs, and to the whole body.

This approach offers a non-invasive and quantitative method of studying glucose metabolism in order to understand the mode of action of novel therapies in diabetes at a molecular level. The work was published in the *Diabetologia* journal in April 2016.

New radiotracers for medical imaging

ANSTO's new approach using microfluidic technology may offer faster and more controlled ways to produce radiotracers for medical imaging; this technology could one day lead to PET radiopharmaceuticals being available to a wider field of scientists and clinicians.

There is growing demand for new PET radiopharmaceuticals that can be prepared rapidly, efficiently and robustly, and

ANSTO's Andrew Arthur, Gita Rahadjo, Arnaud Charil and Arvind Parmar are using nuclear imaging to help in the management of diabetes.

Dr Lidia Matesic is developing new radiotracers for medical imaging that could help improve health outcomes for patients.

microfluidic technology may help to achieve such targets. Microfluidics is the science and technology investigating the behaviour, control and manipulation of very small amounts of fluids, typically in the range of nanolitres to microlitres (compared to millilitres).

This requires the use of 'miniature plumbing', a series of tubes and devices that have dimensions as small as tens of micrometres, in order to deal efficiently with such small volumes of fluids. Research has already demonstrated the benefits of this technology with [18F]-Altanserin, a PET radiotracer which images the serotonin receptor in the brain.

ANSTO'S microfluidic radiochemistry laboratory, as of 2016 the only one of its kind in the Southern Hemisphere, is working towards the concept of dose-on-demand production of radiopharmaceuticals. Dose-on-demand can be described as producing a radiopharmaceutical as rapidly as possible, using the minimum amount of chemicals and radioactivity required for a single (or few) PET imaging dose(s).

With dose-on-demand, it is envisaged that, in the future, hospitals will have the flexibility to produce their desired radiopharmaceutical in-house and on-demand, leading to a larger variety of more specific tracers being used, giving every patient access to faster and personalised diagnosis and treatments.

Improving delivery of proven pharmaceutical products

Melbourne-based biotechnology company Phosphagenics Ltd used the Australian Synchrotron to help characterise its proprietary TPM® (Targeted Penetration Matrix) drug delivery technology to improve the delivery of proven pharmaceutical products.

Research conducted on the Australian Synchrotron's Small and Wide Angle X-ray Scattering (SAXS/WAXS) beamline provided new insight into the hitherto unknown internal structure of TPM nanoparticles. These findings will enable Phosphagenics to further refine its world-leading understanding of Vitamin E molecule self-assembly.

Armed with this new understanding of our technology and how it can be further improved, Phosphagenics will be able to apply our platform to an even wider range of medicinal applications.

The SAXS/WAXS beamline at the Australian Synchrotron is being used to improve the delivery of pharmaceutical products.

Understanding our environment

Understanding the impact of industry on groundwater

ANSTO participated in a study evaluating the extent of natural groundwater connectivity between deep coal seam gas resources and overlying aquifers that can be applied to developments worldwide.

Coal seam gas, or coal bed methane production, is the focus of environmental questions as it generally requires the joint extraction of large quantities of groundwater. Production can have an impact on groundwater quality and quantity in adjacent or overlying aquifers that are used to support irrigated agriculture, stock and domestic water supplies.

The study, which was published in *Scientific Reports*, was funded by the Australian Government's Cotton Research and Development Corporation. It was conducted in the Surat Basin in southeast Queensland and undertaken in association with the University of New South Wales Connected Waters Initiative Research Centre, Royal Holloway, University of London and the University of East Anglia.

The research provided independent baseline information for those communities near Dalby using groundwater for irrigation in proximity to coal seam gas developments. The study indicated that there is some hydraulic connectivity between the Walloon Coal Measures and the Condamine Alluvium near Cecil Plains but the extent is low, and that there was a low concentration of methane measured throughout the Condamine Alluvium.

ANSTO brings considerable expertise in the use of tools and techniques to measure changes in water isotopes that enable researchers to characterise water masses and to trace water and its interaction above and below the earth.

Using radiocarbon for ocean circulation and climate studies

In a joint research project with the University of Queensland, Queensland University of Technology and the Australian National University, ANSTO undertook radiocarbon analyses on corals from two sites in Australian waters of the southwest Pacific that indicated significant changes in ocean

Members of the research team from ANSTO and UNSW sampling an irrigation well during fieldwork in the Condamine Valley, (L-R) Charlotte Iverach; UNSW: Lucienne Martel; ANSTO: Dioni I. Cendón and Stuart Hankin.

circulation in the Pacific and large climate variability during the early to mid-Holocene period (8,000-5,400 years ago).

Traditionally the Holocene had been considered warm with relatively stable climate. The ocean plays a critical role in modulating the earth's climate. Information about large variations in ocean circulation using radiocarbon can be used to improve our knowledge on dramatic climate shifts in the past.

Radiocarbon can be used to verify global ocean models which underpin future climate predictions and impacts.

The researchers dated 40 coral samples using the thorium-230/uranium-234 method. ANSTO analysed the carbon-14 content of coral samples with 3-10 years of growth using accelerator mass spectrometry on the Star instrument at ANSTO's Centre for Accelerator Science.

The results were published in the prestigious journal *Earth and Planetary Science Letters* reporting large temporal variations in the marine radiocarbon reservoir effect, a radiocarbon aging effect of the surface ocean compared to the atmosphere, during the mid-Holocene period for the southwest Pacific.

The timing and magnitude of the variations in the reported southwest Pacific radiocarbon data are similar to those previously published for other sites across the Pacific, suggesting that these variations are likely due to variability in Pacific-wide ocean circulation associated with climatic changes.

Fukushima's impact on the Pacific

The incident at the Fukushima Daiichi nuclear power plant in March 2011 released the largest ever single-event deposition of radioactive caesium into a marine ecosystem. Five years later, economic impacts remain for fisheries in Japan, and the movement of caesium through the Pacific Ocean ecosystems have challenged

Quan Hua is using ANSTO's Vega accelerator to undertake radiocarbon analyses on corals from two sites in Australian waters of the southwest Pacific.

some basic assumptions. ANSTO joined with researchers from Japan and other International Atomic Energy Agency member states, to evaluate movement of the radionuclides and their potential influence on water, fish and birds.

The main finding was that although the accumulation in the fish and other organisms nearest to the Fukushima site was relatively high, the levels decreased rapidly with distance away from the plant. Small amounts of Fukushima contaminants have been detected in migratory animals, far from the accident site, including in fish across the North Pacific, but at levels that do not pose a dose risk to the fish, nor its consumers.

Models have predicted dilute caesium carried by ocean currents crossing the equator and ANSTO worked with the Australian Radiation Protection and Nuclear Safety Agency to collect water samples and fish from Australian coastal waters to test for Fukushima influence. Preliminary results did not find the presence of 134Cs isotope that would indicate Fukushima contamination. The data has provided a valuable baseline important for a range of ocean circulation, marine water chemistry and ecological health concerns.

Operation of key infrastructure

OPAL

OPAL continues to build on its reputation as one of the world's most reliable and available multi-purpose research reactors. In the 2015-16 financial year, the OPAL research reactor operated for 295 days out of a scheduled 296 days. This equates to a planned availability of 99.7 per cent and reliability of over 98 per cent.

A number of capacity and capability improvements to OPAL were completed throughout the year, including a major upgrade to the Reactor's Control and Monitoring System and improvements to plant and equipment used to handle radiopharmaceuticals.

The Reactor Control and Monitoring System is a highly interactive industrial control system used to ensure the reliable control of the reactor and irradiation facilities. The focus of this upgrade was to modernise the control system to effectively minimise risks arising from obsolete components. This upgrade has been the largest IT project undertaken for OPAL, and was completed within the scheduled time and allocated budget.

The reliable supply of reactor-based radiopharmaceuticals was further enhanced through upgrades and improvements to specific plant and equipment used to handle, transfer and deliver irradiated targets. These improvements provide increased capacity and reliability in the delivery of nuclear medicine at a time when ANSTO is establishing itself increasingly as a global supplier of radiopharmaceuticals.

Optimised Cold Neutron Source operations throughout the year have continued to boost capabilities for Australian scientists and industry. 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.

The upgrade to the Reactor Control and Monitoring System will extend the life of the control system by 10 to 15 years.

ANSTO has set a 300+ day target in 2016-17 for the safe operation of the OPAL research reactor to meet the increasing national and international radioisotope supply requirements. OPAL's multipurpose design also allows for a sustained and high availability of neutrons to support ANSTO's research objectives.

Australian Centre for Neutron Scattering

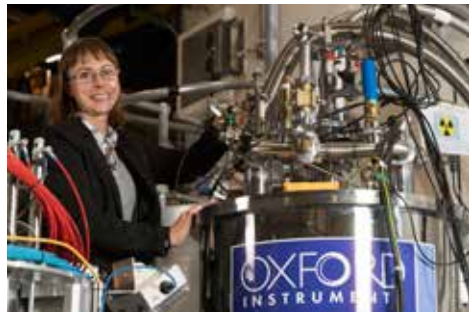
ANSTO is home to Australia's national neutron beam facility, with 13 neutron beam instruments using neutrons produced by the OPAL research reactor. It is the unique properties of neutrons that enable researchers to investigate matter in a way that other techniques cannot.

Australian and international researchers use these instruments to determine the structure and to gain deeper insights into the chemical and physical properties of materials, leading to improvements in computing and energy storage efficiency, food quality, road safety, infrastructure maintenance, manufacturing and mechanisms for treating certain diseases.

Three of the neutron beam instruments are funded through the National Collaborative Research Infrastructure Strategy, which is an initiative of the Australian Government.

This year, 512 scientific users from 164 institutions in Australia and overseas visited ANSTO and utilised the Australian Centre for Neutron Scattering beam instruments for their scientific research. One hundred and five research papers were published using data obtained from the instruments.

As part of ANSTO's mission to promote neutron scattering applications, the training of scientists in the Asia-Pacific region and industry engagement, ANSTO hosted the Inelastic Neutron Scattering School (INSS 2015), and a Workshop on Residual Stress Measurement and Additive Manufacturing. ANSTO also co-hosted the 2nd Asia-Oceania Conference on Neutron Scattering (AOCNS 2015), together with the Australian Neutron Beam Users Group.



Dr Kirrily Rule used the triple axis spectrometer Taipan at the Australian Centre for Neutron Scattering to investigate a highly unusual quantum state of matter in a magnetic material.

Some highlights from Australian and international researchers using the neutron beam facilities and published in 2015-16 are provided below.

- Single-crystal neutron diffraction revealed further evidence for the existence of a highly exotic and elusive magnetic state called a spin-nematic phase.

- Small-angle neutron scattering brought insight into the 'tunability' of membranes for enhanced electrical conductivity in graphene.

- Deformation textures in Himalayan rocks were studied for the first time by neutron strain scanning.

- Neutron powder diffraction underpinned a study of the pressure-induced superconductivity in $BaFe_2S_3$, the first iron-based ladder material to exhibit superconductivity.

- The first in situ study of the changes in chemical and magnetic structure of a lead-cobalt bi-layer nanomaterial with hydrogen gas pressure by combined ferromagnetic resonance and neutron reflectometry points the way to new hydrogen-gas sensors.

Australian Synchrotron

In 2015-16, the Australian Synchrotron consolidated its position as one of Australia's landmark research facilities, experiencing another year of strong demand with more than 5,400 researcher visits involving around 1,000 synchrotron-powered experiments. Additionally, industry clients made use of more than 1,100 beamline hours.

The Australian Synchrotron was able to purchase a state-of-the-art X-ray detector to enhance researchers' ability to solve protein structures – an essential tool in understanding and combatting cancer. This was made possible by a $2 million grant from the Australian Cancer Research Foundation, which was supplemented by significant contributions from the Australian and New Zealand biomolecular research community.

The Australian Synchrotron's team maintained beam availability at record levels in 2015-16, delivering better than 99.2 per cent up-time. In so doing, they consolidated the Australian Synchrotron's position as one of the world's most reliable modern accelerators. Such consistent systems are vitally important to research clients from universities, medical research institutes and across industry.

In 2015-16, Australian Synchrotron beamline scientists and engineers developed and deployed a range of new experimental capabilities including fast X-ray fluorescence tissue scanning at high (50 nm) resolution, protein sample measurement with reduced beam damage and X-ray absorption spectroscopy of samples under geologically-relevant pressures and temperatures.

The Australian Synchrotron empowered research that provided community benefits through developments such as new and life-saving drugs and unearthing the history of art. A one-shot influenza vaccine is being developed by an international collaboration led by University of Melbourne and Monash University researchers using the Australian Synchrotron to discover how T cells can 'bully' emerging mutant strains of influenza into submission. National Gallery of Victoria researchers imaged pigments at the Australian Synchrotron buried within the many layers of paint to reveal the secret history and aid in the restoration of *The North Wind* by Frederick McCubbin, one of Australia's foremost Impressionist artists.

The number of papers published in world-class, peer-reviewed journals remains a gold-standard indicator of success. Published highlights from 2015-16 include:

- More than 480 peer-reviewed papers containing data from Australian Synchrotron beamlines, in addition to a further 73 publications from the Australian Synchrotron team, or from Australian Synchrotron-funded visits to international synchrotron facilities. The excellence of these research outcomes is demonstrated by an average impact-factor of 5.36, and with 18 per cent of published papers appearing in leading journals such as *Nature*, *Immunity*, *Physical Review Letters*, and *Chemical Society Reviews*. More than 2,500 peer-reviewed papers have been published since the facility opened in 2007.

- An average of 48 published papers per beamline during 2015-16, making it one of the most productive synchrotron facilities worldwide.

- Researchers using the Small and Wide Angle X-ray Scattering (SAXS/WAXS) beamline generated more than 107 peer-reviewed publications, making it one of the world's leading synchrotron SAXS/WAXS beamlines.

- Venetoclax, a new drug developed by researchers from the Walter and Eliza Hall Institute using the Macromolecular Crystallography beamline, was used to treat Chronic Lymphocytic Leukaemia in Phase III clinical trials in Australia and the United States. Preliminary results from

this trial have been so successful that the United States Food and Drug Authority granted Venetoclax breakthrough therapy designation and accelerated approval.

• The Powder Diffraction beamline was the source of more than 70 papers during 2015-16, including a study published in *Nature* describing how 2.7 billion year-old micrometeorites point towards to an oxygen-rich upper atmosphere in the Archaean era, which challenges the widely accepted understanding that Earth's lower atmosphere contained essentially no oxygen until 2.4 billion years ago.

National Deuteration Facility

The National Deuteration Facility (NDF) is Australia's national facility for labelling molecules with the non-radioactive isotope of hydrogen called deuterium. This is achieved using chemical or biological processes and enhances contrast between components when conducting structural studies using neutron scattering instruments at the OPAL research reactor or using spectroscopic techniques such as nuclear magnetic resonance, infra-red or mass spectrometry. This capability expands the range of research that can be done at the OPAL research reactor to help solve problems in medicine, health, communications, energy, food and mining.

The NDF labels a broad variety of biomolecules and chemicals to enable the study of the relationship between molecular structure and function in complex systems, and to provide deuterated materials which offer potential improvements in material properties.

The NDF is recognised as one of Australia's nationally significant infrastructure facilities funded through the National Collaborative Research Infrastructure Strategy, which is an initiative of the Australian Government.

This year, the NDF produced more than 84 deuterated molecules and supported more than 108 scientific users from 25 institutions in Australia and overseas. Demand for the NDF's expertise and facilities increased by 22 per cent compared with last year. Leading international organisations accessing the NDF included the Medical Research

Dr Anwen Krause-Heuer at work in ANSTO's National Deuteration Facility laboratories.

Council Laboratory for Molecular Biology in Cambridge, England; the Eidgenössische Technische Hochschule Zürich and the École Polytechnique Fédérale de Lausanne – both Swiss Federal Institutes/Universities of Technology; Helmholtz-Zentrum Berlin, Germany; University of Glasgow, Scotland; University of Freiberg, Germany; Universities of Auckland and Canterbury in New Zealand and University of Regina in Canada.

Some highlights from Australian and international researchers utilising molecules deuterated at the NDF included:

• Evaluation of phosphorescent light-emitting dendrimers potentially suitable for use in Organic Light Emitting Diodes in electronic screens (TVs, mobile phone etc.).

• Determination of the effect of diluting ionic liquids (liquid salts) in oil to more cheaply produce a new generation of lubricants.

• Advancing the understanding of how to use deuterated materials to engineer the spectral properties of incident light, leading to improvement in the efficiency conversion to electricity in solar cells.

• Use of deuterated protein and neutron scattering to characterise the interaction of protein with plant pectins (polysaccharides), which has potential for enhanced properties in food formulations.

• Production of a labelled HIV-1 protein to investigate how the AIDS virus cloaks itself to avoid detection and hence destruction by human cells.

• Design of membrane models for investigation of the biochemistry in mitochondria involved in programmed cell death (apoptosis) to increase understanding of mechanisms in cancer and degenerative diseases.

• Progressing the understanding of how an enzyme involved in biosynthesis of the amino acid histidine in the human body is regulated, building its potential as a target for pharmaceutical design.

• Study of the interaction of model bacterial membranes with antimicrobial peptides from frogs to provide the structural details necessary for the development of alternative antibiotics that are selective in their action – harming only pathogenic bacteria.

• Production of selectively labelled cell membrane lipids to investigate natural mechanisms of protection of cells against damage from very cold or dry conditions (relevant to seed banks).

Centre for Accelerator Science

ANSTO's Centre for Accelerator Science (CAS) operates a major technology platform based around four accelerators, associated beamlines, clean laboratories and in-house expertise.

CAS provides cutting-edge techniques supporting research and analytical services for a wide range of users from academia, publicly-funded research agencies, industry and government. The unique combination of capabilities at CAS affords national and international users access to a suite of tools in one location that can be used across isotopic dating, air pollution, climate science, modification of materials for future nuclear reactors, radiation damage studies, forensic science, nuclear detector characterisation and microbiological studies.

With the completion last year of the $38 million CAS capital construction project, the new facilities are now moving into the operational phase, supported with funding from the National Collaborative Research Infrastructure Strategy, which is an initiative of the Australian Government.

CAS now operates four accelerators – the 2MV Small Tandem for Applied Research (Star), the 10MV Australian National Tandem Research Accelerator (Antares), the new

The expansion of the Centre for Accelerator Science is being supported with funding from the National Collaborative Research Infrastructure Strategy, an initiative of the Australian Government.

1MV accelerator mass spectrometry system (Vega) and the new 6MV tandem accelerator (Sirius). The past 12 months has been a time of commissioning and equipping the 11 ion sources, 17 beamlines and laboratories associated with the new CAS facility.

Major achievements and highlights of the past year included:

• The new 1MV Vega machine is now routinely operational for accelerator mass spectrometry (AMS) analysis of actinides for external and internal users. This capability is unique, custom designed for optimum performance, enabling unsurpassed sensitivity and efficiency for the simultaneous detection of the full range of plutonium or uranium isotopes. The associated new clean laboratories enable background-free preparation of samples from all kinds of environmental media, as required for clients in areas such as nuclear safeguards, forensics, radioecology and geomorphology.

• Vega demonstrated it can achieve the high precision (0.3 per cent) and high throughput required for routine radiocarbon analysis, and is now being brought into routine use for our many radiocarbon users.

• The Sirius accelerator's surface engineering beamline together with its inline implantation system is operational and being used by external users.

• The new conformal heavy ion microprobe beamline on Sirius has achieved sub-three micron beam spot sizes for 3MeV proton beams and is currently being tested with heavy ions.

• The AMS detector stations on Sirius have been commissioned and demonstrated to achieve the required precision and sensitivity for 26Al, 10Be and 36Cl analysis. 36Cl analysis represents a new capability for CAS, and is being utilised by ANSTO's water resources researchers to answer questions for their external clients and collaborators.

• CAS continues to run the Aerosol Sampling Program (ASP), based on the Star accelerator. ASP has completed a 12-month study in Suva, Fiji to characterise fine particle air pollution on the main island. The main issues were found to be with domestic fires, burning of rubbish and emissions from motor vehicles.

• The ASP has also been involved in the Lower Hunter Fine Particle Study, a 12-month Project with CSIRO, NSW EPA and Office of Environment and Heritage (OEH); the final report has been issued and was presented to a public forum in the Newcastle Town Hall.

• CAS staff are partner investigators on a successful ARC Linkage Infrastructure, Equipment and Facilities grant, 'Australian National Facility for Noble-Gas Radio-Isotope Measurements'. Led by the University of

Adelaide, the project will develop a facility for researchers to accurately date water and ice cores, to answer questions of water availability, climate and environmental change; in addition the capability has nuclear security applications.

• CAS staff have initiated ground-breaking work applying radiocarbon dating to kidney stones. Kidney stones affect 1 in 10 Australian men and 1 in 35 Australian women during their lifetime; however very little is known about their growth cycle and longevity. An initial study has served as proof-of-principle, enabling the growth rate of kidney stones to be determined for the first time. Following this work, a collaboration has been established with leading experts in this field at the Department of Urology at the Erasmus Medical Centre in Rotterdam.

• ANSTO lodged a successful bid to host the SNEAP Accelerator Conference in Australia in 2016. This meeting enables collaboration and information sharing among operators of similar facilities around the world.

• During the past year the CAS facilities and operations have been audited and assessed as meeting quality system (ISO 9001) and regulatory requirements (under the *Australian Radiation Protection and Nuclear Safety Act 1998 (ARPANS Act)*).

Radiopharmaceutical production facilities

ANSTO manufactures radiopharmaceuticals through its business arm, ANSTO Health. The core mission is to manufacture and advance the use of radiopharmaceuticals to improve the health of Australians. The products are manufactured at ANSTO Health in its Therapeutic Goods Administration (TGA) licensed facilities.

ANSTO Health products are used in nuclear medicine scans to help diagnose a wide range of diseases and illnesses

Each week ANSTO Health delivers approximately 10,500 patient doses of potentially lifesaving nuclear medicines to hospitals and medical practices across Australia.

including cancers, cardiac conditions, skeletal injuries and hyperthyroidism. ANSTO Health also produces and distributes therapeutic products, and continues to provide a consistently reliable supply of isotopes which ensures the accuracy and speed of diagnosis providing the optimum opportunity for follow up and treatment of these life-threatening conditions for Australians.

Gamma irradiation facilities

ANSTO is Australia's provider of high precision irradiation and dosimetry services, operating an assortment of cobalt-60 gamma irradiators. These services are provided for a wide range of commercial and research applications in key areas of food biosecurity, Australian healthcare manufacturing and advanced materials.

Cobalt-60 emits gamma radiation that is very useful for eliminating pests in food, sterilising medical products and enhancing various material properties. ANSTO's capabilities in this area include being able to irradiate at very low precision doses for radiobiology studies through to irradiation at very high precision doses for material radiation resistance studies of emerging materials in space research and nano-structures such as graphene at very high doses.

ANSTO has contributed its precision irradiation expertise to the following areas:

- The development of a universal influenza vaccine using ionising radiation to inactivate the virus

- Irradiating for sterility of donated human bone and tendons used in transplants and grafting in surgery, leading to improved outcomes for patients

- The domestic quarantine control of the Queensland fruit fly to help reduce infestations

Laboratory-reared fruit flies are sterilised using irradiation. When released they mate but create no offspring. The program is helping to control infestations of the Queensland fruit fly in commercial growing areas in NSW, Victoria and South Australia.

- Food irradiation research as an alternative to pesticide use for post-harvest treatments to improve export market access. ANSTO supports investigations into food quality, nutritional and other effects for various fruits and vegetables

- Irradiation treatment of items subject to Australian quarantine restrictions

- Supporting Australian medical device manufacturers to validate the radiation sterilisation of their products

- Plant breeding studies

- Investigations into the effects of radiation on plastics and electronics

- Manufacture of high-dose radiation dosimeters for the calibration of industrial irradiation facilities in the Asia-Pacific region.

Education

ANSTO runs a number of programs to improve Australia's understanding and engagement with Science, Technology, Engineering, Mathematics, and Medicine (STEMM), and help develop our future leaders and innovators in this field.

ANSTO spoke directly with nearly 15,000 people on tours of ANSTO's Lucas Heights facilities this year. Face-to-face communication with visitors on tours, where we can showcase our research infrastructure first-hand, is a very powerful tool for explaining ANSTO's unique contribution to STEMM in Australia and the benefits of nuclear science.

The majority of our visitors are school students and teachers, and we offer customised tours for a variety of STEMM subjects, including Physics, Chemistry, Biology, Senior Science, Junior Science (Yr 7-10), and Primary School Science (Yr 5-6).

Students build and program a Lego model of ANSTO's neutron diffraction instrument Taipan.

ANSTO's free videoconference programs allow teachers and students across Australia to access ANSTO's expertise and research infrastructure from school. The program includes:

- Nuclear Science Inquiry Skills – students design and perform a first-hand investigation via videoconference using our radiation detection equipment.

- Meet an Expert – students interview a range of ANSTO scientists and engineers about their work and career

- HSC Chemistry and Physics revision – students collaboratively revise nuclear science content with other schools for their HSC exams and practice HSC-style questions.

To facilitate the expansion of this program, we continue to provide teachers with training and support to use videoconference technology to access this opportunity.

ANSTO supports Australian teachers in enthusing and educating their students about the applications and possibilities of nuclear science and STEMM more broadly. In 2016, ANSTO will have engaged nearly 300 primary and high school teachers at our professional development events in Sydney, Melbourne and Perth. Our programs are industry-accredited for NSW teachers and we plan to expand our formal accreditation for other Australian states in 2017. We also have a number of online education resources freely available for teachers and students, including games, videos, posters and workbooks.

More than 1,600 school-aged children participated in our science and technology workshops during the school holidays, learning about coding and robotics, sport science, atomic structure and water science in a hands-on format.

Supported by ANSTO, the F1 Formula Challenge team from Engadine High School showcase their award-winning car design.

ANSTO also offers specialised behind-the-scenes careers tours every school holidays, and many career exhibits throughout the year to highlight STEMM career options in nuclear science. In February 2016, ANSTO launched a new STEMM careers incursion for Year 8 students, showcasing the importance of jobs in STEMM in the future and polling student perceptions using interactive voting keypads.

In April 2016, ANSTO gave a select number of school students a two-day intensive experience working alongside ANSTO researchers and performing their own investigation.

ANSTO sponsors and supports a number of STEMM programs and organisations, including the CSIRO Scientists and Mathematicians in Schools program, Engineers Australia by hosting an annual Discover Engineering Day, the Science and Engineering Challenge, and local schools in the F1 Formula Challenge. We encourage effort and passion in science subjects at school with the ANSTO Science Medal for end-of-year awards ceremonies in more than 100 local schools.

Fact or Fiction is a free travelling science show aimed at school students and the general public. The show explores the science of the internet, and the audience hear from ANSTO scientists and vote with interactive keypads in a bid to separate science fact from fiction. More than 25,000 people across Australia have attended the show since 2012. Fact or Fiction has been designed to be highly entertaining and educational and attract those who aren't necessarily interested in science by providing them with a big dose of pop-culture.

Sponsorship and events

ANSTO's sponsorships are spread over three key areas: Science, Community and Government, and Industry. This ensures 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, promoting ANSTO's Plastics Project citizen science program at their annual Science Week, with environmental researcher Dr Tom Cresswell presenting a number of educational talks.

ANSTO again sponsored the prestigious Eureka Prizes. The ANSTO 2015 Eureka Prize for Innovative Use of Technology was awarded to a team from the University of South Australia for their work in developing an energy storage system that is a tenth the cost of batteries.

In addition, ANSTO supported the UOW travelling STEMM Roadshow and the Wollongong Science Fair which included sponsorship and judging.

ANSTO is proud to support local community members, leaders, businesses, council, government representatives and organisations. ANSTO continued its support of the Sutherland Shire Australia Day festival; the Sutherland to Surf fun run, Menai Business District Awards, Wanda Nippers and the Cook Community Classic.

ANSTO supported programs that highlight its role in health, including the Sutherland Shire Relay for Life event 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.

The Sutherland Shire Relay for Life is a great initiative that shares ANSTO's commitment to improving the health outcomes of Australians.

ANSTO's General Manager of ANSTO Health Mark Moore hands over artwork to Sutherland Hospital as part of the Operation Art program sponsored by ANSTO. An initiative organised by The Children's Hospital at Westmead in association with the NSW Department of Education.

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, including: the annual Business/Higher Education Round Table (B/HERT) Awards; International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS); and the UNSW Women in Engineering Industry night.

Industry engagement

In response to the 'Boosting Commercial Returns for Research' discussion paper published in late 2014, 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 to the national science and research priorities.

- Establishing an industry engagement workgroup to develop and implement a strategy for enhancing collaboration between ANSTO and industry.

- 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.

- Maximising the value and effectiveness of ANSTO's world class landmark research infrastructure such as the OPAL research reactor and the Australian Centre for Accelerator Science, through developing frameworks for high reliability and prioritisation of effort through organisational excellence.

- Utilising new resources such as IP Australia's Source IP tool to promote ANSTO research outcomes to industry partners.

An industry engagement strategy has been developed and implemented, providing ANSTO with the ability to rapidly identify

industry partners and develop solutions to business challenges and increase commercial competitiveness.

The engagement strategy leverages ANSTO's track record of delivery with a known value proposition to identify potential partners. Academic/industry barriers are removed through an innovation structured problem-solving approach (locally known as an 'Innovation sandpit') to develop bespoke solutions for our industry partners. The success of this approach has been quantifiably measured, with 18 per cent of companies contacted further undertaking solution development under commercial arrangements.

Commercialisation of ANSTO's strategic research continues to be an ongoing goal. A big challenge in commercialising research outcomes is funding the gap between research, product development and taking a new product to market. In order to overcome this challenge, ANSTO has adopted an internal incubator program which oversees internal ventures which are established 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 have been three internal ventures incubating technology developed through ANSTO research:

- TSPO knockout model
- Synroc
- Radiation Sensing Technologies.

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' are also 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 co-funded 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.

Businesses

External earnings by ANSTO's business and commercial groups improved on the previous year, with revenue amounting to $68 million in 2015-16.

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 10,000 patient doses of potentially lifesaving nuclear medicines each week. ANSTO health undertakes this function efficiently, effectively and in line with best practice manufacturing principals.

The ANSTO Health business continues to grow with revenues increasing by 15.6 per cent compared to the previous year driven by increase sales of key products.

Construction of the new ANSTO Nuclear Medicine facility is now in the final stages.

Export Low Enriched Uranium Molybdenum 99 (Mo-99)

The 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 of non-proliferation.

In 2014-15, after meeting Australia's Mo-99 requirements, ANSTO Health exported the product to the US, Japan, China and Korea. ANSTO produces Mo-99 on a cost recovery basis. To meet the current and future worldwide demand for Mo-99, ANSTO has initiated a project to increase Mo-99 production capability from its existing facility before it transitions to the new production facility ANSTO Nuclear Medicine (ANM) which is under construction.

This year ANSTO Health has been licenced by the TGA to manufacture 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 us to further support the Australian healthcare community. ANSTO is currently providing Lu-177 for two key clinical trials for the treatment of neuro endocrine tumours. ANSTO Health will also be supplying Lu-177 for another key clinical trial for the treatment of prostate cancer.

ANSTO Nuclear Medicine (ANM)

ANSTO Nuclear Medicine Pty Ltd (ANM) has been established to own and operate the new low enriched uranium (LEU) molybdenum 99 (Mo-99) production facility which will be co-located with a Synroc waste management facility on ANSTO's Lucas Heights campus.

The ANM Mo-99 project continued throughout the 2015-16 year, with major changes and significant progress being visible. As the year drew to a close, the majority of the external building was completed, as well as completion of fittings in the laboratories, plant rooms and change areas. Gas tanks and components of the active ventilation system were installed, as were all ground level cranes.

The concrete hot cell structures have been completed, ventilation connections installed and external finishes applied. The external waste tank shielding walls were completed, with preparation underway for the installation of the stainless steel liquid waste tanks.

Finally, the first of the hot cells and the lead for all other hot cells arrived in the middle of June, with all others due to arrive over the next few months.

PETNET

PETNET Australia Pty Ltd (trading as PETNET Solutions), a wholly owned subsidiary of ANSTO, operates two medical cyclotrons for radiopharmaceutical production at the Lucas Heights campus through an agreement with Siemens Medical Solutions.

PETNET has routinely supplied NSW hospitals as part of the state tender, as well as other facilities and continues to hold a strong market share.

PETNET's revenue earnings for 2015-16 was slightly less than the prior year.

ANSTO Silicon

Revenue from neutron transmutation doping (NTD) silicon irradiations in 2015-16 was slightly lower than the prior year. This is mainly due to new competing technologies in one segment of the market.

However, ANSTO Silicon 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 2015 calendar year reached 41 per cent compared to 35 per cent in the prior year. This is a result of the continued focus on quality operations and customer needs. ANSTO remains 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.

New industrial irradiations (Ir192 discs) increased revenue by 67 per cent, compared with the previous year.

ANSTO Minerals

ANSTO Minerals provides consultancy and process development services for the minerals industry including undertaking applied research to develop 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).

New and improved process concepts are first investigated and refined at the laboratory scale. The next stage of validation typically involves operation on a larger continuous scale for extended periods. ANSTO Minerals has established a strong reputation for high quality technical development for its clients, 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. ANSTO Minerals has

ANSTO Minerals staff operate pilot plants for commercial clients.

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. ANSTO Minerals has also grown its consultancy work in 2015-16 through the provision of a number of technology trade-off studies and input to pre-feasibility and feasibility studies during the year.

The ANSTO Minerals facility precinct is 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 2015-16, integrated pilot plant studies were undertaken for a number of clients evaluating the recovery of uranium, rare earths and lithium.

ANSTO Minerals earnings for 2015-16 were lower than the previous year, reflecting the market challenges in this area resulting from a slowdown of development activity in the minerals sector.

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.

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 increase its revenue and profitability over previous years. Much of the focus has been on establishing longer term contracts with key clients, the broadening of our capabilities base to meet changing industry demands and the capturing of larger scale projects utilising ANSTO's resources.

ANSTO Radiation Services has also continued to develop new offerings including submissions to establish ANSTO as a Registered Training Organisation (RTO), to expand our training services to industry.

International engagement

IAEA

ANSTO was designated (for a third time) as an IAEA Collaborating Centre in early 2016. The Collaborating Centre on 'Multi-analytical techniques for materials research, environmental studies and industrial applications' will function for four years and will utilise ANSTO's neutron beam instruments, particle accelerators, and electron microscopy facilities. The activities carried out under the Agreement will contribute to outcomes in material science, engineering, food science, environment and life sciences. The activities include providing access to ANSTO's state-of-the-art instruments, with training for scientists from developing countries by ANSTO's experts.

The IAEA's Technical Cooperation (TC) program helps to transfer nuclear and related technologies for peaceful uses to developing countries throughout the world, and is the primary mechanism by which Australia fulfils its obligation under Article IV of the Non-Proliferation Treaty to cooperate in the peaceful use of nuclear science and technology. One way in which ANSTO supports the TC program is through the hosting of Fellows and Scientific Visitors from developing countries for specific training. During the past 12 months Fellows and Scientific Visitors to ANSTO hailed from Nigeria, Jordan, Oman, Indonesia, Malaysia, Bangladesh and Thailand. Training was provided by ANSTO experts on neutron applications, water isotope analysis, and decommissioning activities.

Another area of cooperation with the IAEA in which ANSTO was prominent during the year was the Coordinated Research Projects (CRP) program. The program encourages and assists research on and development and practical applications of nuclear technology for peaceful purposes throughout the world, and fosters the exchange of scientific and technical information. Currently ANSTO is

participating in 20 out of a total of 126 active CRPs, an impressive participation rate which demonstrates ANSTO's depth and breadth of expertise in nuclear applications.

Communicating nuclear science and technology to secondary schools is a key element of ANSTO's education strategy. In December, ANSTO hosted and coordinated an IAEA regional workshop on Introducing Nuclear Sciences and Technologies to Secondary Schools: Results of the Pilot Phase and Way Forward.

The Regional Cooperative Agreement (RCA) is an intergovernmental agreement of 22 IAEA Member States in East Asia and the Pacific. Australia is represented on the RCA by ANSTO. During the past year, ANSTO participated in projects in the areas of land degradation, sustainable groundwater resource management, and air pollution characterisation. For the 2018-19 project cycle, Australia successfully proposed three new projects, two with ANSTO participation, one on coastal vulnerability to sea level rise, and the other on land management. During 2015-16, an amended RCA Agreement was adopted.

Security – Global Initiative to Combat Nuclear Terrorism (GICNT)

ANSTO continued its leadership role in the GICNT, both as the Chair of the Nuclear Forensics Working Group (NFWG) and by way of hosting a major workshop and a meeting of the Implementation and Assessment Group (IAG).

In conjunction with the Department of Foreign Affairs and Trade and the New Zealand Government, ANSTO hosted the 'Kangaroo Harbour' workshop in Sydney in May 2016. The workshop focused on how governments would share information with each other and seek assistance in planning and preparedness for, and response to, terrorist events involving the use of radioactive or nuclear materials.

Generation IV International Forum (GIF)

On 22 June 2016, Australia signed the GIF charter, a consortium of advanced nations committed to working together in long-term research on advanced nuclear energy technologies. Generation IV reactors represent the next step in nuclear technology and are being developed to use fuel more efficiently, reduce waste production, be economically competitive, and meet stringent standards of safety and proliferation resistance. Australia's successful bid to join the GIF was based on ANSTO's ability to contribute to the GIF's research and innovation goals using its landmark research infrastructure and world-class research capabilities.

Forum for Nuclear Cooperation in Asia (FNCA)

The FNCA is another multilateral forum of importance to ANSTO, Australia and the

Former Australian Ambassador for Counter-Terrorism Miles Armitage opening the May 2016 Kangaroo Harbour workshop.

Asia-Pacific region. For the past seven years, ANSTO has led a project aimed to identify key aspects of safety management systems (SMS) for nuclear facilities and to develop self-assessment and peer review methodologies for safety. Peer reviews of five regional nuclear facilities have been carried out over the duration of the project, leading to demonstrable improvements to the safety of those facilities. From the beginning of 2017, ANSTO will initiate a project on climate change science with the aim to 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.

Support to government

As mandated by the *ANSTO Act*, ANSTO plays a vital role in providing expert advice to the Australian Government on all matters relating to nuclear science, technology and engineering, and contributes to and informs policy making in this area.

ANSTO's support for government and policy making is achieved in a number of ways. ANSTO frequently engages with the Minister for Industry, Innovation and Science (the Minister), the Department of Industry, Innovation and Science (the Department), other relevant Ministers and their Departments and other agencies.

In particular, the Minister's Office and Department were appraised of significant events in a timely manner. ANSTO works with the Department on a daily basis keeping them abreast of ANSTO's operations and activities, and responding to requests for expert or technical advice regarding nuclear science and technology.

ANSTO's CEO also meets regularly with the Secretary of the Department. In addition, ANSTO engages with the Chief Scientist of Australia, and parliamentarians, including state and local governments, to update them on ANSTO's activities and developments in nuclear science and technology.

During 2015-16, ANSTO supported Australian science and innovation policy making through numerous parliamentary inquiry processes, consultations and reviews. These included the Research Infrastructure Review in which ANSTO worked with the Department to provide comprehensive input. ANSTO also led and coordinated a working paper on behalf of the CEOs of the Publically Funded Research Agencies, which was also submitted as part of the review process. Given ANSTO's experience in managing much of Australia's landmark and national research infrastructure, ANSTO's CEO was appointed as a member of the Chief Scientist's expert working group for the 2016 National Research Infrastructure Roadmap, which will set out Australia's long term research infrastructure needs and propose future areas of investment.

ANSTO's membership of the National Science, Technology and Research Committee supports the policy functions of the Commonwealth Science Council.

ANSTO is supporting the Australian Government's efforts to establish a National Radioactive Waste Management Facility through the provision of expert technical support and advice to the Department.

ANSTO also provides expert and technical advice across portfolios, particularly to the Foreign Affairs and Trade portfolio in the areas of peaceful uses of nuclear energy, nuclear security and nuclear non-proliferation.

During 2015-16 and at the request of the South Australian Nuclear Fuel Cycle Royal Commission, ANSTO provided the Commission with expert advice drawn from our experience in nuclear science and technology and international nuclear developments.

Partnerships and associations

Asia Oceania Forum for Synchrotron Radiation Research (AOFSRR)

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 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.

Australian Collaboration for Accelerator Science (ACAS)

ACAS was established in 2010, between the four major accelerator centres in Australia: ANSTO, the Australian National University (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. This year ANSTO staff lectured and contributed to accelerator summer and winter schools for young researchers. Internationally, collaborative research projects with CERN, and with the Japanese free-electron laser facility at SPring-8, have been ongoing.

Australian Institute of Nuclear Science and Engineering (AINSE)

AINSE provides a platform for training and cooperation in the nuclear science and engineering fields. Its membership comprises 43 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.

European Organization for Nuclear Research (CERN)

ANSTO has a formal agreement with CERN which allows respective scientists to collaborate together and receive reciprocal use of research infrastructure. This means scientists from CERN benefit from access to ANSTO's facilities, including the OPAL research reactor.

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 (DST Group)

ANSTO and the 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 (HZB)

ANSTO has a five-year arrangement in place for cooperation in neutron scattering science with the HZB, Germany's largest scientific organisation. The arrangement encompasses an exchange of personnel, materials, sample environments and instruments, sharing information and joint seminars, workshops and meetings.

Under the arrangement, the BioRef reflectometer from the BER-II Reactor will be transferred to ANSTO, 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 transfer 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 negotiated a research collaboration agreement with the ITER Organisation, which would allow researchers from designated Australian organisations to participate in ITER research projects, and to access ITER data and codes. The agreement is currently before the ITER Council for ratification. If successful, it will be 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.

Japan Atomic Energy Agency (JAEA)

ANSTO continues its collaboration with 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 Australian Centre for Neutron Scattering at ANSTO.

Japan Proton Accelerator Research Complex (J-PARC)

In March 2016, a delegation from ANSTO travelled to Japan to participate in a series of bilateral workshops with Japanese counterparts. Stemming from a MOU signed in July 2015, the ANSTO-J-PARC Workshop discussed focus areas for collaboration, including the management and operation of neutron beam facilities, and applications and research programs in food science, deuteration facilities, industrial engagement and sample environment. Six areas of mutual interest were identified to be carried forward as collaborative projects: deuteration facilities; food and nutrition; post irradiation evaluation and welding of critical structures; user interface and services; neutron optics including polarised neutrons; and high pressure sample environments.

Ludwig Institute for Cancer Research and Austin Health

ANSTO's partnership with the Ludwig Institute for Cancer Research and 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. This collaboration means more patients can benefit from this innovative and highly effective technique to detect cancer.

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 Australian Centre for Neutron Scattering's neutron beam instruments and high energy X-rays at the Australian Synchrotron. The team is commissioning a high pressure sample press at the Australian Synchrotron, which was partly funded by a successful Linkage, Infrastructure, Equipment and Facilities (LIEF) proposal in 2012.

Monash University

ANSTO's agreement with Monash University is helping facilitate knowledge as well as sharing and creating new training and development opportunities for researchers in the areas of biomedical imaging, cancer therapy, accelerator science and neutron science. ANSTO and Monash have jointly provided seed funding to seven joint collaborative research projects.

National Institute for Materials Science, Japan (NIMS)

Building on the MOU between ANSTO and NIMS, reciprocal visits were undertaken throughout the year, with a NIMS delegation visiting ANSTO in September 2015 and a group from ANSTO participating in the first ANSTO-NIMS workshop at NIMS in March. The ANSTO-NIMS workshop identified three collaborative projects to investigate the development of novel magnetic materials used in supercooled devices and advanced steel alloys for applications in extreme industrial environments.

Research Centre Juelich

ANSTO and Forschungszentrum Juelich (Juelich) entered into a collaboration in March 2016 aimed at fostering joint research into the nuclear fuel cycle and the characterisation of nuclear materials. Juelich (part of the Helmholtz Association) is a large interdisciplinary research centre in Germany. It has over 5,700 employees, around 900 PhD students and produces over 1,600 publications per year. There are nine institutes covering research areas such as energy and climate, neutron science, complex systems and simulation.

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 Memorandum 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. The ANSTO-SINAP Joint Materials Research Centre, one of six joint research centres established under the Australia-China Science and Research Fund, operated until June 2015, working on characterising materials for the Thorium Molten Salt Reactor project being undertaken by SINAP.

University of NSW

A collaboration between ANSTO, the University of New South Wales (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 which enables scientists from the University to undertake research using OPAL and, in return, ANSTO has access to experts and scientific facilities at the University. One key area of collaboration is with the University's Brain and Mind Centre. As well as using current state-of-the-art technology, a key focus for the collaboration is to develop new radiopharmaceuticals, instruments and scientific methods that extend the potential applications of molecular imaging in the future. This is important as molecular imaging plays an important role in unravelling the molecular mechanisms of disease.

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 Australian Centre for Neutron Scattering. 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.

University of Wollongong

An ANSTO-University of Wollongong (UoW) Steering Committee was established in 2014-15 to coordinate and develop the relationship between the two organisations. The primary initiative undertaken this year was the establishment of a seed funding scheme for joint research projects. The primary objective of the scheme was to assist UoW and ANSTO researchers to form substantial research partnerships with visibility and prominence, both nationally and internationally. A total of $92,000 was awarded to seven projects.

Staff achievements

Josie Auckett
Josie attended the Australian Academy of Science hosted, Theo Murphy Australian Frontiers of Science – Materials for the 21st Century from design to application – Symposium in December 2015. The event brought together outstanding early- and mid-career researchers (EMCRs) from the materials sciences field to identify ways to bring the ever-expanding 'tool-kit' of materials science to bear on the important materials-based problems of the 21st century.

Jack Binns
Jack was awarded the poster prizes at the 2nd Asia-Oceania Conference on Neutron Scattering (AOCNS) for his poster on the 'Development of High-Pressure Single-Crystal Diffraction on Koala'. AOCNS provides researchers with the opportunity to share and discuss their research findings as well as the latest developments in neutron scattering techniques.

David Cohen
David received the ANSTO Nuclear Science and Technology Award – Award for Sustained Contribution for his 20 years of environmental research, specifically focusing on fine particle pollution.

Lidia Matesic
Lidia was awarded the Royal Australian Chemical Institute (RACI) Nyholm Lectureship. Lidia presented the 'World of Nuclear' to Year 9 and 10 students from several high schools in NSW.

Warwick Payten
Warwick received the ANSTO Nuclear Science and Technology Award – George Collins Award for Innovation for his inspired efforts on the Remlife software project, to assess the remaining life of high temperature infrastructure like power stations.

Michael Saleh
Michael was awarded the ANSTO Nuclear Science and Technology Award – Career Award for his concerted efforts in materials research.

ANSTO Nuclear Science and Technology Award winners (L-R) Michael Saleh, Professor David Cohen and Dr Warwick Payten.

Jessica Veliscek-Carolan

Jessica attended the Australian Academy of Science: 8th HOPE Meeting in Japan with a delegation of Australian researchers in March 2016. A number of Nobel Laureates from around the globe presented lectures at the meeting on physics, chemistry, physiology/medicine, and related fields.

Cooperative Research Centre for Polymers

In March 2016 at the CRC Association Conference in Brisbane, the Cooperative Research Centre for Polymers was awarded the Excellence in Innovation Award, for its work on biodegradable polymer films for agricultural applications. ANSTO is a core member of the CRC for Polymers, along with various industrial partners, universities and CSIRO. ANSTO's Chris Garvey was a member of the large interdisciplinary team that developed the technology.

Capital investment

ANSTO continued to make significant capital investment in 2015-16 with some high quality facilities and upgrades successfully completed or continued during the financial year.

ANSTO data centre remediation

To ensure the robustness and reliability of IT services at ANSTO, an investment was made into the primary onsite data centre. The project delivered new and diverse power feeds to the facility which not only provided redundancy but also the capacity to handle a new cooling system and anticipated future needs. In addition to new mains power supply, a UPS (uninterruptible power supply) was commissioned in conjunction with a diesel generator, ensuring that if mains power loss to site occurs, core IT systems will continue to operate. The project scope also included the installation of new computer room air conditioners, replacing an aging system. Other minor works included thermal protection of the data centre focused on minimising cooling loss, effectively making the facility more efficient. The staged implementation ensured no downtime of the facility.

OPAL Reactor Control and Monitoring System upgrade

The OPAL Reactor Control and Monitoring System (RCMS) Project achieved a successful upgrade of the reactor control system. This substantial and technically challenging project effectively extended the life of the control system by 10 to 15 years. Furthermore it provides a more reliable and fully supported control system platform for Reactor Operations.

ANSTO Nuclear Medicine Project

Construction of the new ANSTO Nuclear Medicine (ANM) production facility commenced in mid-2014, and is scheduled for completion at the end of 2016 calendar year, with commencement of operations expected in 2017. The facility is part of the ANM Project that will secure Australia's supply of nuclear medicines for the domestic market, and deliver the ability to contribute significantly to international demand.

During the past 12 months, the facility structure has been completed and the building services installed ready for final finishes.

ANM External Services

The ANM External Services program was initiated to deliver the infrastructure services required for ANM which is currently under construction. The scope of the program includes provision of electrical, hydraulic and security services as well as landscaping. During FY16 the electrical services were completed and the waste and water services are nearing completion. Landscaping and other civil services have been progressing in alignment with the construction of the ANM facility.

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 2015-16 Annual Performance Statements 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 listed in 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 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.

Performance Criterion	Criteria *	Result
Total availability of OPAL: % of days at power	82%	81%
Planned availability of OPAL: % of actual operating days scheduled	96%	99.7%
Accelerators: average % of days operated per available time	75%	64%
Neutron Beam Instruments: average % of days operated per available time	85%	85%
Australian Synchrotron: % of machine availability based on 16 week rolling average	95%	99%
Nuclear Medicine Manufacturing Facility – % of capital funding completed	100%	100%
Radiopharmaceutical doses: potential doses	2,383,711	2,414,071

*** Criterion source:** Programme 1.1, Portfolio Budget Statements 2015-16, Budget Related Paper no. 1.12, Industry and Science Portfolio, page 108 and as referenced in the ANSTO Corporate Plan 2015-2019.

Analysis of performance against purpose

ANSTO is the custodian of most of Australia's landmark and national research infrastructure – the OPAL Research Reactor and its associated suite of neutron beam instruments, the Australian Synchrotron and the Centre for Accelerator Science. 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 5000 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 2015-16, availability of ANSTO's research infrastructure remained high and largely on target. The Australian Synchrotron exceeded its availability target and availability in previous years. This reflects the strong systems and maintenance program in place at the Australian Synchrotron, which ensures it remains one of the most productive synchrotrons in the world.

As in previous years, the availability of ANSTO's suite of neutron beam instruments remained on target . The continuing reliability of this suite of instruments helps Australia maintain its reputation as a global leader in neutron science. Due to the change in the operational model with the expanded capacity of four accelerators, ANSTO has set the 2016/2017 target at 65%. In 2015/2016, a result of 64% was achieved, which was less than the original target of 75%.

The OPAL reactor operated for a total of 295 days in 2015-16, which makes it one of the world's most reliable and available multipurpose research reactors. It only just fell short of the ambitious target of 300 days availability due to a scheduled extended maintenance shutdown. Planned availability exceeded expectations by attaining 99.6% of the actual operating days scheduled, which is up from previous years.

This achievement is not only beneficial for the thousands of research and industry users that utilise the 13 neutron beam instruments connected to the reactor, but also provides for real benefits to the wider community through the provision of vital nuclear medicine.

Consistent with its purpose as established by the *ANSTO Act*, in 2015-16, as it has done in previous years, ANSTO exceeded its constantly growing target in the production of potentially life-saving radiopharmaceuticals to the Australian public and to the world. ANSTO is Australia's largest source of nuclear medicines, producing around 85% of Australia's nuclear medicine. The availability of the OPAL reactor is crucial to that outcome.

INDEPENDENT AUDITOR'S REPORT

To the Minister for Industry, Innovation and Science

I have audited the accompanying annual financial statements of the Australian Nuclear Science and Technology Organisation for the year ended 30 June 2016, which comprise the following for the consolidated entity:

- Statement by the Accountable Authority, Chief Executive 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, including a summary of significant accounting policies.

The consolidated entity comprises the Australian Nuclear Science and Technology Organisation and the entities it controlled at the year's end or from time to time during the year.

Opinion

In my opinion, the financial statements of the Australian Nuclear Science and Technology Organisation:

(a) comply with Australian Accounting Standards 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 2016 and its financial performance and cash flows for the year then ended.

Accountable Authority's Responsibility for the Financial Statements

The directors of the Australian Nuclear Science and Technology Organisation is 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 and the rules made under that Act and is also responsible for such internal control as the directors determines is necessary to enable the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. I have conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. These auditing standards require that I comply with relevant ethical requirements relating to audit engagements and

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plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements 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 entity's internal control. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of accounting estimates made by the Accountable Authority of the entity, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Independence

In conducting my audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the requirements of the Australian accounting profession.

Australian National Audit Office

Kristian Gage
Acting Executive Director

Delegate of the Auditor-General

Canberra
11 August 2016

Statement by Accountable Authority, Chief Executive and Chief Financial Officer

Australian Government

Australian Nuclear Science and Technology Organisation

In our opinion, the attached financial statements for the year ended 30 June 2016 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 11 August 2016	Adi Paterson Accountable Authority - Chief Executive Officer 11 August 2016	Peter Arambatzis Group Chief Financial Officer 11 August 2016

Consolidated Statement of Comprehensive Income

For the year ended 30 June 2016

	Note	Budget 2016 $'000	Actual 2016 $'000	Actual 2015 $'000
NET COST OF SERVICES				
Expenses				
Employee	4A	143,344	144,422	140,244
Suppliers	4B, 23	70,707	89,465	74,261
Depreciation/amortisation and impairment losses	9A	76,277	73,382	70,106
Write-down of assets	4C	-	3,242	3,261
Grants		5,328	2,518	3,419
Finance costs	4D	20,968	16,247	14,981
Foreign currency exchange losses		-	1,696	11,204
Losses from asset sales		-	24	-
Total expenses		316,624	330,996	317,476
Own-source revenue				
Sales of goods and rendering of services	5	81,038	75,481	74,733
Interest		3,104	5,207	5,288
Grants		34,842	35,429	34,742
Other revenue		-	-	22
Total own-source revenue		118,984	116,117	114,785
Other income				
Foreign currency exchange gains		-	1,536	1,126
Gains from asset sales		-	352	47
Total income		-	1,888	1,173
Total own-source income		118,984	118,005	115,958
Net cost of services		197,640	212,991	201,518
Revenue from Government		156,700	156,700	157,414
Deficit for the year before income tax		(40,940)	(56,291)	(44,104)
Income tax (expense)/benefit	6	-	261	(85)
Deficit for the year after income tax		(40,940)	(56,030)	(44,189)
Other comprehensive income				
Items that will not be subsequently reclassified to net cost of services				
Changes in asset revaluation reserve	12	-	(3,631)	(1,799)
Items that may be subsequently reclassified to net cost of services				
Exchange differences on translation of foreign operations	12	-	6	28
Total other comprehensive income for the year		(40,940)	(3,625)	(1,771)
Total comprehensive deficit for the year		**(40,940)**	**(59,655)**	**(45,960)**

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

Consolidated Statement of Financial Position

As at 30 June 2016

	Note	Budget 2016 $'000	Actual 2016 $'000	Actual 2015 $'000
Assets				
Financial assets				
Cash and cash equivalents		3,782	4,398	6,682
Trade and other receivables	8A	16,549	14,527	15,167
Investments	8B, 23	238,588	154,797	197,025
Total financial assets		258,919	173,722	218,874
Non-financial assets				
Property, plant and equipment	9A, 23	1,021,526	1,078,542	1,069,035
Intangible assets	9A, 23	84,544	89,659	78,698
Inventories	9B	20,589	20,445	18,072
Deferred tax asset	6	-	1,181	920
Prepayments	23	5,185	13,004	8,604
Total non-financial assets		1,131,844	1,202,831	1,175,329
Total assets		1,390,763	1,376,553	1,394,203
Liabilities				
Payables				
Suppliers		16,417	17,102	20,002
Employee	10A	6,987	2,656	6,330
Grants		707	86	135
Other	10B, 23	16,642	2,694	17,995
Total payables		40,753	22,538	44,462
Provisions				
Employee	11A	38,649	40,463	38,581
Decommissioning	11B	298,537	311,625	286,136
Intellectual property payment	11B	49,766	58,348	57,686
Other	11B	-	47	67
Total provisions		386,952	410,483	382,470
Total liabilities		427,705	433,021	426,932
Net assets		**963,058**	**943,532**	**967,271**
Equity				
Contributed equity		741,336	741,336	705,420
Reserves	12	505,394	496,493	500,118
Accumulated deficit	13	(283,672)	(294,297)	(238,267)
Total equity		**963,058**	**943,532**	**967,271**

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

Consolidated Statement of Changes in Equity

For the year ended 30 June 2016

	Accumulated deficit		Asset revaluation reserve		Other reserves		Contributed equity		Total	
	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget
	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000
Balance at 30 June 2014	**(197,583)**		**491,911**		**13,483**		**608,981**		**916,792**	
Net results for the year										
Deficit for the year	(44,189)		-		-		-		(44,189)	
Other comprehensive income										
Foreign currency translation	-		-		28		-		28	
Revaluation increment	-		(1,799)		-		-		(1,799)	
Total comprehensive deficit for the year	(44,189)		(1,799)		28		-		(45,960)	
Transactions with owners										
Government equity injection	-		-		-		96,439		96,439	
Transfer between equity components	3,505		-		(3,505)		-		-	
Balance at 30 June 2015	**(238,267)**	**(242,732)**	**490,112**	**491,911**	**10,006**	**13,483**	**705,420**	**705,420**	**967,271**	**968,082**
Deficit for the year	(56,030)	(40,940)	-	-	-	-	-	-	(56,030)	(40,940)
Other comprehensive income										
Foreign currency translation	-	-	-	-	6	-	-	-	6	-
Revaluation decrement	-	-	(3,631)	-	-	-	-	-	(3,631)	-
Total comprehensive deficit for the year	(56,030)	(40,940)	(3,631)	-	6	**-**	-	**-**	(59,655)	(40,940)

Consolidated Statement of Cash Flows

For the year ended 30 June 2016

	Note	Budget 2016 $'000	Actual 2016 $'000	Actual 2015 $'000
Cash flows from operating activities				
Sales of goods and rendering of services	23	81,038	61,116	78,432
Grants received		34,842	35,429	34,010
Interest received		3,104	5,324	5,154
Receipts from Government		156,700	156,700	157,414
Payments to employees		(147,102)	(146,214)	(140,969)
Payments to suppliers	23	(78,883)	(97,568)	(84,663)
Other payments		(5,328)	-	-
Net cash from operating activities	14	44,371	14,787	49,378
Cash flows from investing activities				
Proceeds from sale of property plant and equipment		-	420	109
Proceeds from investment sales/maturity	23	372,945	505,000	632,827
Purchase of property, plant and equipment	23	(74,594)	(95,641)	(81,722)
Purchase of investments	23	(378,638)	(462,772)	(694,160)
Net cash used in investing activities		(80,287)	(52,993)	(142,946)
Cash flows from financing activities				
Government equity injection		35,916	35,916	96,439
Net cash from financing activities		35,916	35,916	96,439
Net (decrease)/increase in cash and cash equivalents		-	(2,290)	2,871
Effect of exchange changes on the balance of cash and cash equivalents held in foreign currencies		-	6	29
Cash and cash equivalents at the beginning of the reporting year		3,782	6,682	3,782
Cash and cash equivalents at end of the reporting year		**3,782**	**4,398**	**6,682**

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

Notes to the Financial Statements

Note 1. 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 2015-16 Portfolio Budget Statement ANSTO has only one outcome as reflected below:

Outcome 1: Improved knowledge, innovative capacity and healthcare through 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 2(p) and 22.

Note 2. Summary of significant accounting policies

(a) 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) for reporting periods ending on or after 1 July 2015; and
   ii. Australian Accounting Standards and Interpretations 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.

Notes to the Financial Statements (continued)

(b) 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.

(c) 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 in issue but not yet effective. With the exception of AASB 15 and AASB 16, which are currently being assessed, the adoption of these standards is not expected to have a material impact on the financial statements.

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 2014-4 *Amendments to Australian Accounting Standards – Clarification of Acceptable Methods of Depreciation and Amortisation*	1 January 2016	30 June 2017
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
AASB 2015-1 *Amendments to Australian Accounting Standards – Annual Improvements to Australian Accounting Standards 2012-2014 Cycle*	1 January 2016	30 June 2017
AASB 2015-2 *Amendments to Australian Accounting Standards – Disclosure Initiative: Amendments to AASB 101*	1 January 2016	30 June 2017

(d) Revenue recognition

Revenue from Government
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.

erating revenue from sale of goods and rendering of services

/enue 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.

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

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.

(e) Gains

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.

(f) Employee benefits

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.

Notes to the Financial Statements (continued)

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 liability for long service leave has been determined by reference to the work of an actuary as at May 2014. 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 benefits 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.

(g) Fair Value Measurement

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.

(h) Cash

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

- Cash on hand;
- 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.

(i) Financial instruments

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.

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.

Notes to the Financial Statements (continued)

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).

(j) Contingent liabilities and contingent assets

Contingent liabilities and contingent assets 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.

(k) Acquisition of assets

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.

(l) Property, plant and equipment

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 $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.

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.

All valuations are carried out by qualified parties, independent of ANSTO.

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:

	2016	2015
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 2016. 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.

(m) Inventories

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.

Notes to the Financial Statements (continued)

(n) 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 $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 processing 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 (2015: $51,210,000) and a financial liability for the future payments required in relation to the asset. The $58,348,000 liability (2015: $57,686,000) has been derived from calculating the estimated commission to be paid to NTP based on expected future sales and then discounted back at 5.15% (2015: 5.19%). 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:

	2016	2015
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 2016. 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 2016 there were 157 patents (2015: 141) registered to ANSTO and no associated costs are recognised as an asset (2015: nil).

(o) 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.

(p) Taxation

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

- /enues, 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 which is a tax exempt entity, being a charitable institution.

ANSTO Inc. is a USA company and is subject to US tax laws. No deferred tax asset has been recognised at 30 June 2016 (2015: 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.

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.

Notes to the Financial Statements (continued)

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.

(q) 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.

Note 3. Events subsequent to reporting date

On 1 July 2016 100% of the shares of Australian Synchrotron Holding Company Pty Limited (ASHCo) shares on issue were transferred to ANSTO at no cost. ANSTO now owns and operates the Australian Synchrotron the major asset of ASHCo.

Note 4. Expenses

	2016	2015
	$'000	$'000
4A. Employee		
Wages and salaries	110,609	109,475
Superannuation	20,331	19,171
Leave and other entitlements	13,420	11,203
Separation and redundancies	62	395
Total employee expenses	**144,422**	**140,244**
4B. Suppliers		
Goods from external entities	31,037	30,011
Services from related entities	27,055	26,317
Workers compensation premiums – related	752	1,210
Service from external entities	30,621	16,723
Total supplier expenses	**89,465**	**74,261**

	2016	2015
	$'000	$'000
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	540	691
Total operating lease commitments	**1,294**	**1,445**

4C. Write-down of assets		
Financial assets:		
Write-down of receivables/(reversal of write-down)	316	(2)
Non-financial assets:		
Materials – write-off obsolete stock	158	63
Property, plant and equipment write-down	2,768	453
Intangibles write-down	-	2,747
Total write-down of assets expenses	**3,242**	**3,261**

4D. Finance costs		
Unwinding of discount on decommissioning and royalty costs	16,247	14,981
Total finance costs	**16,247**	**14,981**

Note 5. Sales of goods and rendering of services

	2016	2015
	$'000	$'000
Sales of goods		
Radioisotope sales	48,318	44,344
Total sales of goods	48,318	44,344
Rendering of services		
Service and contract research	16,403	17,892
Silicon irradiation	5,634	6,365
CSIRO site support	1,122	1,045
Training courses	274	413
Land management	3,692	3,641
AINSE interactions	38	1,033
Total rendering of services	27,163	30,389
Total sales of goods and rendering of services	**75,481**	**74,733**

Note 6. Income tax benefit/(expense)

	2016	2015
	$'000	$'000
Prima facie tax on results of taxable subsidiaries	262	(34)
Over provision in respect of prior years	(1)	(51)
Total income tax benefit/(expense)	**261**	**(85)**

ANSTO and Synchrotron Light Source Australia Pty Ltd are exempt from income tax. Unbooked deferred tax assets in relation to un-recouped tax losses including timing difference in ANSTO Inc., is $1,168,261 (2015: $891,094). The total deferred tax assets recognised as at 30 June 2016 in relation to PETNET Australia Pty Ltd is $853,000 (2015: $755,000) and ANSTO Nuclear Medicine Pty Ltd is $328,000 (2015: $165,000).

Notes to the Financial Statements

Note 7. 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.

7A. Fair Value Measurement

Fair value measurements at the end of the reporting period by hierarchy for assets in 2016:

	Fair value measurements at the end of the reporting period using			
	Fair value $'000	**Level 1 inputs $'000**	**Level 2 inputs $'000**	**Level 3 inputs $'000**
Non-financial assets:				
Land and buildings	346,363	-	-	346,363
Infrastructure, plant and equipment	732,179	-	15,349	716,830
Total non-financial assets	**1,078,542**	**-**	**15,349**	**1,063,193**

The highest and best use of all non-financial assets is the same as their current use.

Fair value measurements at the end of the reporting period by hierarchy for assets in 2015:

	Fair value measurements at the end of the reporting period using			
	Fair value $'000	**Level 1 inputs $'000**	**Level 2 inputs $'000**	**Level 3 inputs $'000**
Non-financial assets:				
Land and buildings	317,770	-	-	317,770
Infrastructure, plant and equipment	751,265	-	18,383	732,882
Total non-financial assets	**1,069,035**	**-**	**18,383**	**1,050,652**

The highest and best use of all non-financial assets is the same as their current use.

7B. Valuation technique and inputs for Level 2 and Level 3 fair value measurements

Level 2 and 3 fair value measurements - valuation technique and the inputs used for assets:

Non-financial assets	Category	Fair value 2016 $'000	Fair value 2015 $'000	Valuation technique[1]	Inputs used[1]
Land	**3**	**97,200**	97,200	Market approach	Adjusted market transactions (zoning, access, existing use, size, topography, location)
Buildings	**3**	**249,163**	220,570	Depreciated replacement cost (DRC)	Replacement cost of a new/consumed economic benefit/ obsolescence of asset
Infrastructure, plant and equipment	**2**	**15,349**	18,383	Market approach	Adjusted market transactions
	3	**716,830**	732,882	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 2015 are consistent.

Recurring and non-recurring Level 3 fair value measurements - valuation processes

The Australian Valuation Office (AVO) undertook a comprehensive valuation of all non-financial assets effective 30 June 2012. 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. In 2014, the entity engaged Australian Valuation Solutions (AVS) to provide written assurance that the models developed comply with the accounting standard AASB 13 *Fair Value*.

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.

Notes to the Financial Statements (continued)

7C. Reconciliation for recurring Level 3 fair value measurements
Recurring Level 3 fair value measurements - reconciliation for assets

	Land and Buildings 2016 $'000	Infrastructure, plant and equipment 2016 $'000	Total 2016 $'000
Opening balance	317,770	732,882	1,050,652
Total gains/(losses) recognised in net cost of services	(11,319)	(56,733)	(68,052)
Sales	335	1,831	2,166
Purchases	36,419	33,069	69,488
Settlements	3,161	8,203	11,364
Transfer between class of assets	(3)	(2,422)	(2,425)
Closing balance	**346,363**	**716,830**	**1,063,193**

	Land and Buildings 2015 $'000	Infrastructure, plant and equipment 2015 $'000	Total 2015 $'000
Opening balance	308,189	735,431	1,043,620
Total gains/(losses) recognised in net cost of services	(11,862)	(51,985)	(63,847)
Purchases	24,713	47,823	72,536
Settlements	(1,218)	(439)	(1,657)
Transfer between class of assets	(2,052)	2,052	-
Closing balance	**317,770**	**732,882**	**1,050,652**

Note 8. Financial assets

	2016 $'000	2015 $'000
8A. Trade and other receivables		
Goods and services		
Related entities	189	195
External entities	11,685	11,951
Total receivables for goods and services	**11,874**	**12,146**
Less impairment allowance	364	66
Net receivables for goods and services	**11,510**	**12,080**
Other receivables		
Interest accrued	470	587
Other	1,662	1,894
GST receivable from the Australian Taxation Office	885	606
Total other receivables	**3,017**	**3,087**
Total net trade and other receivables	**14,527**	**15,167**

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

	2016	2015
	$'000	$'000
a) **Net receivables are aged as follows:**		
Neither overdue nor impaired	10,739	10,384
Overdue but not impaired:		
Less than 31 days	2,797	3,060
31 to 60 days	173	701
61 to 90 days	63	237
More than 90 days	755	851
Total net trade and other receivables	**14,527**	**15,233**

b) The allowance for doubtful debts $364,000 (2015: $66,000) represents certain debts aged more than 90 days (2015: aged more than 90 days).

Reconciliation of the impairment allowance account:		
Opening balance	66	68
Additional provision	316	-
Amount reversed	(18)	(2)
Closing balance	**364**	**66**

8B. Investments

Term deposits – held to maturity	149,797	192,025
Investment in Australian Synchrotron Holding Company Pty Limited	5,000	5,000
Total investments	**154,797**	**197,025**

8C. Investment in joint venture

			2016	2015
Name	**Place of incorporation**	**%**	**$**	**$**
Southern Radioisotopes Alliance Inc.	USA	100	625	625
Total investment in joint venture			**625**	**625**

Investment is USD 600 (2015: USD 600). This company has yet to commence trading.

8D. Investment - other

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

Clarity Pharmaceuticals Pty Ltd. was incorporated in New South Wales, Australia on 17 September 2010. Current shareholding 107,903 shares (2015: 100,000), 2.4% (2015: 2.83%).

Notes to the Financial Statements

Note 9. Non-financial assets

9A. Property, plant and equipment and intangible assets

Movement summary 2015-2016 for all consolidated assets irrespective of valuation basis

	Land $'000	Buildings $'000	Plant and equipment $'000	Intellectual property $'000	Software $'000	Other intangibles $'000	Assets under construction $'000	Total $'000
Gross value as at 1 July 2015	97,200	211,480	870,271	51,210	38,718	4,953	217,065	1,490,897
Additions - new assets	-	4	4,194	-	21	-	91,422	95,641
Decommissioning cost	-	1,086	(64)	-	-	-	-	1,022
Transfers/reclassifications	-	21,336	97,473	-	1,340	3,151	(123,300)	-
Asset written-off	-	(1,250)	(1,643)	-	(137)	-	(1,510)	(4,540)
Disposals	-	-	(622)	-	-	-	-	(622)
Gross value as at 30 June 2016	**97,200**	**232,656**	**969,609**	**51,210**	**39,942**	**8,104**	**183,677**	**1,582,398**
Accumulated depreciation/amortisation and impairment losses 1 July 2015	-	34,079	273,146	-	31,519	4,420	-	343,164
Depreciation/amortisation	-	11,225	59,766	-	1,730	566	-	73,287
Impairment losses	-	95	-	-	-	-	-	95
Transfers/reclassifications	-	-	390	-	-	(390)	-	-
Assets written-off	-	(335)	(1,300)	-	(137)	-	-	(1,772)
Adjustment for disposals	-	-	(577)	-	-	-	-	(577)
Accumulated depreciation/amortisation and impairment losses 30 June 2016	**-**	**45,064**	**331,425**	**-**	**33,112**	**4,596**	**-**	**414,197**
Net book value as at 30 June 2016	**97,200**	**187,592**	**638,184**	**51,210**	**6,830**	**3,508**	**183,677**	**1,168,201**
Property, plant and equipment	**97,200**	**187,592**	**638,184**	**-**	**-**	**-**	**155,566**	**1,078,542**
Intangibles	**-**	**-**	**-**	**51,210**	**6,830**	**3,508**	**28,111**	**89,659**

There were no impairment indicators in relation to the intangible assets in 2016. No intangible assets are expected to be disposed of within the next 12 months.

Movement summary 2014-2015 for all consolidated assets irrespective of valuation basis

	Land	Buildings	Plant and equipment	Intellectual property	Software	Other intangibles	Assets under construction	Total
	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000
Gross value as at 1 July 2014	97,200	196,369	845,876	51,210	39,586	4,953	179,012	1,414,206
Additions - new assets	-	86	5,376	-	263	-	75,999	81,724
Decommissioning cost	-	538	-	-	-	-	-	538
Transfers/reclassifications	-	14,487	19,908	-	412	-	(34,807)	-
Asset written-off	-	-	(700)	-	(1,543)	-	(3,139)	(5,382)
Disposals	-	-	(189)	-	-	-	-	(189)
Gross value as at 30 June 2015	**97,200**	**211,480**	**870,271**	**51,210**	**38,718**	**4,953**	**217,065**	**1,490,897**
Accumulated depreciation/amortisation and impairment losses 1 July 2014	-	22,217	218,089	-	31,539	3,522	-	275,367
Depreciation/amortisation	-	11,862	55,633	-	1,523	898	-	69,916
Impairment losses	-	-	190	-	-	-	-	190
Assets written-off	-	-	(639)	-	-	-	-	(639)
Adjustment for disposals	-	-	(127)	-	(1,543)	-	-	(1,670)
Accumulated depreciation/amortisation and impairment losses 30 June 2015	**-**	**34,079**	**273,146**	**-**	**31,519**	**4,420**	**-**	**343,164**
Net book value as at 30 June 2015	**97,200**	**177,401**	**597,125**	**51,210**	**7,199**	**533**	**217,065**	**1,147,733**
Property, plant and equipment	**97,200**	**177,401**	**597,125**	**-**	**-**	**-**	**197,309**	**1,069,035**

Notes to the Financial Statements

	2016	2015
	$'000	$'000
9B. Inventories		
Raw materials and stores – not held for resale		
Stores – at cost	15,675	14,080
Cobalt-60 sources – at net realisable value	111	127
Reactor fuel and heavy water – at average purchase price	2,646	2,619
	18,432	16,826
Work in progress – at cost	1,570	1,012
Finished goods – at cost	443	234
Total inventories	**20,445**	**18,072**
Inventories expected to be realised within		
No more than 12 months	17,704	15,344
More than 12 months	2,741	2,728
Total inventories	**20,445**	**18,072**
9C. Commitments		
Infrastructure, plant and equipment	112,891	81,910
Fuel element purchase	2,808	4,448
Mo-99 plate purchase	16,531	21,056
Total commitments	**132,230**	**107,414**
One year or less	114,019	91,745
From one to five years	18,211	15,669
Total commitments	**132,230**	**107,414**

Note 10. Payables

	2016	2015
	$'000	$'000
10A. Employee		
Accrued salaries and wages	393	4,007
Redundancy payments	62	404
Incentives	2,201	1,919
Total employee payables	**2,656**	**6,330**

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

10B. Other		
Revenue received in advance	2,644	17,943
Other payables	50	52
Total other	**2,694**	**17,995**
Other payables expected to be settled within		
No more than 12 months	1,117	16,966
More than 12 months	1,577	1,029
Total other payables	**2,694**	**17,995**

Note 11. Provisions

		2016	2015
		$'000	$'000
11A. Employee			
Annual leave		12,344	12,164
Long service leave		28,119	26,417
Total employee provisions		**40,463**	**38,581**
Employee provisions expected to be settled within			
No more than 12 months		31,264	29,330
More than 12 months		9,199	9,251
Total employee provisions		**40,463**	**38,581**
11B. Other provisions			
Decommissioning	(a)	311,625	286,136
Intellectual property		58,348	57,686
Other claims		47	67
Total other provisions		**370,020**	**343,889**
Other provisions expected to be settled within			
No more than 12 months		34,957	28,003
More than 12 months		335,063	315,886
Total other provisions		**370,020**	**343,889**

Other provisions movement reconciliation

	Decommissioning $'000	Intellectual Property Payment $'000	Other claims $'000
Carrying amount 30 June 2014	**274,678**	**49,717**	**49**
Additional provision made	2,187	-	18
Amounts used	(7,430)	(3,269)	-
Change in accounting estimate	1,799	11,159	-
Unwinding discount	14,902	79	-
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**

(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.

Notes to the Financial Statements (continued)

Note 12. Reserves

		2016	2015
		$'000	$'000
Asset revaluation	(a)		
Opening balance		490,112	491,911
Revaluation – decommissioning		(3,631)	(1,799)
Closing balance		**486,481**	**490,112**
Other reserves			
OPAL depreciation	(b)	**9,061**	**9,061**
Intermediate low level waste (ILLW) return	(c)		
Opening balance		616	4,121
Transfer to accumulated deficit		-	(3,505)
Closing balance		**616**	**616**
Foreign currency reserve	(d)		
Opening balance		329	301
Movement		6	28
Closing balance		**335**	**329**
Other reserves		**10,012**	**10,006**
Total Reserves		**496,493**	**500,118**

(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.

Note 13. Accumulated deficit

	2016	2015
	$'000	$'000
Opening balance	(238,267)	(197,583)
Transfer from intermediate low level waste (ILLW)	-	3,505
Deficit for the year	(56,030)	(44,189)
Closing balance	**(294,297)**	**(238,267)**

Note 14. Cash flow reconciliation

	2016	2015
	$'000	$'000
Reconciliation of net cost of services to net cash from operating activities:		
Net cost of services	(212,991)	(201,518)
Revenue from Government	156,700	157,414
Income tax (expense)/benefit	261	(85)
Adjustment for non-cash items		
Depreciation/amortisation and impairment losses	73,382	70,106
Net (gain)/loss in disposal of non-financial assets	2,441	(47)
Reversal of inventory write-down	-	(22)
Write-down and impairment of assets	3,242	3,261
Unrealised foreign exchange (gain)/loss	626	10,288
Unwinding of discount – decommissioning and royalty costs	16,247	14,981
Movement in assets and liabilities		
Assets		
Decrease in trade receivables	(3,297)	(8,318)
Decrease/(increase) in other receivables	232	(635)
(Increase)/decrease in GST receivables	(279)	141
Decrease/(increase) in accrued interest	117	(134)
Increase in prepayments	(4,400)	(4,424)
(Increase)/decrease in inventories	(2,373)	2,517
(Increase)/decrease in deferred tax assets	(261)	85
Liabilities		
(Decrease)/increase in payables	(2,951)	3,585
Decrease in employee entitlements	(1,792)	(725)
(Decrease)/increase in revenue received in advance	(15,301)	732
Increase in other provisions	642	8,036
Increase/(decrease) in decommissioning provision	4,542	(5,860)
Net cash from operating activities	**14,787**	**49,378**

Note 15. Contingent liabilities

Unquantifiable Contingencies

At 30 June 2016, 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.

Notes to the Financial Statements (continued)

Note 16. Key management personnel remuneration

	2016	2015
	$	$
Short-term employee benefits:		
Salary	3,399,984	3,333,706
Performance bonuses	618,420	508,396
Motor vehicle and other allowances	32,780	32,780
Total short-term employee benefits	**4,051,184**	**3,874,882**
Post-employment benefits:		
Superannuation	446,806	443,540
Total post-employment benefits	**446,806**	**443,540**
Other long-term benefits:		
Annual leave accrued	247,960	237,134
Long-service leave	101,655	83,536
Total other long-term benefits	**349,615**	**320,670**
Termination benefits	-	-
Total key management personnel remuneration	**4,847,605**	**4,639,092**

The total number of key management personnel that are included is 19 (2015: 19). Represented by 7.28 non-executive board members (pro-rated) (2015: 6.08) and 9.76 full time equivalent (FTE) (2015: 10.33 FTE) members of the Executive Standing Committee.

Note 17. Related party transactions

Several ANSTO Board Members were associated with entities with which ANSTO had commercial transactions during the year as part of their role in hospitals or universities. All such transactions were in accordance with ANSTO's normal commercial terms and conditions. None of those transactions led to any conflict of interest.

Note 18. Financial instruments

a) Net income from financial assets

	2016	2015
	$'000	$'000
Loans and receivables		
Cash and cash equivalents	60	67
Investment held to maturity	5,147	5,221
Net income from financial assets	**5,207**	**5,288**

b) Categories of financial instruments

	Note	Carrying amount 2016	Fair Value 2016	Carrying amount 2015	Fair Value 2015
Financial assets		**$'000**	**$'000**	**$'000**	**$'000**
Loans and receivables					
Cash and cash equivalents		4,398	4,398	6,682	6,682
Receivables for goods and services	8A	11,510	11,510	12,080	12,080
Interest accrued	8A	470	470	587	587
Other	8A	1,662	1,662	1,894	1,894
Investments held to maturity	8B	149,797	149,797	192,025	192,025
Investments	8B	5,000	5,000	5,000	5,000
Total financial assets (recognised)		**172,837**	**172,837**	**218,268**	**218,268**
Total financial liabilities					
Amortised cost					
Trade creditors		17,102	17,102	20,002	20,002
Employees	10A	2,656	2,656	6,330	6,330
Grants received in advance		86	86	135	135
Other	10B	2,694	2,694	17,995	17,995
Total financial liabilities (recognised)		**22,538**	**22,538**	**44,462**	**44,462**

c) Net expenses from financial liabilities

There were no expenses from financial liabilities for 2016 (2015: $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.

d) Credit risk exposure

The maximum exposure to credit risk is the risk that arises from potential default of a debtor. This is equal to the total amount of trade and other receivables as per note 8A. ANSTO has assessed the risk of the default on payment and has provided for doubtful debts as per note 8A(b).

ANSTO manages its credit risk by undertaking background and credit checks prior to allowing a debtor relationship. In addition, ANSTO has policies and procedures that guide employees to apply debt recovery techniques. The Organisation holds no collateral to mitigate against credit risk.

e) Liquidity risk

ANSTO's financial liabilities are payables and other interest bearing liabilities. The exposure to liquidity risk is based on the notion that ANSTO will encounter difficulty in meeting its obligations associated with financial liabilities. This is highly unlikely due to Australian Government appropriation funding and mechanism available to ANSTO and internal policies and procedures put in place to ensure there are appropriate resources to meet its financial obligations.

Notes to the Financial Statements

2016	Note	Carrying amount $'000	On demand $'000	1 year or less $'000	1 to 2 years $'000	More than 2 years $'000	Total contractual cash flows $'000
Financial liabilities							
Trade creditors		17,102	-	17,102	-	-	17,102
Employees	10A	2,656	-	2,656	-	-	2,656
Grants received in advance		86	-	86	-	-	86
Other	10B	2,694	-	2,694	-	-	2,694
Total financial liabilities		**22,538**	**-**	**22,538**	**-**	**-**	**22,538**

2015	Note	Carrying amount $'000	On demand $'000	1 year or less $'000	1 to 2 years $'000	More than 2 years $'000	Total contractual cash flows $'000
Financial liabilities							
Trade creditors		20,002	-	20,002	-	-	20,002
Employees	10A	6,330	-	6,330	-	-	6,330
Grants received in advance		135	-	135	-	-	135
Other	10B	17,995	-	17,995	-	-	17,995
Total financial liabilities		**44,462**	**-**	**44,462**	**-**	**-**	**44,462**

f) Market risk

(i) Interest rate risk

This refers to the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. ANSTO is exposed to interest rate risk primarily from Investment held to maturity. The impact as shown below:

Risk variable	Change in variable		Effect on		Effect on	
	2016	2015	Profit or loss 2016 $'000	Equity 2016 $'000	Profit or loss 2015 $'000	Equity 2015 $'000
Investment held to maturity ($'000)	149,797	192,025				
Interest	0.30%	0.40%	449	449	768	768
Interest	(0.30%)	(0.40%)	(449)	(449)	(768)	(768)

Interest rate sensitivity analysis has been calculated on a reasonably possible change basis. A 'reasonably possible' change has been estimated using both statistical and non-statistical analyses. The statistical analysis has been based on the cash rate for the past five years issued by the Reserve Bank of Australia (RBA) as the underlying dataset. This information is then revised and adjusted for reasonableness under the current economic circumstances.

As a result of the analyses above, a standard rate of 30 basis points (2015: 40 basis points) shock level was selected as a 'reasonably possible' change in market interest rate. 30 (2015: 40) basis points is management's best estimate of future volatility.

(ii) Foreign currency risk

This refers to the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in foreign currency rates. ANSTO is exposed to foreign currency rate risk primarily from trade creditors. The impact only relates to assets and not profit and loss or equity.

Risk variable	Change in variable		Effect on		Effect on	
	2016	2015	Profit or loss 2016 $'000	Equity 2016 $'000	Profit or loss 2015 $'000	Equity 2015 $'000
USD Currency ($'000)	590	437				
Foreign currency	10.50%	10.90%	62	62	48	48
Foreign currency	(10.50%)	(10.90%)	(62)	(62)	(48)	(48)

The method used to arrive at the possible risk of 10.5% (2015: 10.9%) was based on both statistical and non-statistical analyses. The statistical analysis has been based on main currencies movement for the last five years. The two main currencies ANSTO has exposure to are the USD and the EURO. This information is then revised and adjusted for reasonableness under the current economic circumstances.

10.5% (2015: 10.9%) is management's best estimate of future major currencies foreign exchange volatility.

Notes to the Financial Statements (continued)

g) Reconciliation of level 3 fair value hierarchy

	2016	2015
	$'000	$'000
Opening balance	5,000	5,000
Total gains or losses for the year recognised in profit and loss	-	-
Closing balance	**5,000**	**5,000**

The investment in the Australian Synchrotron Holding Company of $5 million is assessed as not requiring impairment testing due to the certainty regarding future funding 30 June 2026 and ownership transferring to ANSTO on 1 July 2016.

Note 19. Government funding

	2016	2015
	$'000	$'000
Revenue from Government	156,700	157,414
Government equity injection	35,916	96,439
Total government funding	**192,616**	**253,853**

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

Note 20. 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.

Note 21. Remuneration of auditors

	2016	2015
	$	$
Amounts received or due and receivable by ANAO for:		
Audit of the ANSTO Group	266,000	256,500
Special audits required by regulators	-	5,500
Amounts received or due and receivable by entities other than the ANAO for:		
Audit of entities within the ANSTO Group	9,419	8,005
Other non-audit related services (a)	-	46,634
Total remuneration of auditors	**275,419**	**316,639**

(a) The audit of New Policy Proposals spending.

No other services were provided by the Auditor-General during the reporting period.

Note 22. Information relating to ANSTO (the parent entity)

	2016	2015
	$'000	$'000
Current assets	180,537	224,106
Non-current assets	1,183,182	1,148,088
Total assets	**1,363,719**	**1,372,194**
Current liabilities	82,725	82,798
Non-current liabilities	343,924	324,042
Total liabilities	**426,649**	**406,840**
Net assets	**937,070**	**965,354**
Contributed equity	741,336	705,420
Asset revaluation reserve	486,204	489,506
Other reserves	9,677	10,006
Accumulated deficit	(300,147)	(239,578)
Total equity	**937,070**	**965,354**
Deficit of the parent entity	**(60,569)**	**(44,215)**
Other comprehensive income of the parent entity	**(3,631)**	**(1,799)**
Total comprehensive income of the parent entity	**(64,200)**	**(46,014)**

As at 30 June 2016 and 30 June 2015 ANSTO issued a letter of support to Synchrotron Light Source Australia Pty Ltd, to pass on the funding received from Government and other sources to allow it to pay its debts as and when they fall due.

The lease commitments shown in note 4B only relate to ANSTO.

Investment in subsidiaries

			2016	2015
Name	**Place of incorporation**	**%**	**$**	**$**
PETNET Australia Pty Ltd (a)	Australia	100	9,474,588	10,957,588
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
Total investment in subsidiaries			**9,474,689**	**10,957,689**

(a) ANSTO continues to own 100% of PETNET and assessed the carrying value of its investment, including a review of the cash flow projections. The resulting PETNET valuation based on a discount rate of 8.94% (2015: 13.45%) and 22 years (2015: 23 years) cash flow plus the value of cash on hand (surplus asset) was $10,957,588 (2015: $10,958,000) compared to a carrying value of the investment of $9,474,588 (2015: $10,958,000), giving a $1,483,000 impairment (2015: nil impairment).

Notes to the Financial Statements (continued)

(b) ANSTO established on Synchrotron Light Source Australia Pty Ltd (SLSA) 14 August 2012 and owns 100%. Effective from 1 January 2013 SLSA has operated the Australian Synchrotron. ANSTO secured $519.8 million in funding for the operation and ownership of the Australian Synchrotron for the 10 years to 2026 as part of the Government's National Innovation and Science Agenda. This funding is conditional on the transfer of the Australian Synchrotron to ANSTO and is in addition to the $30 million of interim funding committed from the Commonwealth Government, the Victorian Government, the Department of Education and Training, the Department of Defence and the New Zealand Synchrotron User Group. The ownership of the Australian Synchrotron transferred to ANSTO on 1 July 2016 and ANSTO is now restructuring the group to transfer the ownership and operations of the Australian Synchrotron directly into ANSTO.

(c) ANSTO Inc. was incorporated in Delaware, USA on 27 October 1999 with ANSTO owning 100% of the issued equity. At 30 June 2016, US$100 (2015: US$100) of capital has been invested in this wholly owned subsidiary. This investment has been written off in prior periods. In November 2004, the Board decided to utilise ANSTO Inc. to promote the commercialisation of ANSTO Technology in the USA. For the financial year ended 30 June 2016 the financial statements of ANSTO Inc. were audited by Wipfli LLC.

(d) ANSTO formed ANSTO Nuclear Medicine Pty Ltd (ANM) in 2013 owning 100% of the issued equity. During 2015, the shares were split into two classes, A and B. The existing shares were classified as B class shares. ANSTO owns all the B class shares on issue. 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 and Science on behalf of the Commonwealth. The A class share is entitled to dividends. ANM was established to own and operate the new Molybdenum 99 (Mo-99) production facility which 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 late financial year 2017. ANM will also own and operate a waste treatment facility which will utilise ANSTO's proprietary Synroc technology for the treatment and immobilisation of liquid waste from the Mo-99 production facility. This plant which will also be constructed on ANSTO's Lucas Heights campus is scheduled for completion in late-2018 and will be the first commercial scale demonstration of this technology.

Note 23. Budgetary reports and explanations of major variances

The following tables provide a comparison between the 2015–16 Portfolio Budget Statements (PBS) budget and the final financial outcome in the 2015–16 financial statements. The Budget is not audited and does not reflect additional budget estimates provided in the 2015–16 Portfolio Additional Estimates Statements (PAES) or the revised budget provided as part of the 2015–16 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.

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 2016 the value of the ANM facilities is $92.7M (2015: $50.6M).	**Statement of Financial Position:** Investments Property, plant and equipment
During the year ANSTO received the final appropriation in relation to the ANM project. In addition to the $42.1M spent during the year on the ANM facilities, ANSTO spent an unbudgeted $20M on assets during the year, primarily on assets under construction. This included $5.1M on the project to update ANSTO's business information system, SAP. ANSTO staff have been utilised on these two projects and contractors have been employed in a number of instances to backfill these positions. An unbudgeted amount of $4.2M has been spent in FY16 on contractors. ANSTO actively manages surplus cash through the use of term deposits. Term deposits are 'rolled' having consideration of the immediate cash requirements of ANSTO and the level of interest rates. During the year ANSTO rolled their excess funds more frequently than anticipated to take best advantage of the interest rates on offer and maximise its interest income.	**Statement of Financial Position:** Investments Property, plant and equipment **Statement of Comprehensive Income:** Suppliers expenses **Statement of Cash Flows:** Purchase of investments Purchase of property, plant and equipment Proceeds from investment sales/maturity
The fuel assemblies for the operation of the OPAL research reactor and the target plates required for the production of Mo-99 have a long lead time from order to receipt. In preparation for the operation of the ANM facilities contracts have been negotiated this year and deposits paid to commence the multi-year process to manufacture the additional target plates that ANSTO will need to supply to ANM to meet their demand which gave rise to a $2M variance. The additional production of Mo-99 results in the need for additional containers to transport the bulk Mo-99 once irradiated $2.6M. Down-payment on a contract for LEU is also included $1.4M. The planned level of expenditure has not changed though this expenditure was made in FY16 not in future years. An unbudgeted increase of $11.6M relating to the decommissioning OPAL Spent Fuel and Local Waste was made to the decommissioning provision.	**Statement of Financial Position:** Prepayments Property, plant and equipment Decommissioning provision **Statement of Comprehensive Income:** Suppliers expenses **Statement of Cash Flows:** Purchase of property, plant and equipment
Even though external sales have increased the downturn in the mining industry and lower commodity prices of uranium ore and rare earths has resulted in lower than anticipated revenue and based on the levels of revenue in advance this in expected to continue. The impact in of this in FY16 is $4M. The revenue for a commercial opportunity did not eventuate as planned and led to $2.6M of budgeted revenue not being received.	**Statement of Financial Position:** Other payables **Statement of Comprehensive Income:** Sales of goods and rendering of services
The timing of payments involved in the long term nuclear contracts can be difficult to forecast as they often rely on specialised equipment being available. During the year $4.4M was spent on the transportation of the HIFAR reprocessed spent fuel back to Australia.	**Statement of Financial Position:** Investments **Statement of Comprehensive Income:** Suppliers expenses

Notes to the Financial Statements (continued)

Event impacting financial statements	Affected consolidated statements and line items
ANSTO's wholly owned subsidiary, SLSA operates the Australian Synchrotron. Funding for those operations has, up to 30 June 2016 come via a funding package from a number of sources managed by Monash University on behalf of the Special Research initiatives in Synchrotron Science utilising ARC funding. These funds were initially prepaid ($15.5M). At the time the budget was submitted it was assumed that the funding post 30 June 2016 would be in a similar format. However, the Commonwealth Government has assumed ownership of the Australian Synchrotron via ANSTO and the Synchrotron is now funded primarily via appropriation.	**Statement of Financial Position:** Investments Other payables
Employee payables are primarily driven by the number of days between the last pay period of the year and year end. The budget figure was based on the 2015 and not 2016 the impact being $4M.	**Statement of Financial Position:** Employee payables
The intellectual property payment provision is denominated in USD. The difference between the budget and the actual figure is primarily driven by the difference between the exchange rate used for the budget and the actual exchange rate at 30 June 2016, $8.5M.	**Statement of Financial Position:** Intellectual property payment

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 (ANSTO) Act 1987*. 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 ANSTO Board and the Chief Executive Officer's responsibilities and duties 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 also subject to the provisions of the *Public Governance, Performance and Accountability (PGPA) Act 2013* 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 Commonwealth entity.

Over the 2015-16 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.

ANSTO's governance structures and processes are underpinned by its corporate values and Code of Ethics. ANSTO's values and business ethics standards and culture are regularly reviewed and adapted, when appropriate, to accommodate organisational change and to reflect national and international best practice.

In October 2015, ANSTO prepared and lodged an annual *Public Governance, Performance and Accountability (PGPA) Act – Compliance Report* with the Minister for Finance and ANSTO's responsible Minister (covering the reporting period 2014-15). This report confirmed ANSTO's compliance with the *PGPA Act* and Regulations and the General Policy Orders of the Commonwealth Government applicable to ANSTO at that time. In addition, the report confirmed ANSTO's ongoing financial sustainability.

Ministerial oversight

In 2015-16 the Minister responsible for ANSTO was the Minister for Industry and Science, who became the Minister for Industry, Innovation and Science in September 2015.

Under the *ANSTO Act* and *PGPA Act*, the relevant Minister and the Finance Minister may provide the ANSTO Board with directions in writing in respect of the performance of the functions or the exercise of the powers of the Board or the organisation, including compliance with Government Policy Orders.

No Ministerial Directions, issued under either the *ANSTO Act* or *PGPA Act*, were received by the ANSTO Board in 2015-16.

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 to ANSTO. 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.

Notification of 'significant' events

Under section 19 of the *PGPA Act* and in accordance with the Minister's *Statement of Expectations*, 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 2015-16, two notifications of significant events were provided to the Minister:

- On 17 November 2015, ANSTO provided notice to the Minister of its intention to enter into a joint venture to establish an overseas nuclear medicine business.
- On 3 May 2016, ANSTO provided notice to the Minister of an upcoming transaction to enact the transfer of the State of Victoria's shares in the Australian Synchrotron Holding Company Pty Ltd (ASHCo) to ANSTO resulting in ASHCo becoming a wholly owned ANSTO subsidiary. This transaction took place in July 2016.

In addition, 59 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 and corporate governance frameworks 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 operation 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; and
- ensure the establishment of effective organisational governance, risk management, compliance, and assurance mechanisms.

A key obligation under the *PGPA Act* is the need for Board members to disclose a material personal interest in any matter being considered by the Board. The *PGPA Act* also prohibits participation, deliberation and decision-making by any member on such matters. For the reporting period 2015-16 the Board is satisfied that it has discharged its duties and obligations in accordance with relevant requirements.

The effectiveness and performance of the Board and the individual members of the Board are evaluated regularly. The Board Chair leads the evaluation process. During the period, the results of a Board Engagement survey were reported and discussed. In addition, 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.

Composition of the Board

As of 30 June 2016, ANSTO's Board comprised the ANSTO 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 CEO 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. The Board requested ANSTO appoint a Company Secretary and this was done during the 2015-16 financial year. The Company Secretary 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. Six Board meetings were held during the 2015-16 financial year. Details of the number of Board meetings attended by each member during the financial year 2015-16 are outlined in **Table 1**.

Board committees

The ANSTO Board operates 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.

Table 1 - Board meetings attended

Member	Eligible to attend	Attended
Mr Jim W McDowell (Chair)	6	6
Ms Erica Smyth (Deputy Chair)	6	6
Dr Adrian (Adi) Paterson (Chief Executive Officer)	6	6
Emeritus Professor Stephen Buckman, AM[1]	6	6
Professor David Copolov, AO[2]	6	6
Ms Penelope J Dobson	6	6
Professor Brigid Heywood[3]	0	0
Ms Carol Holley[4]	2	1
Professor Judy A Raper[2]	6	5
Professor Andrew M Scott	6	5
Professor Margaret Sheil[3]	0	0

1. Appointed 23 July 2015 **2.** Term ended on 27 June 2016 **3.** Appointed effective 28 June 2016 **4.** Appointed 25 February 2016

Risk and Audit Committee (RAC)

The overall purpose of the RAC is to assist 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 ANSTO 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 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 committee 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 2015-16 are provided in **Table 2**.

Remuneration and Nominations Committee

The objective of the Remuneration and Nominations Committee is to assist the Board in fulfilling its responsibilities regarding the overall 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 position of the CEO.

Table 2 - RAC meetings attended

Member	Eligible to attend	Attended
Ms Erica Smyth (Chair)	4	4
Emeritus Professor Stephen Buckman, AM[1]	4	4
Professor David Copolov AO[2]	4	3
Ms Penelope J Dobson	4	4
Ms Carol Holley[3]	1	0
Professor Judy A Raper[2]	4	4
Professor Andrew M Scott	4	3

1. Appointed 23 July 2015 **2.** Term ended on 27 June 2016 **3.** Appointed 25 February 2016

Table 3 - Remuneration and Nominations Committee meetings attended

Member	Eligible to attend	Attended
Mr Jim W McDowell (Chair)	4	4
Dr Adrian (Adi) Paterson	4	3
Professor David Copolov AO[1]	4	4
Ms Penelope J Dobson	4	4

1. Term ended on 27 June 2016

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 General Manager, Human Resources 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 four occasions during the 2015-16 financial year. Details of the number of Remuneration and Nominations Committee meetings attended by each member during the financial year 2015-16 are provided in **Table 3**.

Commercial Sub-Committee

The Commercial Sub-Committee was established during the year to provide 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 2015-16 financial year. Details of the number of Commercial Sub-Committee meetings attended by each member during the financial year 2015-16 are provided in **Table 4**.

External audit

The Commonwealth Auditor-General, through the ANAO, is the external auditor for ANSTO.

For the year 2015-16, the ANAO contracted KPMG to assist with the ANSTO external

Table 4 - Board committee

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

audit. KPMG did not provide any additional services to ANSTO after accepting the ANAO contract.

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 they are 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 key risks, risk management activities and the risk management maturity of the organisation.

Internal control

The ANSTO Board is ultimately responsible for the establishment and maintenance of a system of internal controls 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.

ANSTO is currently implementing the *COSO Internal Control – Integrated Framework* and the *Three Lines of Assurance Defence* model to assist in the development, deployment and evaluation of internal control systems and arrangements.

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; and
- 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 has prepared a comprehensive Fraud Control Plan that details fraud control governance arrangements and risk mitigation strategies.

ANSTO has also established 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 and reporting as well as investigation standards.

In addition, ANSTO has a *Public Interest Disclosure Act 2013 (PID Act)* scheme (including a PID reporting scheme) which is consistent with the requirements of the *PID Act* and the guidance provided by the Commonwealth Ombudsman. This scheme provides a mechanism for reporting, amongst other things, incidents of fraud.

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 CEO 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 all ANSTO Institutes, Divisions, and Business Units. 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.

The findings and recommendations arising from each Internal Audit engagement are presented to the RAC. Follow-up reviews are conducted to ensure that all Internal Audit recommendations are properly closed-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.

'Combined' assurance

ANSTO continues to derive significant benefits from its 'combined assurance' approach by eliminating unnecessary duplication of assurance activity and improved assurance coverage of key risk areas.

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 2015-16 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 governance parts of the *ANSTO Act*

During the 2015-16 reporting period, the definition of a "law enforcement agency" appearing in section 3 of the *ANSTO Act* was amended by the *Customs and Other Legislation Amendment (Australian Border Force) Act 2015* to reflect the creation of the Australian Border Force. This change in turn impacted section 5 of the *ANSTO Act*.

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

The Minister executed a new Deed of Indemnity on 21 April 2016 for a period of ten years. The indemnity 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

Career paths for research and technical staff

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

We operate a number of early career programs to secure strong career pipelines for future generations of scientists and engineers 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:

- 65 per cent of the support currently offered to employees under ANSTO's study support arrangement in undertaking a formal qualification is specifically aligned to science (50 per cent) and engineering (15 per cent) degrees. The qualifications being undertake range from Diploma level to PhD support.
- 35 per cent of external training requests have been received from the research areas for technical training over the last financial year.

ANSTO has established an Engineering Council to provide a consistent approach to engineering and specialised technical services across the organisation. The Council undertakes ANSTO-wide workforce planning for staff in these roles, develops resource plans for our capital programs and ensures these highly specialised staff members have options to develop their careers.

Careers in STEMM

In addition to establishing formalised early career pathways; ANSTO's Education centre delivers a number of programs designed to promote careers in STEMM disciplines through student engagement and teacher enrichment.

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 the Masters in Nuclear Engineering course at UNSW Australia with financial support, syllabus and course development and academic support to deliver the modules.
- Initial work in the establishment of a graduate institute at Lucas Heights aimed at fostering greater industry engagement and research training.
- Long term support of AINSE and its programmes.
- An existing neutron scattering industry engagement plan. An overall ANSTO industry engagement plan is under development.
- Research accounts to encourage and incentivise researchers.
- A number of successful IP presentations have been held and the Chief Economist was hosted to give a distinguished lecture. We are examining harmonising IP Policies across Clayton and Lucas Heights and are securing IP associated with Synroc technology in particular.

- The establishment of a research ombudsman office to examine research ethics and governance issues
- A 'Developing Your Commercial Acumen' program for all staff. To date 40 per cent of participants have been from the research areas. The program has been designed specifically to help individuals in research groups to understand how their work can be translated into commercial opportunities for the organisation.

Gender equity and diversity at ANSTO

ANSTO has committed itself to achieving greater diversity and gender equity by 2030. ANSTO is a member of the Science in Australia Gender Equity (SAGE) program, which is designed to improve gender equity and diversity in STEMM.

The first stage of this commitment is working to achieve a bronze level Athena SWAN accreditation.

Significant workforce planning has been undertaken to develop strong links with universities and industries to secure the pipeline for future specialists in nuclear science and technology. Particular importance has been placed on ensuring opportunities at ANSTO for the next generation of STEMM professionals.

Equality of employment opportunity for 2015–16

	Number employed	% of Total Staff	Average Salary
Female	318	29%	$87,625
Male	779	71%	$103,502
People with disabilities	7	1%	$95,204
Aboriginal and Torres Strait Islanders	7	1%	$89,279
Non-English-speaking background	250	23%	$104,356

Benefits and performance

ANSTO has been exploring ways in which to offer greater flexibility and mobility to our employees through increased development opportunities; secondments both internal and external to the organisation; and opportunities to learn different organisation skills and leap on different career paths through our Learn and Leap Program. ANSTO empowers our employees to seek effective ways of working to balance work demands with personal life through mechanisms like part-time, job share, individual flexibility agreements, phased retirement, purchased leave, and telecommuting.

Health and Wellbeing Programs

ANSTO's Health and Wellbeing Programs continued to offer benefits for employees. Apart from the annual flu vaccines and bowel screening programs, men's and women's health screens were also offered and conducted on site to all staff.

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) as part of the organisation's early intervention and wellness service.

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

(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.

APPENDIX 2

(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's commitment to environmental protection and sustainability principles is defined in its corporate strategic plans, WHSE Policy and organisational core values. We are committed to effective stewardship, the sustainability of our operations and to responsibly interact with the local ecology and biosphere, and to protect it. We minimise our environmental footprint through the sustainable use of resources 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. Proposals for new (or modifications to existing) facilities or activities also undergo a rigorous internal safety, regulatory and environmental assurance process with oversight provided independent to the project management of major capital works.

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

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

Environmental management system

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. ANSTO was re-certified in April 2016 to this standard. This standard requires that environmental impacts and compliance obligations are identified, with the risks managed and mitigated; an effective measurement and review system is in operation; and that there is an organisational commitment to continual improvement. Our extensive environmental monitoring program also operates within a quality framework that is certified to the ISO 9001standard for Quality Management Systems.

ANSTO has developed a 6-year Environmental Management System Strategy. As the action plans derived from the initial implementation of this Strategy have been largely completed, the Strategy has been reviewed and new key performance indicators (KPI's), targets and action plans have been developed to ensure the 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.

APPENDIX 3

Environmental performance

ANSTO aims to reduce its environmental footprint by minimising the generation of waste wherever possible and 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.

The performance indicators below show that over the past six years, ANSTO's water consumption has remained reasonably steady whilst a slight annual increase (<1 % per year) has been observed for electricity consumption; for 2015-16 less waste was discharged to sewer and sent to landfill than the previous year. The decrease in waste to landfill is correlated with an increase in the amount of co-mingled waste that is being diverted for recycling. There has been a consistent decrease in the mass of paper being recycled which may reflect ANSTO's target to become paperless by 2019. ANSTO continues to recycle ferrous metals, garden waste, concrete, batteries, toner cartridges, mobile phones and redundant computer equipment. The decrease in wastewater to sewer can be attributed to lower overall water usage over the period in combination with progressive upgrades of ANSTO's sewer system.

Electricity consumption increased slightly from the last period which can be attributed to slight increases in operational hours at the Cyclotron facility, the Centre for Accelerator Science facility and an overall increase in the workforce. Although temperatures were above average for the period, electricity consumption patterns did not point to a corresponding increase in the use of air-conditioning over the hottest months. Awareness campaigns have been active over the period to inform staff of the efficient use of office air-conditioner units.

ANSTO continues to invest and plan for the use of renewable energy. During the period, ANSTO installed a solar hot water array servicing the air conditioning system within the OPAL Reactor building that has the potential to reduce ANSTO's consumption of grid electricity by up to 143 kWh annually.

	Units	First reported 2010-2011	Previous year 2014-2015	Current year 2015-2016	% change from previous year
Resource Usage [1]					
Electricity	GWh	37.1	41.0 [3]	41.7	+1.7%
Water	m^3	280,086	337,432	283,411	-16%
Waste Disposal [2]					
Waste sent to landfill	tonnes	307.5	231.7	225.8	-2.5%
Wastewater discharged to sewer	m^3	111,055	100,342	89,235	-11%
Recycled Waste [2]					
Cardboard	tonnes	20.2	23.9	20.8	-13%
Co-mingled containers	tonnes	4.2	5.8	5.9	+2%
Paper	tonnes	20.7	9.5	1.51	-84%

Notes: **1.** Data for both Lucas Heights & Camperdown sites (excluding all tenants).
2. Data for the Lucas Heights site only (includes tenants).
3. 41.0 as per NGER, previously reported as 40.59.

APPENDIX 3

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 2015-2016 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 Organization. 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 acceptance 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 Organization 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.

APPENDIX 3

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.

Referrals under the *EPBC Act*

A referral regarding the proposed expansion of the solid intermediate level and solid low level waste facilities was submitted in June 2016. A determination on the referral had not been advised at the time of reporting.

Safe waste management

ANSTO has maintained safe and effective management of its radioactive wastes 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 and space required.

Liquid wastewater comprising trade waste and sewage is treated and tested for compliance with 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 no measureable 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.

APPENDIX 3

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. Studies previously 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 2015-2016 was 0.0019 millisievert (mSv). This is less than 0.2 per cent of the annual public dose limit of 1 mSv established by ARPANSA.

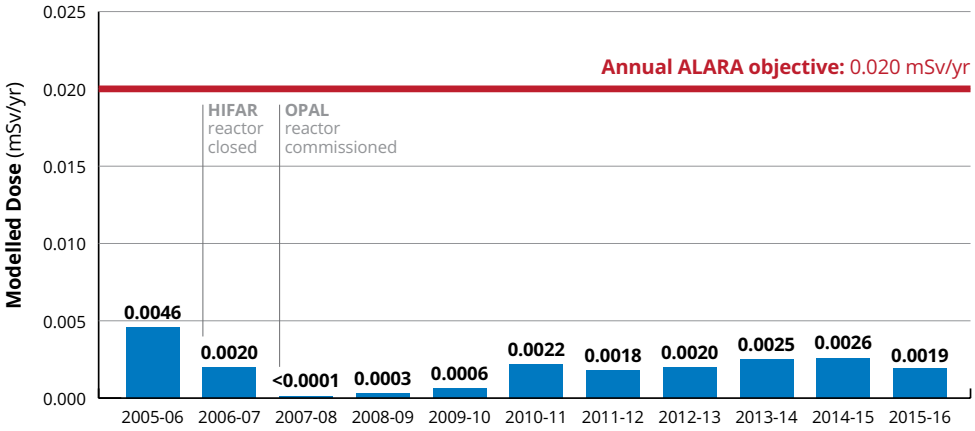
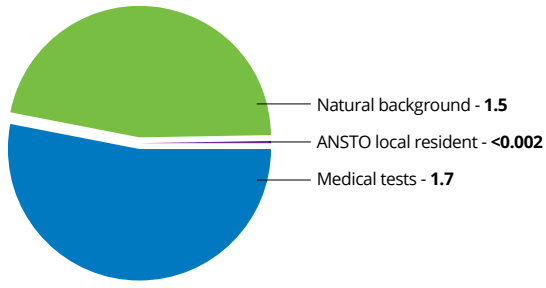


Figure 1: Maximum annual effective dose from LHSTC airborne discharges at the boundary of ANSTO's 1.6 km buffer zone.

Doses from ANSTO's airborne emissions in 2015-2016 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**.

Average Annual Dose Received by Australians* (mSv)



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

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 2015-2016.

APPENDIX 3

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 1.6 km buffer zone around the Lucas Heights site comprises developed areas, various landfill sites as well as natural bushland and waterways. 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 active bush care group of ANSTO staff has been meeting monthly for a number of years to target high risk locations within the buffer zone that have been overrun by a number of weed species. The work that this group has undertaken to date has seen the eradication of noxious weed species such as Crofton Weed, Cotton Bush and Cassia from over two hectares of riparian vegetation within the buffer zone.

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 of new equipment.

ANSTO is implementing a new chemical management system that will enable 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.

In line with ANSTO's focus on digitisation of records, the ANSTO Content Server is facilitating our transition to paperless offices by providing a secure platform for electronic document control and storage. Many functions such as budgeting, business planning, procurement, maintenance, recruitment and training are now managed through online user interfaces.

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 wastewater and sub-metering are enforced within the ABC.

Organisational Excellence (OE) is a model for integrated planning and decision making that ANSTO deploys 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.

APPENDIX 3

ANSTO is integrating environmental protection into management processes by requiring environmental impact assessment and management plans at the project planning phase. All capital projects such as construction of buildings, infrastructure and support facilities must have environmental protection plans in place to prevent environmental impacts such as soil erosion, dust, noise and discharges to stormwater. Independent oversight of these projects includes ad hoc inspections and formalised 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 in collaboration with the University of New South Wales (UNSW) have implemented the Feather Map of Australia Project which aims to utilise specialised analytical equipment to analyse feathers collected from waterbirds to help characterise the uptake of stable isotopes and minerals of waterbirds feeding at different wetlands across Australia. This project is actively asking members of the public to contribute by supplying discarded feathers from wetlands across the country.

The ANSTO Citizen Science program provides a forum for our scientists to engage with the community and the ANSTO Plastics Project has teams of volunteers collecting data on the distribution of plastics in their local environment, with the aim of tracing their passage through aquatic ecosystems.

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

ANSTO remains committed to the target of 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 the lessons learnt 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 2015-16 the WHSE Committee endorsed the top WH&S priorities for the organisation, changes to the pre-employment health assessment process and improvements to the reporting of safety event data.

The importance of an agile and flexible workforce in supporting the business' WH&S 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. To this end two roles, HR&WHS advisor for Nuclear Operation and the WH&S Compliance Leader, have been filled with candidates that met these requirements.

ANSTO continues to work closely with Comcare on initiatives that are designed to engage and provide assistance to stakeholders, including other agencies, and improve work health and safety outcomes for the business. Key deliverables in the improvement programs include; review of Change Management and Consultative policies and processes, development of a Change Management Toolkit that incorporates the organisational risk matrix and identifies consultation requirements. During these programs Comcare have provided support to ANSTO's Work Health and Safety (WH&S) Management System and provided information and guidance regarding WH&S legislative requirements.

The practice of occupational hygiene is a fundamental part of WH&S risk assessment. The occupational hygiene capabilities have been further improved with the engagement of a dedicated occupational hygienist. This role provides support to ANSTO operations and projects by providing expert advice on the management of potential exposures to chemical and physical agents.

A key element of ANSTO's proactive approach is the implementation of the Safety Strategy 2010-2015; all actions identified in the 2010-2015 Strategy have been completed. The 2016-2022 Safety Strategy has been developed, the seven national actions identified in the Australian Work Health and Safety Strategy 2012-2022 were adopted; healthy and safe by design, supply chains and networks, health and safety capabilities, leadership and culture, research and evaluation, and responsive and effective regulatory framework. The strategy also identifies priority areas and disorders that are ANSTO specific. Actions identified to meet the requirements of the strategy will be monitored by the Executive WHSE Committee.

The Safety Coach program continues to provide a trained, independent voice to General Managers/Leaders on safety matters. Safety Coaches lead the local implementation of identified best practices across the organisation; the first practice shared across all areas of the organisation was Radiation Safety Best Practice.

APPENDIX 4

ANSTO continued with the update, development, review and implementation of key WHSE Standards and Practices.

ANSTO continued its asset renewal program with the construction of new facilities during 2015-16 with the WH&S group continuing to provide safety advice and oversight to these projects which were completed without serious injury.

WH&S communication to all workers continued by providing: a risk based WH&S focus program, a renewed poster program and intranet stories with specific talking points to encourage discussion. Further improvements were made to the tenant landing page which provides key safety information to ANSTO's tenants and external contractors. Key WH&S hazards communicated to workers during 2015-16 included traffic safety on site, correct connection of temporary switchboards, inorganic lead, and Apple wall plug adaptors.

ANSTO continues to work with our contractors to improve site safety through the implementation of a WH&S pre-qualification system. This system has improved the visibility of ANSTO contractors' WH&S compliance to the organisation and in particular to contractor supervisors. It also allows direct communication with our contractors on key safety issues through sharing our Safety Alerts.

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 a productive team members as soon as possible. The ANSTO rehabilitation program continues to be certified against the *SRC Act* demonstrating effective procedures and programs are in place. The overall impact of these physiotherapy interventions along with other initiatives have contributed to an overall reduction in ANSTO's Workers Compensation Insurance premiums.

Comcare has advised ANSTO of the indicative annual premium for FY17 of $713,557 (FY16 premium $657,600). This premium is dependent on the aggregate premium pool (the total premium to be charged across all Commonwealth agencies) and ANSTO's claim performance. Due to the effective rehabilitation and return to work programs in place at ANSTO and the improvement in expected claim costs, the FY17 premium included a bonus of $52,728.

Accidents and incidents

ANSTO continued to monitor and report on key WH&S performance indicators. This included; total number of recorded events, number of Opportunities for Improvement, Lost Time Injury Frequency Rate (LTIFR) and Lost Shift Injury Frequency Rate (LSIFR).

The implementation of the Governance Risk and Compliance project has progressed and will consolidate the existing event recording and reporting processes. The ANSTO investigation process has ensured that appropriate response and controls have been adopted in each case. Additional event investigation training is being implemented. All Comcare reportable events have been closed by the regulator with no further action or information required.

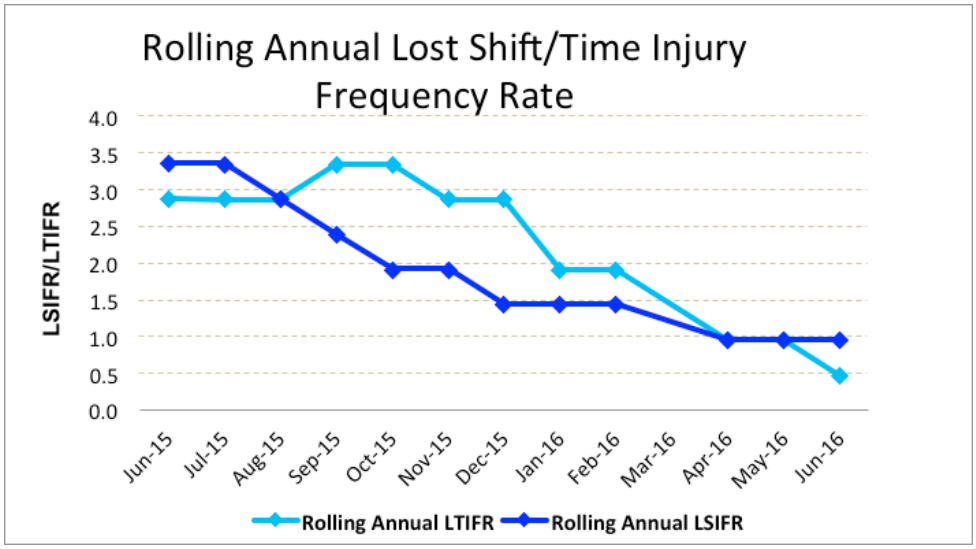
APPENDIX 4

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 2015-16 a total of 938 events were reported, compared to 1,128 (2014-2015), 952 (2013-14), 795 (2012-13) and 761 (2011-12). 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 2015-2016 82.5% of events were OFI.

Lost shift and lost time injuries

Lost Shift Injury Frequency Rates (LSIFR) and Lost Time Injury Frequency Rates (LTIFR) are a safety performance measure at ANSTO. These classifications are used to separate serious injuries (LTI) from less serious injuries (LSI). In 2015-2016 the LSIFR has decreased to 1.0, down from 3.4 (2014-2015) and the lowest rate recorded in four years. These injuries were random and isolated and all workers have resumed normal duties. There has also been a decrease in the LTIFR, 0.5 compared to 2.9 (2014-15) which is the lowest rate recorded in three years. The early intervention program and the effective management of injuries by appointed rehabilitation coordinators has also resulted in a decrease in the time taken off. Refer to the chart below.



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).

APPENDIX 4

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 2015 show that the radiation doses received by ANSTO workers remain significantly below regulatory limits. In 2015 the average effective dose across all ANSTO workers was 0.5mSv.

Table 1 shows the maximum, average and collective effective doses for the past five years. Collective effective dose is the total cumulative dose to an exposed group, in this case all ANSTO personnel registered with our radiation dosimetry service.

Table 1: Effective dose

	Calendar Year				
Effective Dose	**2011**	**2012**	**2013**	**2014**	**2015**
Max. Individual Dose (mSv)	6.9	6.6	6.44	6.44	5.3
Average Dose All ANSTO Workers (mSv)	0.5	0.4	0.4	0.5	0.5
Collective Effective (Person-mSv)	446.6	407.7	416.4	447	463

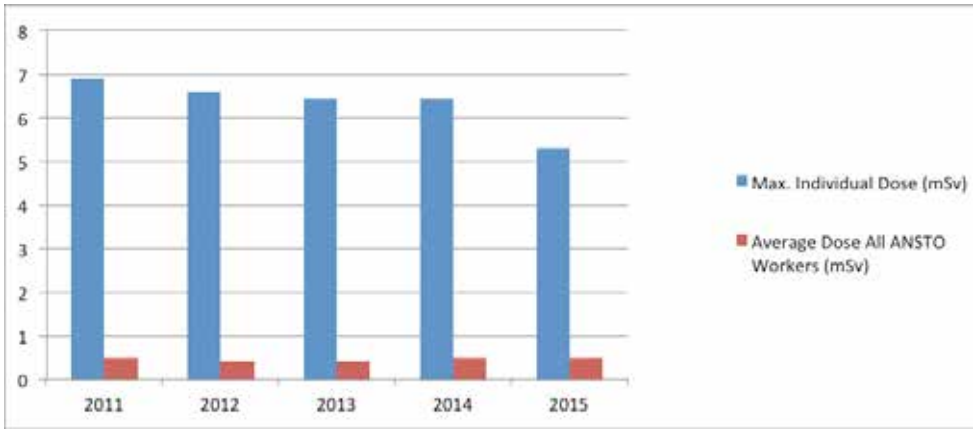
Table 2 shows the distribution of individual effective doses over the same period. The graph in **Figure 1** compares maximum effective dose to a single worker and the average effective dose across all relevant ANSTO workers.

APPENDIX 4

Table 2: Distribution of individual effective dose

	Calendar Year				
Effective Dose	**2011**	**2012**	**2013**	**2014**	**2015**
0 to O.99mSv	854	914	893	894	890
1 to 1.99mSv	66	32	40	47	59
2 to 4.99mSv	22	18	20	21	23
5 to 9.99mSv	5	4	2	4	1
>10mSv	0	0	0	0	0

Figure 1: Comparison of maximum and average effective doses.



Regulations give annual dose limits for radiation workers for the whole body (effective dose), for the skin (shallow dose) and for extremities such as hands or feet.

The respective dose limits are:

- whole body 20 mSv, averaged over five years
- shallow (skin) 500 mSv
- extremities 500 mSv.

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 2016, ANSTO has received 4 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.

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 http://www.ansto.gov.au/AboutANSTO/About/AccesstoInformation/IPS/index.htm

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 99 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 5 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 http://www.ansto.gov.au/Resources/Publications/AnnualReports/index.htm.

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/About.

Freedom of Information Act 1982, subsection 8

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 2015-16 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.

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

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 Index of compliance with reporting guidelines under various Acts, Regulations and Orders applicable to ANSTO as a Commonwealth authority

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Public Governance, Performance and Accountability Act 2013 (PGPA Act)

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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)	
Annual performance statements (Section 39 (1) and (2)	49-50
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)	
Financial statements (Sections 42 and 43)	51-87
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.	

Minister's Statement of Expectations June 2015

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ACRONYMS

ACAS	Australian Collaboration for Accelerator Science
AINSE	Australian Institute of Nuclear Science and Engineering
AMS	Accelerator mass spectroscopy
ANAO	Australian National Audit Office
ANSTO	Australian Nuclear Science and Technology Organisation
ANM Project	ANSTO Nuclear Medicine Project
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
CERN	European Organization for Nuclear Research
CRC-P	Cooperative Research Centre for Polymers
CRP	Cooperative Research Project
CTP	Consequential and Transitional Provisions
DSTO	Defence Science and Technology Organisation
EIF	Education Investment Fund
FNCA	Forum for Nuclear Cooperation in Asia
FOI Act	*Freedom of Information Act 1982*
HIFAR	High Flux Australian Reactor
HZB	Helmholtz-Zentrum Berlin
I-124	Iodine-124
IAEA	International Atomic Energy Agency
ILW	Intermediate level waste
INLEX	International Expert Group on Nuclear Liability
IR	Infra-red
ISSP	Institute of Solid State Physics (University of Tokyo)
JAEA	Japan Atomic Energy Agency

LEU	Low enriched uranium
LIEF	Linkage, Infrastructure, Equipment and Facilities
Lu-177	Lutetium-177
Mo-99	Molybdenum-99
MOU	Memorandum of understanding
MS	Mass spectrometry
MX	Macromolecular crystallography
NDF	National Deuteration Facility
NIF	National Imaging Facility
NIMS	National Institute of Materials Science
NMR	Nuclear magnetic resonance
NORM	Managing naturally occurring radioactivity
NPT	Non-proliferation treaty
NTD	Neutron transmutation doping
OLEDs	Organic light emitting diodes
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
SEEA	Sydney Engineering Excellence Awards
SINAP	Shanghai Institute of Applied Physics
STEM	Science, technology, engineering and mathematics
Tc-99m	Technetium-99m
TGA	Therapeutic Goods Administration
TLE	Temporal lobe epilepsy
TSPO	Translocator protein
UNSW	University of New South Wales
UTS	University of Technology Sydney

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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 ANSTO's neutron beam instruments are used to solve modern manufacturing problems including developing solutions for repairing Australian pipelines, trains and aircrafts. Pictured is a critical component of a pipe connection being studied by ANSTO researcher Anna Paradowska and technician Tai Nguyen.

Top Right Graduate Lucy Griffiths at the controls of ANSTO's Research Cyclotron Facility at the Camperdown campus

Bottom row left ANSTO offers customised education tours of its Lucas Heights campus covering a variety of STEMM subjects including physics, chemistry, biology plus senior, junior and primary school science.

Bottom row middle ANSTO materials process engineer Dr Dorji Chavara leads Synroc's back end process engineering team, which consolidates the nuclear waste form into a dense, solid object using Hot Isostatic Pressing (HIP) technology.

Bottom row right ANSTO's Dr Michael Hotchkis (front) and colleagues (L-R) Jon Knight (Griffith University); Patrick Dwyer (NSW Department of Primary Industry - Fisheries); and David Child (ANSTO) in front of the Vega accelerator, one of four accelerators that make up the Centre for Accelerator Science.

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Locations

Lucas Heights | Camperdown | Clayton

www.ansto.gov.au

Printed October 2016