Australian Government

Ansto

Nuclear-based science benefiting all Australians

Annual Report

2013-14

CHAIRMAN'S LETTER

Australian Government | ansto
Nuclear-based science benefiting all Australians

16 September 2014

The Hon Ian Macfarlane MP
Minister for Industry
Parliament House
CANBERRA ACT 2601

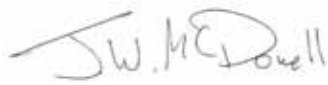
Dear Minister

I am pleased to present the Annual Report of the Australian Nuclear Science and Technology Organisation (ANSTO) for the period 1 July 2013 to 30 June 2014. This report has been prepared in accordance with the requirements of the *Australian Nuclear Science and Technology Organisation Act 1987* (ANSTO Act) and in accordance with section 9 of the *Commonwealth Authorities and Companies Act 1997* (CAC Act).

Under section 9 of the CAC Act, ANSTO Board members must prepare an annual report in accordance with schedule 1 of the CAC Act, and are responsible for the preparation and contents of the Annual Report and its Operations prepared in accordance with the Finance Minister's Orders.

The report has been approved for presentation to you by a resolution of the ANSTO Board members on 15 September 2014.

Yours sincerely



Jim McDowell
Chairman

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 most important science infrastructure, including the OPAL nuclear research reactor, the Australian Synchrotron, accelerators, cyclotrons and neutron beam instruments.

More than 1000 scientists, engineers and experts work at ANSTO to answer the significant environmental, medical and industrial questions using nuclear techniques. On average, ANSTO accommodates over 1800 visiting researchers from other Australian research organisations and international research centres each year.

ANSTO has achieved many great research achievements this year including the development of a rare earths separation process to help meet the global demand for these much sought after elements; a neutron scattering study that is improving the structural integrity of turbine blades used in power stations; contributing to the development of nuclear fuel materials that are safer to use as part of a major international collaboration; using nuclear techniques to trace the source of fine particle pollution; and undertaking research that is helping explain the role marine and coastal ecosystems play in storing carbon to offset greenhouse gas emissions.

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); the French Atomic Energy Agency (CEA); Shanghai Institute for Applied Physics (SINAP); Japanese SPring-8 Synchrotron Centre and the Asia Oceania Forum for Synchrotron Radiation Research. These important partnerships give Australian scientists access to some of the world's most sophisticated research techniques, enabling discoveries that benefit all Australians.

As part of enabling a strong national collaborative network, ANSTO is connected with all 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's Lucas Heights campus is home to OPAL, Australia's only nuclear reactor

ANSTO operates research facilities across three locations including 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 production of medical radioisotopes, and the irradiation of silicon used in microelectronics and other specialised irradiations for research and industry.

OPAL facilitates specialised research using an increasing suite of neutron beam instruments at ANSTO's Bragg Institute where scientists apply neutron scattering and X-ray techniques to solve complex research and industrial problems. Neutron scattering allows scientists to see what X-rays cannot. Neutrons are used to see the internal structure of many materials, helping scientists understand why materials have the properties that they do, and helping tailor new materials. ANSTO's neutron beam instruments are used for developing renewable, clean energy technologies; new battery technologies and studying the structural integrity of materials such as railway tracks.

ANSTO also operates two particle accelerators, the Small Tandem for Applied Research (STAR) and the Australian National Tandem Research Accelerator (ANTARES) with another two accelerators to come online by the end of 2014 as part of the Centre for Accelerator Science (CAS). The accelerators are used to analyse materials to determine their elemental composition and age, and are fundamental to advancing knowledge in areas such as climate science.

The Australian Synchrotron is supporting a range of Australian industries including food manufacturing and agriculture

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. It services some 3000 registered users at Australian and international universities and research institutes

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

ANSTO is central to Australia's nuclear medicine manufacturing capabilities. Each week ANSTO delivers 10,000 patient doses of potentially lifesaving nuclear medicines to over 250 partner hospitals and medical practices across Australia and the region. It is estimated one in two Australians will benefit from the nuclear medicines that originate from ANSTO.

The minerals industry relies on ANSTO to provide advice and technology to handle naturally occurring radioactive materials in minerals processing. ANSTO also provides expert advice to the minerals sector on the safe treatment and disposal of nuclear waste and specialised irradiation services.

ANSTO has specialised expertise and provides quality advice to the Australian Government on all matters relating to nuclear science, technology and engineering. This expertise is also recognised internationally and, on behalf of Australia, ANSTO holds a seat at the prestigious Board of Governors table at the International Atomic Energy Agency (IAEA) headquarters in Vienna.

ABOUT ANSTO

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

For example, low-enriched uranium, used to power Australia's OPAL research reactor is the safest nuclear fuel because of its proliferation resistance. The mass production of molybdenum-99 (Mo-99), used in 80 per cent of nuclear medicine procedures, using a low-enriched uranium reactor and low enriched uranium target in the production of Mo-99, is therefore a major advancement of Australia's regional and global leadership in nuclear medicines and will position Australia at the forefront of a global movement to eradicate the use of highly-enriched uranium.

Significant progress has been made on ANSTO's new $168.8 million nuclear medicine manufacturing facility with the first sod being turned this year. This facility will position Australia as a global leader in the high-end manufacture of nuclear medicines, all made using proliferation-resistant low-enriched uranium.

Strategic priorities

Our strategic priorities for 2010-15 are to:

- Deliver world-class research and innovation in nuclear science and technology
- Expand ANSTO's reach and contribution, exploiting landmark technologies
- Serve the nuclear needs of government, industry, community and the people of Australia
- Drive organisational renewal.

Our vision

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

Our Corporate Plan 2010-15

ANSTO Corporate Plan 2010-15 is the enabling document for the organisation to implement our 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

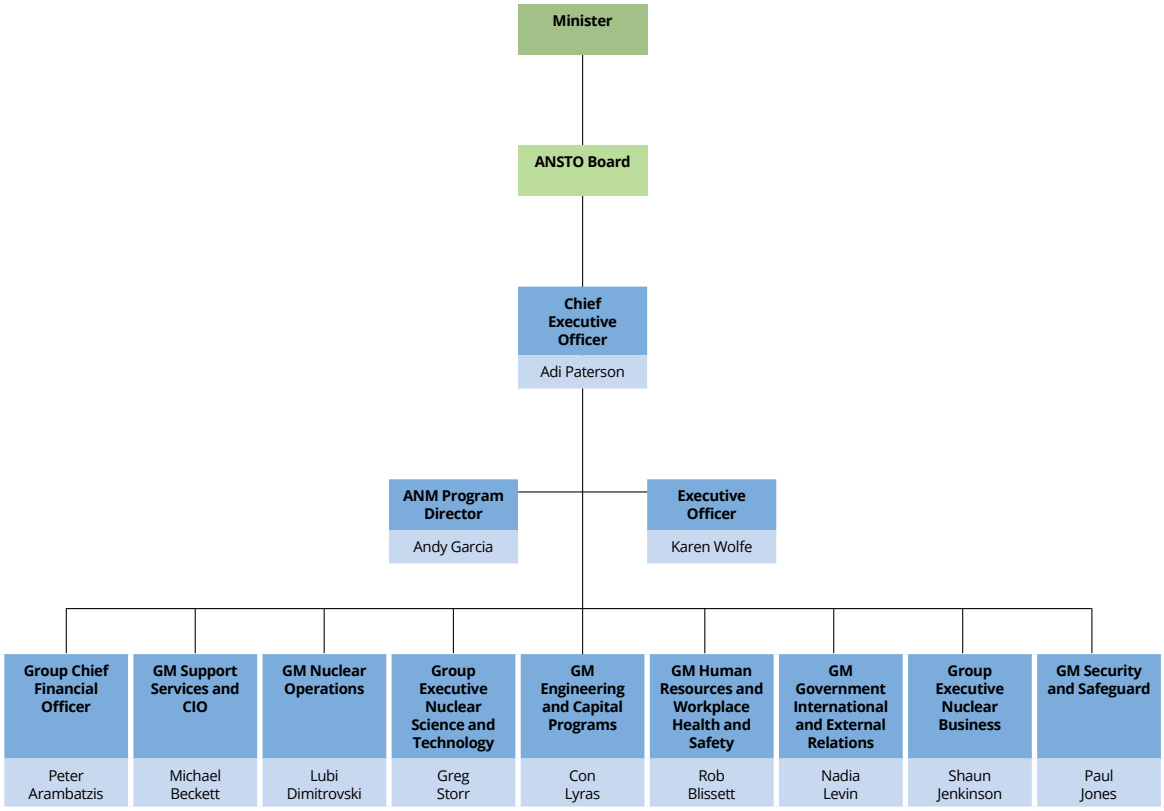
This report is written with reference to the Commonwealth Authorities (Annual Reporting) Orders 2011.

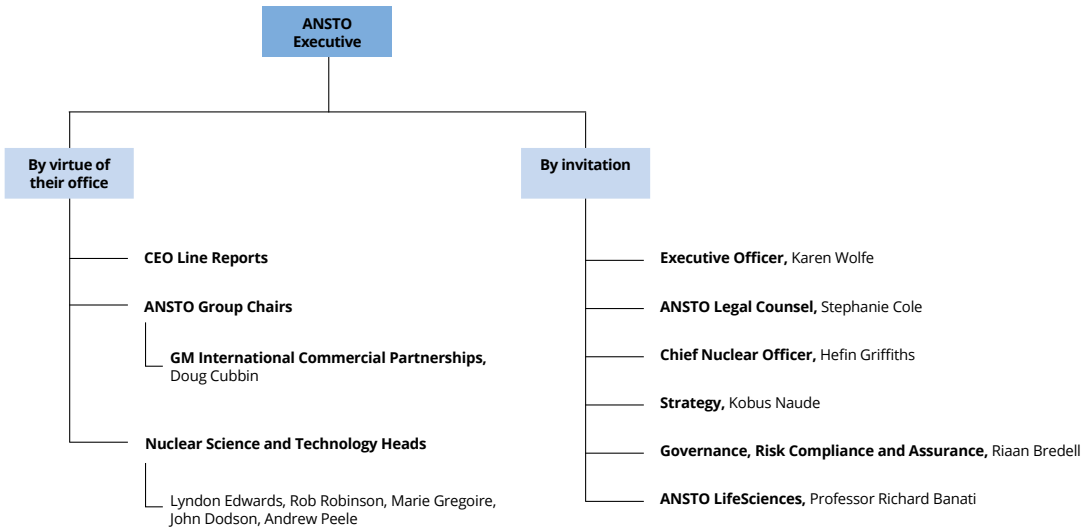
Responsible Ministers

The Hon Ian Macfarlane MP, Minister for Industry (above) from 18 September 2013

Senator the Hon Kim Carr, former Minister for Innovation, Industry, Science and Research and Minister for Higher Education, 1 July – 17 September 2013.

ORGANISATIONAL CHART





MEMBERS OF THE BOARD

Dr Paul Greenfield AO (Chairman)

BE (Hons), B.Econ, PhD, FTSE, FIEAust, FIChE, FAICD, CPEng, CEng, CSci

Engineer.

Chairman

24 February 2011 – 24 July 2014

Appointed

25 July 2007

Reappointed

25 July 2010

Term concludes

24 July 2014

Jim McDowell (Deputy Chairman)

LL.B (Hons)

Independent businessman with 35 years' experience in aerospace and defence.

Appointed

12 December 2013

Term concludes

11 December 2018

(Appointed Chairman 29 August 2014)

Ms Erica Smyth

MSc, FAICD, FTSE

Scientist and businesswoman.

Appointed

12 December 2008

Reappointed

14 March 2013

Term concludes

13 March 2018

(Appointed Deputy Chairperson 29 August 2014)

Dr Susan Pond AM

BMBBS (Hons), MD, DSc, FTSE, FRACP

Adjunct Professor, University of Sydney Medicine; scientist and business woman

Chair of ANSTO's Risk and Audit Committee.

Appointed

1 July 2010

Term concludes

30 June 2014

Professor David Copolov OAM

MBBS, PhD, FRACP, FRANZCP, MPM, DPM

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

Appointed

1 May 2008

Reappointed

28 June 2012

Term concludes

27 June 2016

Professor Judy A Raper

PhD, BE (Hons)

Deputy Vice-Chancellor (Research) University of Wollongong; Academic and engineer.

Appointed

28 June 2012

Term concludes

27 June 2016

Professor Andrew Scott

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

Director Ludwig Institute for Cancer Research; Nuclear medicine physician, scientist and academic.

Appointed

26 September 2007

Reappointed

29 September 2011

Term concludes

28 September 2016

Ms Penelope J Dobson

Dip Pharm, MPS, MBA, GAICD

Global pharmaceutical executive and businesswoman.

Appointed

24 April 2014

Term concludes

23 April 2019

Dr Adrian (Adi) Paterson

BSc, PhD

Chief Executive Officer; Chemical engineer.

Appointed

1 March 2009

Reappointed

1 March 2014

Term concludes

28 February 2017

ANSTO EXECUTIVE TEAM

Dr Adrian (Adi) Paterson
Chief Executive Officer

Mr Peter Arambatzis
Group Chief Financial Officer

Mr Michael Beckett
General Manager, Support Services and Chief Information Officer

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

Mr Douglas (Doug) Cubbin
General Manager, International Commercial Partnerships

Mr Lubi Dimitrovski
General Manager, Nuclear Operations

Professor John Dodson
Head, Institute for Environmental Research

Professor Lyndon Edwards
Head, Institute of Materials Engineering

Dr Marie-Claude Gregoire
Head, ANSTO LifeSciences

Mr Shaun Jenkinson
Group Executive, Nuclear Business

Mr Paul Jones
General Manager, Security and Safeguards

Ms Nadia Levin
General Manager, Government, International and External Relations

Mr Con Lyras
General Manager, Engineering and Capital Programs

Dr Robert (Rob) Robinson
Head, Bragg Institute

Dr Greg Storr
Group Executive, Nuclear Science and Technology

By invitation:

Professor Richard Banati
Distinguished Research Fellow and ANSTO LifeSciences

Dr Riaan Bredell
Senior Manager Governance, Risk, Compliance and Assurance

Ms Stephanie Cole
Legal Counsel

Mr Hefin Griffiths
Head of Nuclear Services and Chief Nuclear Officer, Nuclear Operations

Mr Kobus Naude
Senior Manager, Strategy and Planning

Ms Karen Wolfe
Executive Officer to CEO

CHAIRMAN'S REPORT

It is with great pride that the ANSTO Board reflects on 2013-14 with significant progress being made in key areas that are laying the foundations for ANSTO to take a lead role in key areas of research and engagement with industry.

On reflection, our attention inevitably turns to new facilities, such as the ANSTO Nuclear Medicine (ANM) Project, the Centre for Accelerator Science (CAS) and the commissioning of new instruments at the Bragg Institute and Australian Synchrotron's new Imaging and Medical Beamline as detailed elsewhere in this Annual Report. These new facilities will be the drivers for exciting new developments in research and industry, not only locally, but on the global stage.

OPAL, the jewel in the crown of Australian research facilities is reaching its full operating potential with good reliability and expanding services. It continues to be a catalyst for the development of ANSTO's research capabilities and collaborations.

Hon Ian Macfarlane MP acknowledged progress on the ANM Project at a sod turning ceremony in May. When complete, ANM will position Australia as a global leader in the high-end manufacturing of nuclear medicines used in over 45 million medical procedures globally each year to diagnose cancers, heart disease, muscular and skeletal conditions.

The Board also welcomed progress on the development of the Synroc waste treatment facility which will support the ANM operations by processing waste from the production of nuclear medicines. Once in operation, this new facility will provide an opportunity for ANSTO to demonstrate this innovative Australian-developed technology to a global market seeking sophisticated solutions for the management of nuclear waste.

During the year, ANSTO began commissioning two new accelerators that will form part of the $25 million CAS. Accelerators are used to analyse materials, often using extremely small samples, to determine, for example, their elemental composition and age. CAS will house a unique cluster of four accelerators representing a significant offering for both local and international researchers. This will permit us to broaden the already well-established techniques that underpin 'the A to Z of scientific analysis'.

Similarly, the opening of the Australian Synchrotron's $25 million Imaging and Medical Beamline in July, represents another exciting step towards supporting improved health outcomes. The prospect for new research, diagnostics and treatments is good.

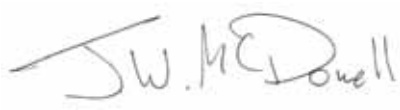
ANSTO's efforts in driving Australia's reputation in the peaceful application of nuclear technology has continued, with ANSTO taking part in important conversations around nuclear security and being one of the few nuclear organisations globally to use, proliferation proof, low enriched uranium fuel and targets for the production of nuclear medicine.

I would like to take this opportunity to congratulate Adi Paterson on his re-appointment and commend him for his leadership. I would also like to thank the Executive Leadership Team and all of the ANSTO staff for their outstanding work and dedication.

I would particularly like to acknowledge the dedication of Paul Greenfield during his tenure as Chairman of the ANSTO Board from 2011-14 and his strong contribution as an appointed Director from 2007. Paul's guidance and commitment during the past several years have been part of a crucial growth phase for the organisation and has ensured ANSTO is well positioned for the future. Our thanks also go to Susan Pond who made important contributions, not least as Chair of the Risk and Audit Committee, earlier the Remuneration Committee.

I look forward to continuing this legacy together with my fellow Board members who have enthusiastically employed their expertise to the challenge of governance.

There are promising times ahead for ANSTO, and we look to the future with much confidence.



Jim McDowell
Chairman

CHIEF EXECUTIVE OFFICER'S REPORT

It was another excellent year for ANSTO achieving significant progress on key projects to enhance Australia's research capabilities, support Australian health and provide new foundations for Australian industry into the future.

While many research reactors around the world are ageing or closing down, the OPAL multi-purpose reactor is one of the youngest and most reliable in the world. Because of this OPAL is well placed to meet the growing local and global demand for nuclear medicine.

The new molybdenum-99 (Mo-99) production facility is beginning to take shape. ANSTO has established supply of Mo-99 to the United States, Japan, China and South Korea utilising our current facility. Health care requirements will make these countries increasingly important in the years to come. ANSTO supplies Mo-99 using, low-enriched uranium fuel and targets, setting a benchmark that is being replicated around the world – leading an important trend supporting non-proliferation goals.

ANSTO is a key player in the global microelectronic supply chain. High performance micro-chips need precise control of the silicon used to fabricate these. This is achieved by neutron transformation doping in the OPAL reactor. ANSTO has experienced strong growth in the last year and is now the leading global supplier of this crucial irradiation service.

I would like to congratulate ANSTO's Lyndon Edwards and Michael Saleh whose work on the Defence Materials Technology Centre (DMTC) Armour Applications Program was recognised with a prestigious Eureka Prize for Outstanding Science in Safeguarding Australia. Working with defence contractors Thales Australia, armour manufacturers Bluescope Steel, the University of Wollongong and Swinburne University of Technology, this is a wonderful example of what can be achieved through collaboration.

During the year two new instruments were added to the suite of neutron scattering instruments in the Bragg Institute. The Institute has created a thriving centre for excellence in neutron scattering and attracts researchers from all over the world to our region. Our neutron scattering platform is complemented by the X-ray scattering facilities at the Australian Synchrotron which ANSTO is operating on behalf of the shareholders and broadly based user community in Australia and New Zealand. We continue to strive for a sustainable solution for the ongoing operations after June 2016.

2014 is the UN proclaimed International Year of Crystallography. Australian researchers in academia and industry benefit from the diverse beamlines and instruments which include high-performance diffractometer to study materials using the science of crystallography. In 1915 Henry and Lawrence Bragg received the Nobel Prize for their work in demonstrating that the patterns of scattered X-rays could be used to understand the structure of crystals. This remains one of the foremost techniques in determining the structures of complex molecules, materials and minerals underpinning the development of new medicines, developing new energy systems and understanding most of modern biology at the molecular scale. Crystallographic techniques were the basis of no fewer than 28 Nobel Prizes. ANSTO has supported UNESCO efforts to raise awareness amongst the science and non-science community for crystallography through the development of national school resources and outreach activities.

ANSTO enables Australia to be connected with the global nuclear industry and play an influential role in advocating for the peaceful uses of nuclear.

I am very proud of the people who work at ANSTO and our partners and collaborators. The Australian nuclear medicine community is taking great strides in developing new applications of diagnostic and therapeutic isotopes. This leadership is growing Australia's reputation globally. Our staff make ANSTO a distinctive and attractive place to work.

During the year a team of staff members developed, tested and refined a new set of six core values to guide the behaviours that will strengthen our future success. These values: curiosity; excellence; trust and respect; leadership; working together; and safety, security and sustainability have been widely adopted and are helping us be more effective. I note with pride the enthusiasm exhibited by staff as we entrench these values as an ongoing part of ANSTO culture.

The KU ANSTO Children's Centre opened in September 2013 at our Lucas Heights campus. The Centre supports employees with young families and provides one of the necessary elements to support women who aspire to have careers at ANSTO. This was a bricks and mortar demonstration of our commitment to encouraging a family friendly workplace and a step on the journey to achieve gender equity.

I would like to thank ANSTO's Executive Team and our staff, without their great work and foresight, none of these achievements would be possible.

I would also like to acknowledge the ANSTO Board for their continued leadership, good governance and strategic guidance as we focus on adding value to Australia through the nuclear science and technology that makes a positive impact.

Dr Adrian (Adi) Paterson
Chief Executive Officer

2013-14 HIGHLIGHTS

Above: The Hon Ian Macfarlane MP, Minister for Industry (pictured centre), visited ANSTO to officiate the commencement of the ANM Project. Right: The ANM Project will triple production of radiopharmaceuticals used for the diagnosis of cancers, heart disease, muscular and skeletal conditions

First steps underway in nuclear medicine facility

In May, the Hon Ian Macfarlane MP, Minister for Industry, and 100 guests and dignitaries visited ANSTO to officiate the commencement of the $168 million ANM Project building works which will position Australia as a global leader in the high-end manufacturing of nuclear medicine.

Through the Project, Australia will triple production of molybdenum-99 (Mo-99), which becomes a nuclear medicine called technetium-99m (Tc-99m) in hospitals and medical centres, and is used for diagnosis of cancers, heart disease, muscular and skeletal conditions.

ANSTO currently delivers the equivalent of 10,000 patient doses of Mo-99 across Australia each week and it is estimated that Mo-99 is used in around 45 million medical procedures worldwide every year, with demand growing particularly in the Asia-Pacific region.

In addition to positioning Australia as a global leader in nuclear medicines, this project has particular significance on the world stage because we will be producing these medicines using proliferation-proof low-enriched uranium (LEU).

The ANM Project includes a nuclear medicine manufacturing plant and a waste treatment plant to treat by-products for permanent, safe storage at a national waste repository. Subject to required approvals the plant will be operational late in 2016.

New world-class neutron beam instruments

ANSTO's Bragg Institute is home to eight operational neutron beam instruments which use OPAL's neutrons for solving complex research and industrial problems. During 2013-14 an additional five instruments were under construction or in various stages of commissioning including a time-of-flight small-angle neutron scattering instrument, called Bilby, and a neutron imaging and tomography instrument, called Dingo.

Small-angle scattering is a powerful technique for looking at sizes and structures of objects including biological molecules, defect structures in metals, pores in rocks, and magnetic flux in superconductors.

First tests were also carried out on Dingo, an instrument that can scan the inside of rocks, fossils and industrial materials while keeping objects intact.

ANSTO's neutron beam guide hall with the new time-of-flight small-angle neutron scattering instrument, Bilby (at right)

Dingo is set to be one of the highest intensity neutron radiography machines in the world, and will be capable of making real-time movies of the objects studied.

Dingo has many potential industrial applications including investigating medical devices, new and damaged car parts, water flow through pipes or soil, and examining cracks in steel and concrete.

It is anticipated that Dingo will attract international palaeontologists to ANSTO, who will recreate images of dinosaurs and other prehistoric creatures.

It is the first instrument to be commissioned as part of a $37 million Australian Neutron Beam Expansion project.

2013-14 HIGHLIGHTS

Centre for Accelerator Science takes delivery of the first of two accelerators

In late 2013, ANSTO's new Centre for Accelerator Science (CAS) took delivery of the first of two new accelerators. The new 1MV low energy multi-isotope accelerator mass spectrometry (AMS) accelerator system is custom designed with the capability to perform high-efficiency, high-precision AMS analysis.

The accelerator has a vast array of applications and can be used for the A to Z of science, from archaeology to zoology. It can measure rare radioisotopes from radiocarbon for dating applications to plutonium for nuclear safeguards and forensics.

CAS is being established with a $25 million grant funded by the Australian Government through the national Education Investment Fund (EIF), and a further contribution by ANSTO bringing the total to $38 million.

When complete, CAS will house ANSTO's existing ANTARES and STAR accelerators, the new 1MV accelerator and a new 6MV medium-energy tandem accelerator.

The 1MV accelerator will undergo development trials for several months before beginning routine sampling measurements. The 6MV accelerator will be delivered in stages from June and it is anticipated that the whole facility will be operational by December 2014.

ANSTO's new 1 MV low-energy multi-isotope accelerator mass spectrometer, VEGA

A key player in the global microelectronic supply chain

Globally, ANSTO is the leading provider of silicon irradiation services for the microelectronics industry.

ANSTO Silicon has experienced strong growth in the last year and is now the leading global supplier of this important irradiation service.

ANSTO's silicon ingots are used in microelectronic switching devices 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.

Irradiating silicon, a process technically known as neutron transmutation doping, changes electronic properties of silicon, making it more conductive of electricity.

During 2013 and 2014, ANSTO experienced unprecedented demand for silicon irradiation services from Asian and European companies, and this strong performance is expected to continue.

Silicon irradiated in the OPAL reactor is used by the microelectronics industry in hybrid cars and for renewable energy sources such as wind

2013-14 HIGHLIGHTS

The Armour Applications Program team, including Michael Saleh (fourth from left) with their award

ANSTO wins Eureka Prize

Professor Lyndon Edwards and Michael Saleh from ANSTO's Institute of Materials Engineering were recognised at the prestigious Australian Museum 2013 Eureka Prizes for their role in helping keep Australian troops safe.

Lyndon and Michael are part of a team working on an Armour Applications Program which includes representatives from defence contractors Thales Australia, armour manufacturers Bluescope Steel, the University of Wollongong and Swinburne University of Technology.

The Defence Materials Technology Centre (DMTC) Armour Applications Program has driven the development and commercialisation of high-performance armour materials and manufacturing techniques which are increasing the levels of protection and performance offered by Australian Defence Force vehicles and to operating personnel.

It is the first time researchers from ANSTO have played a key role in winning a Eureka award.

Professor Richard Banati TEDx Sydney presentation

In April, ANSTO's Professor Richard Banati presented at TEDx Sydney on his research on the feathers of sea birds, how our shift to using recycled plastic may have resulted in ocean pollution on a nano scale and how nuclear techniques can be used to trace plastic in the biosphere.

The event, which took place at the Sydney Opera House, featured 16 Australians who 'aim to change the world' with thought-provoking ideas and inspiring personal stories, was attended by more than 2500 people and watched online by millions.

Richard is the first ANSTO speaker to present at a TEDx event and talks at the event reach an audience that spans more than 130 countries.

TED is a non-profit organisation devoted to Ideas Worth Spreading. Started as a four-day conference in California 30 years ago, TED has grown to support those world-changing ideas with multiple initiatives.

ANSTO's Professor Richard Banati, presenting at the TEDx event, held at the Sydney Opera House

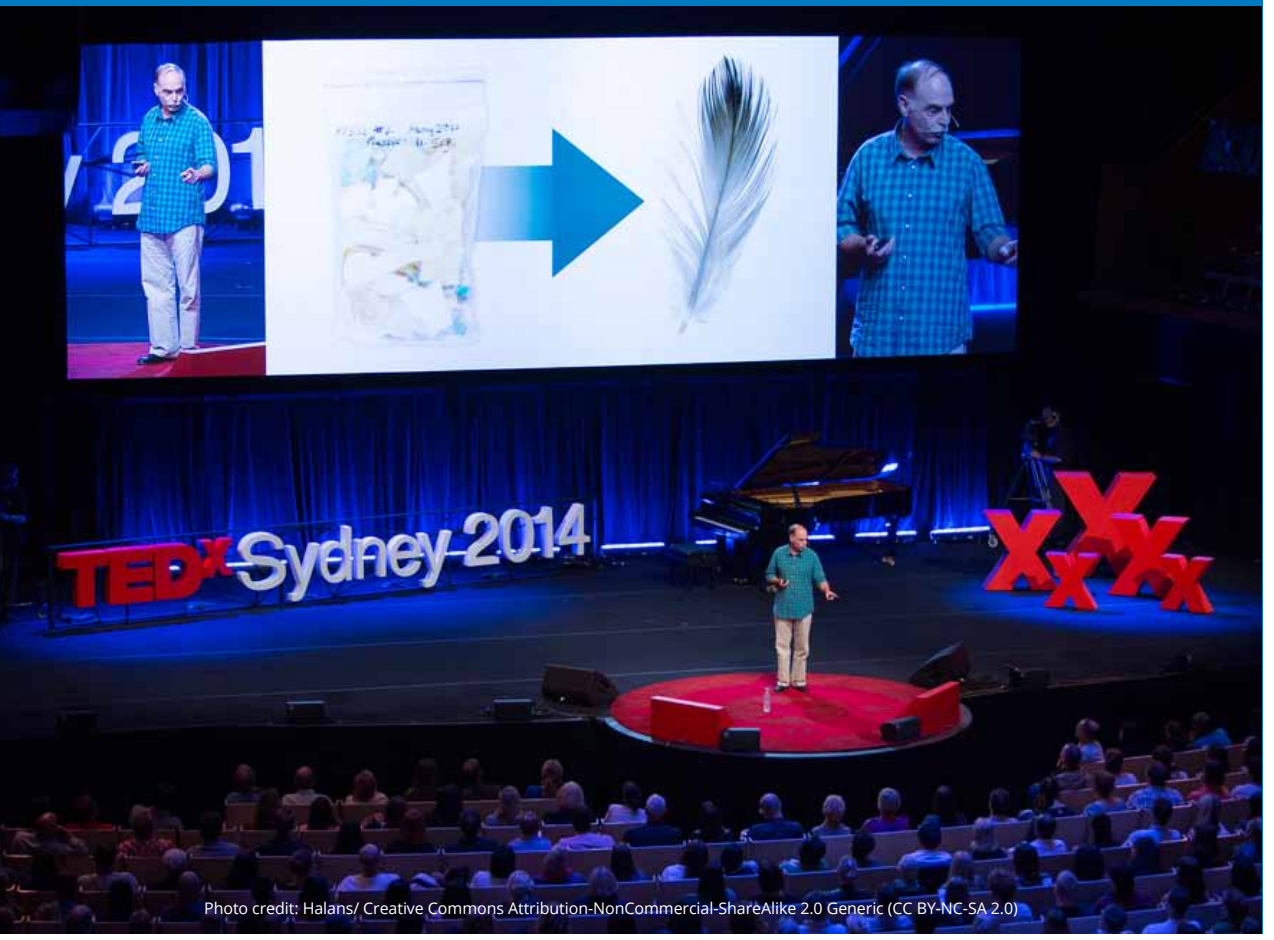


Photo credit: Halans/ Creative Commons Attribution-NonCommercial-ShareAlike 2.0 Generic (CC BY-NC-SA 2.0)

2013-14 HIGHLIGHTS

Imaging and Medical Beamline (IMBL)

In July, the then Innovation Minister, Senator the Hon Kim Carr opened a new $25 million Imaging and Medical Beamline (IMBL) at the Australian Synchrotron which enables live imaging at incredibly high resolution inside the human body and is facilitating exciting new research, developing improved diagnostics and treatments.

The new line is the world's widest synchrotron X-ray beam and would lead directly to advances in medical diagnosis and treatment.

This investment in cutting-edge research will pay dividends in a range of areas – most notably in human health. In a first for Australia, the IMBL will enable scientists to take a live, three-dimensional image of a person breathing in unprecedented detail, as well as track the movement of cells through tissues in real time. This has direct clinical application.

It is also envisaged the new line will enable clinicians to develop new treatments, including a new form of radiation therapy that will target tumor cells while sparing healthy tissue.

The transfer line for the imaging and medical beamline delivers a 4 cm x 50 cm x-ray beam to a sample 136 metres from the source.

Childcare centre opening

The KU ANSTO Children's Centre was officially opened in December by ANSTO Board Member Dr Susan Pond, ANSTO CEO Dr Adi Paterson and KU Children's Services CEO Christine Legg.

The architect-designed, purpose-built facility represents the realisation of a vision championed by the ANSTO Board, delivered by a dedicated team of ANSTO executives and brought to life under the direction of KU Children's Services.

This new childcare service is an important part of ANSTO's gender equity program which in part is looking to support young researchers who wish to continue their careers whilst having a family.

The centre provides places for both ANSTO staff and members of the community.

Above: KU Children's Services CEO Christine Legg (left); ANSTO Board member, Susan Pond (fifth from left) and ANSTO CEO Adi Paterson (sixth from left) with ANSTO staff and their children at the opening of the childcare centre. Right: Susan Pond (left), Christine Legg (third from left) and Adi Paterson (third from right) with children and staff in the new centre's playground.

Linking with Australian industry

Mixed solvents to improve rare earth separations

The rare earths are a group of 15 elements that are used in batteries, magnets and light emitting diode (LED) phosphors. They are also essential in environmentally clean and green technologies such as hybrid vehicles and wind turbines. While the rare earths are not actually that rare, they are difficult to separate from each other. Researchers from ANSTO Minerals are investigating ways of improving the current separation process to help meet the increasing global demand for these elements.

In industry, the most commonly used separation technique is called solvent extraction. The rare earths are first dissolved into an acid, and then transferred into an organic solvent. The solvent is a specially chosen, oily liquid that does not mix with the acid. The rare earths are then removed from the solvent into a fresh acid solution. By repeating this process many times over, one element can be enriched with respect to the others.

However, the rare earths' close chemical similarity means that around 1000 of these industrial-scale stages are required for a full separation of all elements. A large amount of relatively expensive acid and alkali is also consumed, and a substantial volume of waste effluent is produced.

ANSTO Minerals are investigating the chemistry of 'synergistic solvents' – mixtures of more than one molecule in the same solvent – for this application. It is hoped that the rare earths can be purified more cost-effectively and with less production of waste using this method.

Development of processes for the recovery of uranium from saline leach liquors

Uranium is extracted from uranium ore via a process called leaching, which uses sulphuric acid as the leaching agent. The presence of chloride in sulphuric acid leach liquors has a detrimental impact on conventional uranium recovery techniques, such as solvent extraction and ion exchange. One way to reduce chloride levels is to limit the recycling of process water, replacing it with clean, fresh water.

This is of concern to many mines, particularly in Australia, where fresh water can be scarce.

ANSTO has recently conducted research into alternative solvent-extraction and ion-exchange processes that are impervious to chloride in the process water. The objective of the research is to provide processing options which use sea water or saline bore water in uranium hydrometallurgical circuits, which would in turn deliver reduced operating costs and positive environmental outcomes.

The results of this research have been encouraging, revealing mixed reagents solvent systems and alternative ion-exchange processes that have the potential to offer solutions and have pointed the way to further investigations.

Marina Fainerman-Melnikova, Karin Soldenhoff, James Quinn, Abigail Wilson and Deborah Wilkins (L-R) are studying alternative ways for extracting uranium from uranium ore

Recovery of uranium as a by-product of phosphoric acid production

Uranium is a valuable resource used worldwide to generate power for millions of people. The uranium present in phosphate rocks and reporting to phosphoric acid during processing is currently not being recovered because the necessary technology is not economically viable.

There is estimated to be up to 25 megatonnes of uranium around the world stored in phosphate, representing an extensive untapped global resource.

ANSTO has partnered with the Uranium technology company Urtek LLC to develop the PhosEnergy® process to recover uranium from phosphoric acid. Uranium recovery in this context is important for the energy sector as well as the agricultural sector, as it provides a means of removing uranium present as an impurity in fertiliser production. The PhosEnergy® process is integrated into phosphoric acid production, resulting in a cleaner phosphoric acid product whilst recovering uranium as a by-product.

The process uses ion-exchange resin technology to concentrate and separate the uranium from the phosphoric acid. The ANSTO team has successfully overcome the technical challenge of improving the effectiveness of the resin used to extract the uranium. Once this was achieved in the laboratory, the process was tested continuously at ANSTO using feed liquors sourced from operating plants worldwide. The process is now well on its way to commercialisation.

Urtek has built and is currently operating a PhosEnergy® demonstration plant in the United States.

Toan Manh Tran, Chris Griffith, Tomasz Safinski and Karin Soldenhoff (L-R) outside the new ANSTO Mineral's main building

Kowari helps improve power turbine blades

Kowari is one of the instruments operated by ANSTO's Bragg Institute. Researchers from the Bragg Institute and their research partners use Kowari and the unique properties of neutrons produced by the OPAL reactor to look at the structural integrity of turbine blades used in power stations.

Neutrons are capable of penetrating deep into materials used in this crucial infrastructure and provide information about materials used in things such as turbines, bridges, pipes and aircraft engines. This information ensures the safety of people using these materials, enables companies to maximise the efficiency of their assets, and provides them with knowledge about the best types of materials to use in future.

Kowari is used for investigations into the structural integrity of large engineering components weighing up to 1000 kilograms and is just one of many instruments operated by the Bragg Institute to help solve scientific and industrial problems.

Developing safer nuclear fuels

ANSTO researchers are part of a major international collaboration developing safer nuclear fuel materials.

Using atomic scale computer simulations, the team replicate how the crystal structure of nuclear fuel (eg. uranium dioxide) and cladding materials (the first barrier between the nuclear fuel and the external environment), behave under extreme conditions including loss of coolant scenarios. These computational models allow for an understanding and predictability not previously possible. The team can effectively show how a fuel and materials will behave in a reactor environment before experimental testing. In theory, the new fuels and materials being

developed and studied can function safely without coolants such as water, gases or molten salts.

Some of the work looks at high-entropy alloys which can be applied as a coating to cladding materials to improve their oxidisation resistance and mechanical behaviour. This is to increase safety if an accident occurs by preventing decomposition and maintaining structural integrity where current materials fail.

ANSTO is collaborating on this project with Westinghouse Nuclear, the University of Technology Sydney, a number of national laboratories and universities in the United States (US) and Imperial College London in the United Kingdom. It has the potential to deliver safer nuclear practices throughout the world.

Researcher Daniel King's work is helping to develop safer nuclear fuels

Supporting Australian health

New research on devices that more accurately diagnose the flu

New devices for the rapid identification and diagnosis of patients suffering from influenza (flu) are increasingly useful for timely and effective treatment.

Although there are existing diagnostic kits that can be used by doctors or in the home and provide a rapid, simple response in the form of a colour change, they have limitations. For example, there are many variables such as age and the duration of the illness, that can lead to varying results. Devices that use new molecular techniques are gaining interest since they combine a rapid electronic read out and the results are not as influenced by variability.

Researchers from ANSTO have been working with scientists from the University of Newcastle upon Tyne and Orla Protein Technologies Ltd in the United Kingdom to assess the molecular structure and assembly processes of a new method for detecting molecules from the influenza virus. The new method involves creating a layer of biomolecules one molecule thick on a gold surface which can then bind nucleoprotein, a protein from the flu virus present in vast numbers in flu patients.

Neutron reflectometry is a technique for measuring the thickness and composition of materials on the nanoscale. Using ANSTO's neutron reflectometer, Platypus, the scientists were able to measure the properties of the engineered biomolecular platform at each stage of its assembly. The measurements confirmed that the 13.5 nm (this is ten thousand times thinner than a sheet of A4 paper) layer spontaneously assembles in a defined direction. Having all of the molecules orientated in the one direction maximises the platform's ability to detect the flu virus and means the devices can be manufactured more easily. The study

also found that the platform specifically binds the influenza A nucleoprotein which confirms the ability to detect proteins from the flu virus.

Understanding how this layer of biomolecules functions will aid in the future design and manufacturing of new devices.

'Micro-plumbing' – the technology of microfluidics

ANSTO's new approach using microfluidic technology may offer faster and more controlled ways to produce radiotracers for medical imaging that could one day lead to Positron Emission Tomography (PET) radiotracer production being made available to a wider field of scientists. This in turn, will provide better biological impacts and improved health outcomes for patients suffering from diseases such as Parkinson's disease.

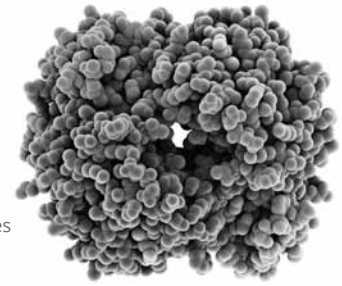
PET is the leading molecular imaging technique for investigating a range of physiological functions, including drug distribution and organ molecular functioning, after a radiotracer has been injected into the body. PET radionuclides tend to have relatively short half-lives. They need to be comparable to the biological half-lives of the physiological processes to image. There is a growing demand for new PET tracer molecules that can be prepared rapidly, and microfluidic technology may help.

Microfluidics is the science and technology dealing with the behaviour, control and manipulation of very small amounts of fluids. It is measured in microlitres. 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 with such small volumes of fluids. Research has already demonstrated the benefits of this technology with [^{18}F]-altanserin, a PET radiotracer which images the serotonin receptor in the brain.

Decreased serotonin is related to several diseases, most notably depression. While [^{18}F]-altanserin can be produced with a 60-70 per cent radiochemical yield in 20 minutes under conventional (vessel-type) chemistry; microfluidic technology allows a similar yield to be produced in 47 seconds using 85 per cent less chemical mass.

Haemoglobin study sheds light on one of the body's most important molecules

Haemoglobin molecules store oxygen in the body, and red blood cells transport this vital storage unit around the body. Haemoglobin is essential for the effective function of our bodies, with haemoglobin deficiencies causing diseases such as anaemia. It is therefore important that we understand how haemoglobin works and what factors affect its function. In this study, researchers look at how haemoglobin molecular operations are optimised, based on body temperature, by comparing haemoglobin function in different animals.



Haemoglobin is essential for the effective functioning of human bodies, with haemoglobin deficiencies causing diseases such as anemia

Chris Garvey and researchers from France and Germany have been working to gain a better understanding of the molecular basis for this optimisation, which involves a complex interplay between structure and the internal flexibility of the structure.

To undertake this study, the researchers selected haemoglobins from species which regulate their body temperature over a range of external conditions, including the platypus, domestic chickens and humans,

and species which do not have a regulated body temperature, including the salt water crocodile.

The researchers discovered that there is a positive correlation between the thermal stability of the environment around these oxygen storage cells (i.e. the protein) and its resilience - shedding light on how haemoglobin may have evolved to carry oxygen best at different body temperatures in different species.

Computer simulations were used to examine which part of the haemoglobin molecule from different species was responsible for the change in the overall softness of the protein.

Having gained a better understanding of haemoglobin function, the next steps are to examine observations in the context of oxygen affinity, or how well haemoglobin molecules hold on to oxygen.

This will be possible with further development of instruments at ANSTO's OPAL research reactor facilities.

Study aids development of antifungal agents

This study investigated the protein coat of a fungal spore called hyrophobin, looking particularly at its ability to self-assemble into a robust surface layer.

Understanding the structure of this fungal spore will be useful for the design of antifungal agents such as antifungal creams or other medications.

This collaborative study between ANSTO, the Universities of Sydney and New South Wales and the Harvard Medical School is the first study of its type and has pointed the way for further exploration of this material and its potential uses.

ANSTO's (L-R) Anthony Duff, Karyn Wilde and Peter Holden in the National Deuteration Facility laboratory

Understanding our environment

Understanding the impact of industrial waste on aquatic ecosystems

Studies on Australian prawn species at ANSTO have aided recent research on the impact of mining on the tropical Strickland River in Papua New Guinea. This collaborative PhD study between CSIRO, ANSTO and RMIT University has provided valuable insight into the bioaccumulation of metals through diet and water.

Prawns were chosen to play this important role because they are one of the only species able to survive in what is one of the naturally murkiest rivers in the world allowing them to act as bio-monitors to identify chemicals in the environment.

Using gamma emitting radioisotopes, researchers were able to trace how much metal was in the prawns while they were still alive and then follow the concentration levels over time and from different sources of metal (i.e. from water or from diet).

The research showed just how complex the river system actually was, but has not demonstrated any negative impact from the mining operations. The levels picked up in the research were all well below health guidelines in terms of prawn consumption and toxicology to the prawns.

Revealing the sources of Sydney's air pollution

There can be few more important issues for humans than the quality of the air that we breathe. Air pollution is made up of countless fine particles that can travel hundreds of kilometres and create serious problems for both the environment and human health.

In recent years, nuclear techniques have been developed to 'fingerprint' pollution, so it can be traced back to its source, across cities and across nations. In short, by using isotopic techniques researchers can identify the origin of the particles in the pollution and its impact on our environment.

By using a combination of techniques including analysing the particles' chemical composition and taking account of meteorological data, ANSTO researchers are able to quantify the effects of air pollution. This information is invaluable for planners when it comes to making decisions that impact on the quality of the air we breathe.

David Cohen and his team have collected fine particles in western Sydney for more than a decade

ANSTO graduate Stephanie Kermode and environmental scientist Henk Heijnis undertaking sediment core testing at Towra Point Nature Reserve, NSW

ANSTO helps protect sensitive wetlands

Wetlands are the nurseries of much of the world's wildlife, and are particularly sensitive to human intrusion.

Wetlands of international significance are protected by an international convention known as RAMSAR (named after the Iranian city the convention was agreed to) – and ANSTO scientists are doing their bit to monitor and provide invaluable information about these sensitive sites.

One such site is the Towra Point Nature Reserve located at the southern end of Botany Bay. Towra Point is Sydney's largest and most diverse wetland environment, containing 60 per cent of the saltmarsh communities in the region and 40 per cent of the region's mangroves. More than 100 species of birds have been identified at the Nature Reserve including 34 species of migratory birds, some of which fly up to 12,000 km from places as far away as Siberia, China and Japan.

ANSTO researchers have examined core samples of sand taken from Towra Point Nature Reserve. By analysing the heavy metals in the sand, the researchers are able to compile a history of pollution and gain an understanding of how best to manage this sensitive site.

Mapping the groundwater resources of Mozambique

Supporting a population similar in size to Australia's, Mozambique is located on the east coast of southern Africa. Following years of civil war, it is considered one of the emerging economies of the region, but access to clean drinking water will be fundamental to the welfare of the people and future prospects of the nation.

Without dams or other infrastructure, groundwater is often the only supply available in many African countries. Most Mozambicans depend on shallow ground water supplies pumped to the surface by hand, so salinity is a matter of considerable concern.

With the support of several funding sources, including UNESCO, researchers from ANSTO are helping to train other researchers in using isotopic and nuclear techniques to trace the movement of water in the region. This information is vital for helping water resource managers make more informed decisions about sustaining the country's water supply.

Without dams or other infrastructure, groundwater is often the only supply available in many African countries including Mozambique which is located on the east coast of southern Africa

Mongolian glaciers reconstruct our climate past to predict our climate future

Mountain glaciers are sensitive climate indicators. Their expansion or retreat mirrors changes in temperature and precipitation, and leave land formations and sediments to help researchers reconstruct past climates.

ANSTO researchers have contributed to the development of a new geological dating method that will help improve models of past climate movements and ultimately help predict future climate changes.

As large glaciers expand and retreat, fresh rock becomes exposed at the Earth's surface. These are bombarded by cosmic rays which in turn produce small amounts of beryllium-10 and aluminium-26 within the quartz minerals in the rocks.

Over time these radionuclides build up so that the older the rock, the greater the isotopic concentration. By 'counting' the atoms using ANSTO's particle accelerator ANTARES, for the first time we can date the geological event that exposed the rocks to cosmic rays. From this we can establish a chronology of past glaciations going back as far as three to four million years and as short as a few thousand.

How marine ecosystems capture carbon

Cutting edge Australian research is helping explain the major role marine and coastal ecosystems play in storing carbon to offset greenhouse gas emissions.

Blue carbon is a concept name for the capture and storage of atmospheric carbon in the marine environment. The concept is that coastal vegetation stores carbon far more effectively and permanently than terrestrial forests and freshwater wetlands, where organic carbon is often re-mineralised and lost to the atmosphere.

Mangrove and saltmarsh are considered the most efficient wetlands for sequestering carbon because the saline conditions inhibit the capacity of methanogenic bacteria which are responsible for methane (greenhouse gas) emissions.

Until now though, there has been limited studies to understand this process. Conducted by ANSTO, the New South Wales Office of Environment and Heritage, Department of Premier and Cabinet, (NSW) and the University of Wollongong, this new study not only helps to explain the potential of these natural phenomena, but it also plays a vital role in promoting the importance of restoration and conservation of coastal vegetation.

Rottnest Island's bore water: a sustainable resource?

ANSTO researchers are studying groundwater on Rottnest Island, Western Australia, to assess the isotopic composition of the water underlying the island. The groundwater is already used during the summer months to supplement the island's other water supplies and this study is looking into whether it can be sustainably used as a resource long term by determining how much groundwater there is and how quickly it is being replenished.

ANSTO's chemical analysis of the water includes measuring the naturally-occurring isotope tritium as an indicator of the water's age. These isotopes are used as they give added information on the history of the water. The studies are able to reveal different rainfall events that the water has been recharged from.

As tritium (or hydrogen-3) has a half-life (time required for it to reduce to half its quantity) of 12 years, groundwater with none of the isotope present would be deemed to be a subterranean resource more than 50 years of age.

If the water contains any measurable tritium, it follows that it has been in contact with the atmosphere within the past 50 years. When the water molecule goes into the ground it undergoes radioactive decay and every 12 years its tritium activity will decrease by half.

Regular sampling and analysis will assist in planning the island's future water needs.

Graduate Eliza Wells (left) and scientist Karina Meredith on site undertaking groundwater testing at Rottnest Island

Operation of key infrastructure

OPAL nuclear research reactor

OPAL continues to consolidate its reputation as one of the world's most reliably available multipurpose research reactors. In the 2013-14 financial year, the OPAL research reactor operated for 294 days at high power. The reactor achieved planned availability of 99 per cent.

OPAL undertook two planned extended shutdowns during the 2013-14 financial year; a two week shutdown in January for scheduled preventive maintenance and a three week shutdown in June for upgrading the Cold Neutron Source control system to support the dependable operation of this important research capability.

Successful production of reactor based radiopharmaceuticals, neutron activation analysis for scientific research, and irradiation of neutron transmutation doped silicon was achieved during the year. The effective delivery of these products and services was progressed through embedding of the integrated planning framework as part of ANSTO's Organisational Excellence program.

An operations improvement strategy for increasing the reliability of the Cold Neutron Source has resulted in the achievement of 95 per cent availability for the 2013-14 financial year and boosted opportunities for Australian scientists and industry in neutron research. The Cold Neutron Source supplies low-energy neutrons for research and facilitates the study of superconductivity, magnetic, and other quantum effects that occur in materials at very low temperatures.

ANSTO has set a 300+ day target in 2014-15 for the safe operation of the OPAL reactor to meet radioisotope supply requirements and sustain high availability for neutron based research. Reactor Operations will continue to implement essential projects including replacement of the Reactor Control and Monitoring System and strengthening the supply security of Mo-99 from OPAL to the current Mo-99 production facility and future Australian Nuclear Medicine facility.

Neutron-beam instruments

ANSTO's Bragg Institute is home to eight operational neutron-beam instruments which use OPAL's neutrons for solving complex research and industrial problems. Neutron scattering allows scientists to see what X-rays cannot. Neutrons are used to see the internal structure of many classes of materials, helping scientists understand why materials have the properties that they do, and helping tailor new materials that suit specific technological needs in computing, refrigeration, mobile batteries, solar cells, renewable plastic packaging, and medicine.

Five additional neutron-scattering instruments were under construction or in various stages of commissioning during 2013-14, three of which were funded under the Australian Government's national Education Investment Fund (EIF).

As part of ANSTO's mission to promote neutron-scattering applications and the training of scientists in the Asia-Pacific region, the Bragg Institute supported and hosted a number of regional scientific activities through the year. In August, the Institute welcomed Dr Yuntao Liu, Director of the Neutron Scattering Laboratory of the China Institute of Atomic Energy (CIAE). The CIAE hosts the new 60-MW China Advanced Research Reactor (CARR), to initiate potential cooperation between our neutron-scattering research groups, exchange ideas on improving the use of neutron texture diffractometers for material research and industrial applications, and management of instrument user communities. ANSTO also hosted two further IAEA-funded visitors, one from the CIAE who undertook six months of intensive hands-on texture-measurement training on the Kowari strain scanner, and another from the SAFARI reactor, South

Africa, who undertook one month of intensive hands-on training on the Quokka small angle neutron scattering (SANS) instrument, both under the auspices of IAEA Fellowships. The institute also engaged in mutual scientific visits to and from Indonesia's National Nuclear Energy Agency (BATAN) Neutron Scattering Laboratory, supported by the Indonesian State Ministry of Research and Technology, to plan and continue joint experiments at our facilities, review the progress of a PhD student from BATAN, and further the collaborative between our neutron-scattering research groups.

Dr Klaus-Dieter Liss spent a year at the SPring-8 X-ray synchrotron on a Japanese Atomic Energy Agency fellowship. Dr Liss was also appointed an Honorary Professor at the University of Wollongong in 2014, partly in recognition of his involvement in training and supervision of PhD students from that university.

During 2013-14, ANSTO hosted a number of significant conferences and workshops aimed at industry and academia, including the 7th International Conference on Mechanical Stress Evaluation by Neutron and Synchrotron Radiation and the first Workshop on Strain/Stress Scanning and Imaging for Engineering Applications to increase the knowledge and practical skills of regional engineers and researchers in the use of neutron engineering instruments. This latter workshop was organised in conjunction with the Australian Institute of Nuclear Science and Engineering (AINSE) and the National Committee on Applied Mechanics.

Australian Synchrotron

This year, the Australian Synchrotron has continued its trajectory of increasing productivity and breadth of research, adding significant contributions to the health and security of all Australians, and helping to keep Australian industrial and scientific innovation globally competitive.

Numerous ground-breaking discoveries and insights were realised, with particular benefits for the nation's health, agricultural and industrial sectors, across more than 4340 researcher visits and over 820 experiments.

ANSTO's Bragg Institute is home to eight operational neutron-beam instruments including the high-resolution powder diffractometer Echidna, pictured above with scientist Vanessa Peterson

Scientific papers appeared in the world's leading journals such as *Nature, Science and Cell*, with more than 440 published with the support of the Australian Synchrotron and its scientific staff.

Many users bring close connections with industry to their Synchrotron experiments, and the facility has a strong track record supporting Australian businesses ranging from small to medium-sized enterprises (SMEs) to the minerals sector, as well as global corporations, particularly in the pharmaceuticals sector. The facility has established an independent industry scientific support team to bolster the efficiency and efficacy of our direct industry engagement. Clients this year include Hospira – the world's leading provider of injectable drugs and infusion technologies, Aqua Diagnostic Pty Ltd - a SME about to venture into the global market, and BHP Billiton.

T-cell activation in the gut, by transitory antigens

Research highlights for 2013-14 include:

Trigger for coeliac disease

An Australian and Dutch research team used the Synchrotron to discover the 'trigger' for coeliac disease, a debilitating condition that affects one in 70 Australians. The team is now working with a US biotechnology company to develop a therapeutic vaccine and a blood test.

Human immunity secret unlocked

A world class Australian-led international collaborative research team used the Synchrotron to help unlock a secret about the front line of the human immune system, through imaging of the complex molecular interactions in the gut that help us fight disease. The patented and ground-breaking work, published in *Nature*, will likely lead to new ways of diagnosing and treating chronic inflammatory diseases, peptic ulcers and even tuberculosis. It could also lead to novel protective vaccines.

World first milk study

For the first time, scientists have been able to observe at the nanoscale, the highly geometrical order and structure of milk during digestion, using synchrotron techniques. The work will likely pave the way for the development of new milk products for premature babies, novel nutrient fortification techniques and potential drug delivery mechanisms.

Research at the Australian Synchrotron could lead to new milk varieties to overcome milk intolerances

Plant immunity

Using the Synchrotron, researchers revealed details of the mechanism some plants use to activate their immune responses to two bacterial pathogens that can cause devastating diseases in kiwifruit, potato and tomato crops. This breakthrough may mean better crop yields, and could improve understanding of the human immune system.

Radiopharmaceutical production

Each week ANSTO Health delivers 10,000 patient doses of potentially lifesaving nuclear medicines to over 250 partner hospitals and medical practices across Australia. These nuclear medicines, which can only be produced in a research reactor such as ANSTO's state-of-the-art OPAL reactor, are used to diagnose and treat a wide range of illnesses such as cardiac conditions and cancer.

ANSTO's Mo-99 processing facility recovers, separates and purifies the Mo-99 from uranium targets irradiated in OPAL to meet the demand for this important radiopharmaceutical. This product is exported to Southeast Asia, the USA and South Africa. The other radiopharmaceuticals distributed to over 220 nuclear medicine centres across Australia and New Zealand are iodine-131 (I-131) for the diagnosis and treatment of thyroid cancer and hyperthyroidism; gallium-67 (Ga-67) to determine the extent of Hodgkin's disease, lymphomas and bronchogenic carcinoma; and iodine-123 mIBG (I-123) for detection, staging and follow-up to therapy for neuroblastomas. The OPAL reactor provides a consistently reliable supply of radiopharmaceuticals for Australians.

Accelerators

ANSTO leads the region in accelerator-based research, operating a well-established platform based around ANSTO's accelerators, support facilities, and in-house expertise. The Centre for Accelerator Science (CAS) at Lucas Heights will offer a suite of four accelerators which is unique in the region. The combination of capabilities offered by the ANTARES, STAR, VEGA and SIRIUS accelerators affords ANSTO and its external users, access to a suite of tools in one location that are more advanced and offer more sophisticated solutions.

In 2013-14 the CAS came to life with the completion of the new, Education Investment Fund (EIF) funded accelerator facilities including, facilities for accelerators and accelerator mass spectrometry (AMS), ultra-sensitive isotopic tracing laboratories, and the installation and operation of the 1 MV low-energy multi-isotope accelerator mass spectrometer, VEGA. The Centre will be completed in December 2014, with the commissioning of the 6 MV medium-energy tandem accelerator, SIRIUS.

The breadth of accelerator-based research in Australia is now quite broad, extending across isotopic dating, air pollution, climate science, modification of materials for future nuclear reactors, radiation damage studies, forensic science, nuclear detector characterisation, and micro-biological studies.

CAS provides for Australia's and the region's accelerator-based research needs well into the future – conducted through the IAEA Regional Collaborative Agreement (RCA), global Co-operative Research Projects (CRPs) and bilateral partnerships with countries across Europe and within the Asian region such as such as Vietnam, Philippines, and Indonesia.

The National Deuteration Facility

ANSTO's National Deuteration Facility (NDF) produces molecules where hydrogen is in the form of the non-radioactive isotope deuterium. This enables scientists to use neutron scattering techniques at the OPAL reactor and Nuclear Magnetic Resonance (NMR) at Australian universities more effectively in previously impossible investigations of the structure of medically and environmentally relevant proteins and biomolecules, synthetic polymers, or other nanotechnology- or biotechnology-based materials.

This year, the NDF produced more than 61 deuterated molecules and supported more than 83 scientific users. NDF impact and demand continued to grow with new collaborators arriving from 29 Australian and international research organisations and universities, such as the Group of Eight (Go8) Australian Universities, Walter and Eliza Hall Institute, Imperial College London, Harvard Medical School and University of Cambridge.

Some research highlights that utilised deuterated molecules and neutron scattering included:

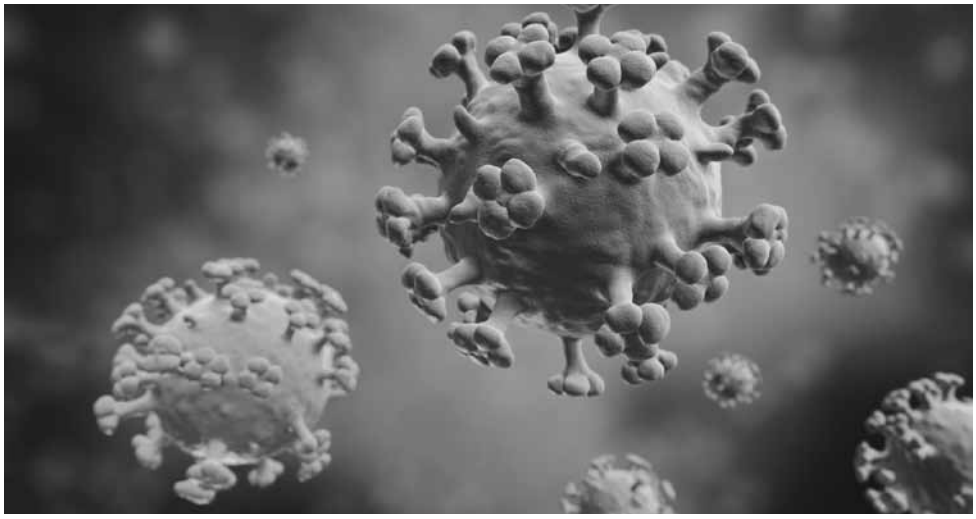
- Demonstrating a new mechanism for the contraction and expansion of some new nanoporous metal-organic frameworks that are used to store hydrogen gas – a fuel for the future energy economy.
- Investigating of the structural properties of anti-cancer and anti-bacterial compounds from milk.
- Probing the diffusion of chemicals in thin film organic light emitting diodes (OLEDs) which effects the stability of these devices which already are beginning to replace conventional electronic components in digital display screens (e.g. in mobile phones).
- Demonstrating a new tool for understanding the behaviour of environmentally friendly plastics in blends suitable for biomedical tissue engineering applications
- Revealing the location and role of sugars in protecting biological membranes during freezing and dehydration events, enabling better storage of living materials such as seed banks.
- Investigating portable nanotech thin film sensors for explosive vapours to optimise security at Australia's airports and other strategic assets.

The NDF also continued to receive increasing interest from research communities beyond neutron scattering. Our labelled molecules were used together with other techniques such as nuclear magnetic resonance, infrared, and mass spectroscopy, to investigate processes such as human digestion of lipids and trigylcerides to unravel key questions relating fat nutrition to health, the dynamics and interactions of gelating compounds used to create gels for drug delivery to human cells, and the structure of amyloid proteins implicated in resistance of fungi to antibiotics.

Irradiation facilities

ANSTO operates a range of cobalt-60 irradiators for small-scale irradiation of a wide range of products. ANSTO is the only Australian provider of high-precision irradiation services including:

- Underpinning the sterility of donated human bone and tendons for transplants and grafting in surgery, leading to improved outcomes for patients
- Irradiation of the Queensland fruit fly to help control infestations
- Food irradiation research as an alternative to pesticide use for postharvest treatments to improve export market access. ANSTO supports



ANSTO's irradiation facilities are being used to develop a universal flu vaccine

investigations into food quality, nutritional and other effects for various fruits and vegetables.

- The development of a universal influenza vaccine using ionising radiation to inactivate the virus
- Irradiation of quarantined goods
- Plant mutation studies
- Sterilisation of medical products
- Accelerating long-term radiation damage to plastics and electronics
- Assisting researchers at universities in developing meta-materials for multifunction applications.

Highlights of the year included:

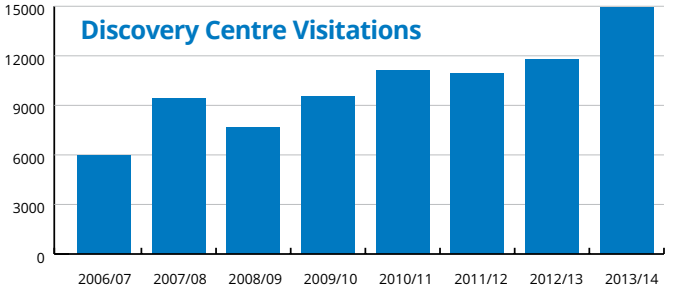
- ANSTO's highly skilled team at the Gamma Technology Research Irradiator (GATRI) facility assisted the Institute for Frontier Materials at Deakin University develop a new, highly efficient method of preparing porous and reduced graphene oxide for their potential applications in sensing, energy storage, membrane separation, biological sequencing, composite materials and nano-electronics. Utilising the high precision irradiation facility at ANSTO to carefully vary the amount of irradiation, the team was able to find a dose which increased the surface porosity to 33.5 per cent - the largest GO surface porosity reported to date.
- Irradiation is used as safe and reliable phytosanitary treatment on agricultural commodities for market access instead of pesticides. Food Standards Australia New Zealand (FSANZ), the body granting food safety approval for irradiation as a technique for pest disinfestation of many fresh tropical fruits requires data on the effects of irradiation on nutritional levels and fruit quality. A collaboration between ANSTO and NSW Department of Primary Industries studied the effects of gamma irradiation on passionfruit, blueberries and raspberries at a range of low precision doses to gain critical information for submissions to FSANZ. Results of irradiated commodities showed no significant differences in nutritional and quality during storage, demonstrating irradiation as a viable technique for phytosanitary treatments.

Community and education

The tours are one of the most powerful communication tools for shifting public opinion about ANSTO. Combined with greater community outreach, the tours help ensure the community understands the benefits that ANSTO delivers.

Supported by a comprehensive marketing and communications campaign, a record number of 14,937 visitors participated in free guided tours of ANSTO's Lucas Height facilities. This represents a 27 per cent increase on the previous year and a doubling on the number of visitations from six years ago.

Kids attending ANSTO's popular Easter egg and Halloween Science Workshops for Kids. The workshops introduce children to science in a fun yet educational format



Other highlights of the 2013-14 financial year include:

- The Fact or Fiction show was held in Adelaide, Canberra, Bathurst and Albury, with over 3,500 people attending the events.
  The Fact or Fiction concept will be expanded in 2014-2015 with regular social media content and more Fact or Fiction surveys accompanying the shows
- The very popular school holiday Science Workshops for Kids continued to build awareness and goodwill for the organisation
- The year saw an increase in engagement with local schools with over 60 schools receiving the ANSTO Science Award for their top science student, and schools were provided with an ANSTO branded periodic table for all Year 9 students
- ANSTO's education programs reach was expanded via videoconferencing with schools who participated in a virtual radiation experiment and talk with ANSTO scientists
- A suite of educational materials were provided to the IAEA for sharing with other countries.

ANSTO's General Manager, Government International and External Relations, Nadia Levin, presenting a student prize at the Operation Art Program

Sponsorship and events

ANSTO's sponsorships and events target our many important stakeholders from the local community, to universities and other research organisations, schools, and our government stakeholders. ANSTO uses sponsorship and event opportunities to actively engage and inform these stakeholders about the role ANSTO plays in contributing to health, environment and industry.

ANSTO continued its involvement with the Australian Museum Eureka Prizes through the ANSTO Eureka Prize for Innovative Use of Technology, awarded in 2013 to the Zebedee Team at the CSIRO for developing a device that is able to survey enclosed spaces where GPS cannot reach, such as inside caves, mines, factories and public buildings, or beneath forest canopies.

ANSTO again supported programs that highlight the role ANSTO plays in supporting health, including Operation Art, a program by the Children's Hospital at Westmead and the New South Wales' Department of Education and Communities inviting all schools from around the state to submit artwork for display in hospitals. The best works are displayed at the Art Gallery of New South Wales.

ANSTO's sponsorship of a number of local community events provided opportunities to engage with the local community including at the Sutherland Shire Australia Day celebrations; Endless Summer event at Cronulla; the Sutherland Shire Relay For Life; Sutherland to Surf fun run and the Cook Classic.

ANSTO also supported a number of industry events such as the Innovation Series events; Science meets Parliament and the Australian Academy of Technological Sciences and Engineering's (ATSE) Clunies Ross Awards.

Education activities remained a focus including sponsoring the Synchrotron and Neutron New User Symposium; the Australian Museum Science Festival; the National Youth Science Forum (NYSF), and support for the Engadine High School's F1 in Schools project.

ANSTO also engaged with the scientific audience of potential users and collaborators by supporting selected Australian and international conferences and workshops including the 29th Biennial Conference of the Society of Crystallographers in Australia and New Zealand (Queensland); Third International Workshop on Studying Kinetics with Neutrons (France); American Conference on Neutron Scattering (US), AusIMM International Uranium Conference (Perth); Nuclear Security Summit (Netherlands); and the CRC conference – Innovation with Asia 2014 (Perth).

Businesses

Despite a continued tough financial climate, external earnings by ANSTO's business and commercial groups improved on the previous year with revenue amounting to $62.6 million achieved in 2013-14.

ANSTO Health

ANSTO Health is the commercial division of ANSTO that produces radiopharmaceuticals in Australia and operates a production facility from ANSTO's southern Sydney campus. ANSTO Health plays an important role in the nuclear medicine and health industries in Australia, supplying 10,000 patient doses of potentially lifesaving nuclear medicines each week.

The ANSTO Health business continues to grow. ANSTO Health's revenue earning increased by 17.2 per cent on the previous year.

The ANSTO designed GenTech Generator and clinician

Export Low Enriched Uranium Mo-99

The Mo-99 produced by ANSTO uses Low-Enriched Uranium LEU as both the starter material and the fuel for OPAL, consistent with ANSTO's support of non-proliferation. In 2011-12, after meeting Australia's Mo-99 requirements, ANSTO Health exported the product to the US, Japan, China and Korea. During April and May ANSTO played a critical role in providing Mo-99 to US suppliers, while the Canadian reactor was unavailable due to an extended planned shutdown. Support from ANSTO was critical to ensure important diagnostic imaging was maintained for the US health system.

PETNET

PETNET Australia Pty Ltd (trading as PETNET Solutions), is a wholly owned subsidiary of ANSTO, which 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 and continues to hold a strong market share based on its value proposition of reliable supply of quality product.

PETNET's revenue earnings for 2013-14 continue to increase in line with the forecast revenues.

Neutron transmutation doping (NTD) silicon

ANSTO Silicon revenue earnings for 2013-14 were very strong. This is a result of the continued focus on a well-defined value proposition, and represents a significant growth over the prior year.

ANSTO remains the leading provider of NTD silicon irradiation services globally.

ANSTO Silicon continued to grow its market share by delivering high quality consistent irradiation of silicon ingots that are used 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.

ANSTO Minerals

ANSTO Minerals provides consultancy 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. New process ideas 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 distinctive mix of facilities to allow scale up of a range of unit operations including roasting, leaching, solid/liquid separation, multi-stage solvent extraction, ion exchange and precipitation. The Minerals facility precinct is well placed to cater for such activities at both a mini-plant or a larger, fully integrated pilot/demonstration plant scale.

ANSTO Minerals revenue earnings for 2013-14 were lower than the previous year, reflecting the market challenges in this area. ANSTO Minerals continues to play a critical role in a market that continues to experience high levels of uncertainty.

External radiation services

ANSTO is the leading provider of radiation protection services and advice in Australia. ANSTO has practical expertise in almost all facets of radiation safety and dealing with radioactive materials. Services are tailored to client requirements. They include radiation safety training, radiation protection advice, measurement and management plan development and reviews, radiation instrument calibration, systems safety and reliability consultancy.

ANSTO offers a hands-on radiation safety training service

ANSTO also provides services and advice in high-dose irradiation and high-dose dosimetry for scientific research and the provision of irradiation services to health care, agriculture and industry clients.

International engagement

Nuclear Industry Summit 2014

The international Nuclear Industry Summit 2014 was an official satellite event to the Nuclear Security Summit 2014. Held in Amsterdam in March, the Industry Summit was attended by the CEOs of all major international nuclear companies and reached significant agreement on measures to further protect security-sensitive nuclear and other radioactive materials, including in the areas of security culture and cyber-security.

Adi Paterson chaired an international working group, which developed a consensus report on 'Managing Materials of Concern', specifically Highly Enriched Uranium (HEU) used in the civilian domain and high-activity radioactive sources. The report encourages broader implementation of international programs to research and develop new technologies that do not require HEU fuels for reactor operation or HEU targets for radioisotope production, and greater effort in ensuring the safe and secure management of disused radioactive sources.

Adi raised awareness of the non-proliferation aspects of medical isotope production and in particular ANSTO's success in producing the critical nuclear medicine molybdenum-99, using LEU as well as the security challenges involved in the long-term management of spent fuel and radioactive waste.

International Conference on Nuclear Security

Held in Vienna in July, the IAEA's International Conference on Nuclear Security was attended by some 1300 participants from 125 IAEA Member States. A number of ANSTO experts delivered presentations on a range of nuclear security issues including nuclear security culture, the security of radioactive sources and the detection of smuggled radioactive materials.

GICNT Tiger Reef

In February, during the lead-up to the 2014 Nuclear Security Summit, Malaysia hosted a Global Initiative to Combat Nuclear Terrorism (GICNT) cross-disciplinary training workshop and tabletop exercise in Kuala Lumpur called 'Tiger Reef'. ANSTO played a pivotal role in its development and conduct. The activity was attended by 100 participants from 21 countries and brought together representatives of different agencies that would work together in the event of a nuclear security incident. The exercise focused on the importance of coordination of radioactive crime scene management and nuclear forensics.

Safety and Security of Radioactive Sources

In October, an international conference on the safety and security of radioactive sources in Abu Dhabi, United Arab Emirates, celebrated the achievements of the last 15 years in strengthening controls over radioactive sources; identified means to maintain the highest level of safety and security throughout source life cycle, from manufacture to disposal; and identified the challenges still to be met – which include management of disused sources.

In February, the fourth regional review meeting on radioactive source security was hosted by the Thailand Office of Atoms for Peace in Phuket. Representatives of South and South East Asian countries including Australia, Bangladesh, Cambodia, Indonesia, Laos, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam discussed the implementation of, and future plans for, radioactive source security in the region. There were important discussions on the role of threat assessment in source security programs, and on the interplay between radiation regulators and national security agencies. It was recognised that ANSTO, through the former Regional Security of Radioactive Sources project, has significantly contributed to the impressive progress on source security in the region over the last decade, but that national radioactive source security programs must aim to become sustainable over the mid- to long-term in the absence of such international assistance programs.

RCA and FNCA

ANSTO's engagement in multilateral agreements and fora such as the Regional Cooperative Agreement (RCA) and the Forum for Nuclear Cooperation in Asia (FNCA) provides significant outreach into the region. ANSTO scientists contribute to the RCA and FNCA programs, as demonstrated by our active participation in ten current technical cooperation projects. This year ANSTO has taken on the leadership of an RCA project investigating the use of nuclear and isotopic techniques to measure the impact of land-use practices on land degradation

IAEA General Conference

A highlight for the year was the invitation to ANSTO's Richard Banati and Catherine Chagué-Goff to speak at the prestigious Scientific Forum held in Vienna during the annual IAEA General Conference in September. The theme of the Scientific Forum was 'The Blue Planet - Nuclear Applications for a Sustainable Marine Environment'. Richard spoke on plastic contaminants in the breast feathers of several migratory bird species that migrate between Japan and Australia, whilst Catherine presented on the applications of

nuclear techniques to the study of storm surges, tsunamis and sea-level rise. The presentations demonstrated ANSTO's breadth and depth of expertise in nuclear science and technology to the international community.

INLEX

ANSTO continued to chair the International Expert Group on Nuclear Liability (INLEX), which provides a forum to advise the IAEA on issues related to nuclear liability. In March, INLEX held a regional workshop on nuclear liability in Vietnam. The East Asian region is the fastest growing region for nuclear power in the world, and the 2011 Fukushima accident has refocused attention on nuclear liability issues. Participants in the workshop evinced strong interest in the global nuclear liability conventions.

BATAN

ANSTO continues to forge strong links with Indonesia, in particular with Indonesia's National Nuclear Energy Agency (BATAN) under a long-standing memorandum of understanding (MOU). In November-December ANSTO hosted six visitors from BATAN, funded by Indonesia's Ministry of Research and Technology to pave the way for the initiation of the four collaborative projects. Research topics cover battery development, targeted drug and vaccine development, water quality management, and improving the application of Ion Beam Analysis and Neutron Activation Analysis. This year ANSTO initiated a new project with BATAN to share knowledge on nuclear forensic response to nuclear security events. This project is partly funded by the Department of Foreign Affairs and Trade (DFAT) Australia-Indonesia Security Cooperation Program. The first workshop held in Jakarta in June was enthusiastically received by the BATAN Chairman and senior managers.

KONICOF

ANSTO entered into a MOU for cooperation in nuclear human resource development with the Korea Nuclear International Cooperation Foundation (KONICOF). KONICOF is a Korean Government supported organisation which brings together the various bodies involved in the Korean nuclear sector to promote international nuclear cooperation, particularly in terms of professional development. Three interns sponsored by KONICOF undertook three month placements at ANSTO, working in areas associated with neutron beam science, materials science and environmental monitoring.

Partnerships and associations

Asia Oceania Forum for Synchrotron Radiation Research

The Asia Oceania Forum for Synchrotron Radiation Research (AOFSRR) is an association of all synchrotron operating and user nations in the Asian region. Its mission is to strengthen regional cooperation in, and to promote the advancement of, synchrotron radiation 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 financial manager of the AOFSRR, to facilitate the payment of membership fees by the eight full member nations.

Australian Collaboration for Accelerator Science

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

Accelerator science underpins a wide range of modern research and technology, and is a key competency for ANSTO with its operation of the Centre for Accelerator Science, the Australian Synchrotron, and its maintenance of international relationships with overseas accelerator laboratories such as CERN and the Shanghai Institute of Applied Physics (SINAP).

The mission of ACAS is to grow accelerator science activities in Australia, and to link with major international accelerator centres. To date, the main activity has been collaborative research with CERN, and with the Japanese free-electron laser facility at SPring-8 (more detail below). ANSTO provides administrative support and some funding to ACAS.

Australian Institute of Nuclear Science and Engineering

The Australian Institute of Nuclear Science and Engineering (AINSE) provides a platform for training and cooperation in the nuclear science and engineering fields. Its membership comprises 46 Australian and New Zealand universities and science organisations, including ANSTO, making it one of few scientific institutions with such a wide membership. AINSE facilitates access to ANSTO and other associated nuclear capabilities through research grants, fellowships and support for conferences and workshops.

CERN

ANSTO has a formal agreement with the European Organization for Nuclear Research (CERN) which allows scientists affiliated with each organisation to collaborate and receive reciprocal use of equipment. This means scientists from CERN benefit from access to ANSTO's facilities, including the OPAL reactor.

The agreement is laying a pathway for collaborative research by Australia's best and brightest scientists in areas such as 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.

The collaboration also involves the joint supervision of research students, staff exchanges and negotiated arrangements for the exploitation of intellectual property.

Cooperative Research Centre for Polymers

Cooperative Research Centre for
Polymers
Solutions for a better world

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

The initiative features a novel degradable plastic film that Greening Australia and the Birchip Cropping Group have shown can dramatically improve the re-establishment of native woodlands.

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

Polymers include plastics, and more than $9 billion worth of polymers and polymer-based products are used annually in almost all sectors of the Australian economy. The CRC-P has a strong track record of developing technologies for the plastics industry, including ceramifying polymer technology, first used in 2003 by Australia's Olex Cables in a new range of fire performance cables.

In the current period of funding the CRC-P will help Australian manufacturers develop new products through clever chemistry and strong industry collaboration.

Defence Science and Technology Organisation

Australian Government
Department of Defence
Defence Science and Technology Organisation

ANSTO and the Defence Science and Technology Organisation (DSTO) signed a new partnership agreement in 2013 that covers a number of joint activities and projects including a whole of government Radiological and Nuclear Gamma Spectrum Database that will enable Australian emergency services and federal and state law enforcement agencies to more rapidly identify and deal with suspect objects. The database will hold measurements of gamma ray signatures emitted by nuclear and other radioactive materials, and the information will be made available to first responders and other national security agencies. This is a risk mitigating approach and provides better protection for emergency services and, overall, will provide a safer Australia.

Japanese SPring-8 Centre

SPring-8

ANSTO has a Memorandum of Understanding (MOU) with the Japanese SPring-8 Centre that gives Australian scientists access to its world leading photon science facility – the SPring-8 Angstrom Compact free-electron Laser.

The MoU was signed in 2011 by ANSTO on behalf of the Australian Collaboration for Accelerator Science (ACAS), meaning the benefits are extending to ANSTO's ACAS partners which are Melbourne University, the Australian National University and the Australian Synchrotron.

The agreement has opened up opportunities for collaboration amongst Australian and overseas scientists to undertake reciprocal visits and facilitate greater cooperation. The MOU was renewed for a further five years in 2014.

Ludwig Institute for Cancer Research and Austin Health

LUDWIG INSTITUTE FOR CANCER RESEARCH

ANSTO's partnership with the Ludwig Institute for Cancer Research and Austin Health established a state-of-the-art Positron Emission Tomography (PET) Solid Targetry Laboratory at the Austin Hospital.

The lab is enabling researchers from the three organisations to pursue vital 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 suitable for radiolabelling of biomolecules for research and clinical imaging applications.

In addition, the partnership is encouraging knowledge transfer between ANSTO, Ludwig Institute for Cancer Research, Austin Hospital staff, and the Australian scientific community.

This improved training 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 provides joint funding for a senior level research appointment in the University's Department of Earth and Planetary Sciences. The appointee is helping lead work to replicate environments located 400 kilometres beneath the earth's surface: specifically a layer called the upper mantle, which is the source of most magma or molten rock beneath the surface. This research makes complimentary use of the Bragg Institute's neutron beam instruments and high energy X-rays at the Australian Synchrotron. The team is commissioning a high pressure sample press at the synchrotron, which was partly funded by a successful Linkage, Infrastructure, Equipment and Facilities (LIEF) proposal in 2012.

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.

Monash University

ANSTO's formal agreement with Monash University is helping facilitate knowledge sharing and creating new training and development opportunities for researchers from both organisations. In particular, the common research areas of biomedical imaging, cancer therapy, accelerator science and neutron science are benefiting from the agreement.

One additional area of collaboration is education. Monash University and ANSTO are involved in joint projects such as the annual 'Synchrotron, Accelerator and Neutron New User Symposium' together with other partners.

ANSTO, including the Australian Synchrotron, and Monash took part in a retreat in March to develop medium and long term strategic roadmaps for the collaboration. ANSTO and Monash have also jointly provided seed funding to seven collaborative research projects involving researchers from Monash, every ANSTO research institute and the Australian Synchrotron.

Shanghai Institute for Applied Physics (SINAP)

ANSTO and SINAP signed a research collaboration MOU in 2012, as part of an ongoing program to recognise and enhance the mutual research links between two of the region's key nuclear science and technology organisations.

A significant early result of this collaboration was the announcement, also in December, of the ANSTO-SINAP Joint Materials Research Centre, one of six joint research centres being established under the Australia-China Science and Research Fund. The Centre is working on characterising materials for the Thorium Molten Salt Reactor project being undertaken by SINAP.

The third ANSTO-SINAP workshop was hosted by SINAP in Shanghai in December 2013. The Joint Materials Research Centre work was the major theme of this workshop, which also included updates on the TMSR project and discussion of additional collaboration opportunities between ANSTO and SINAP.

The ANSTO Joint Research Centre team travelled to Shanghai for an extended visit in June 2014 to work directly with SINAP researchers and to participate in a progress review of the Centre.

University of NSW

A collaboration between ANSTO, the University of NSW (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.

The 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 featured 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 of Sydney to undertake research using OPAL and, in return, ANSTO has access to experts and scientific facilities at the University, which ranks among the best research institutions in the world.

The MOU also ensures that representatives of both organisations meet regularly to consider opportunities for joint research and the sharing of facilities.

One key area of collaboration is between ANSTO and the University's Brain and Mind Research Institute for research and educational purposes. The dedicated medical research cyclotron and radiochemistry facility form part of the National Imaging Facility (NIF) network.

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. Molecular imaging plays an important role in unravelling the molecular mechanisms of disease.

Staff achievements

2013 Eureka Prizes

In September, Professor Lyndon Edwards and Michael Saleh from ANSTO's Institute of Materials Engineering were recognised for their role in helping to keep Australian troops safe as part of a team working in the Armour Applications Program, including representatives from defence contractors Thales Australia, armour manufacturers Bluescope Steel, the University of Wollongong and Swinburne University of Technology. It was the first time researchers from ANSTO have won a Eureka award.

TEDx Sydney presentation

In April, ANSTO's Professor Richard Banati presented at TEDx Sydney on his research on the feathers of sea birds, how our shift to using recycled plastic may have resulted in ocean pollution on a nano scale and how nuclear techniques can be used to trace plastic in the biosphere.

The event, which took place at the Sydney Opera House, featured 16 Australians who 'aim to change the world' with thought provoking ideas and inspiring personal stories. Richard is the first ANSTO speaker to present at a TEDx event.

NSW Tall Poppies Award

Dr Vanessa Peterson was awarded a NSW Young Tall Poppy Science Awards. The awards, run by the Australian Institute of Policy and Science, are designed to celebrate Australian scientific excellence and encourage young people to get involved with science.

Dr Peterson from ANSTO's Bragg Institute, researches how materials work at the atomic scale, using neutron scattering to reveal the motions and arrangements of atoms that otherwise cannot be seen. Her work on improving cement has led her to carbon-free energy materials, and she currently leads a group researching materials in "energy technologies" such as batteries that power laptop computers and phones.

Women in Mining

ANSTO Board member, Ms Erica Smyth was named as one of the world's top 100 inspirational women in mining by the United Kingdom's Women in Mining group, a non-profit organisation that aims to promote the value women bring to the minerals sector. Twenty-nine Australian women made the list from a diverse range of occupations and interests.

Lindau Nobel Laureate Meeting

Two young ANSTO scientists attended the 63rd and 64th Lindau Nobel Laureate Meeting's held in Lindau, Germany. Radiochemist, Anwen Krause-Heuer attended in 2013 and PhD student, Catriona Wimberley in 2014, joining 600 young researchers and scientists from 80 different countries. Both were selected for the honour following a grueling selection process and joined several other talented Australians to be recognised as stars of tomorrow in their field. Held annually in Germany since 1951, the meetings introduce Nobel Prize winners in chemistry, physiology, medicine and physics to younger generation scientists.

Radiochemist, Anwen Krause-Heuer (left) attended the 2013 Lindau Nobel Laureate Meeting's held in Germany

2014 Paul Phelps Continuing Education Grant

Two of ANSTO's early career researchers were awarded the prestigious 2014 Paul Phelps Continuing Education Grant for their work in the Wollongong University Centre for Medical Radiation Physics (CMRP)/ANSTO collaborative research project. Thuy Linh Tran and Jeremy Davis will travel to Paris in July 2014 to receive their awards. They were selected from 50 applicants world-wide and this achievement is particularly significant given there are only three awards on offer, which reflects the quality of research and the amount of effort the recipients invested in their work.

Capital investment

Neutron Beam Expansion Program

The Neutron Beam Expansion Program is one of ANSTO's largest engineering construction programs which, when completed, will significantly enhance the OPAL research reactor's neutron science research capabilities. It will provide various university, government and industry-based user groups with new world-class facilities for investigating the structure and dynamics of condensed matter, with particular emphasis on the areas of nano-science, soft matter dynamics and biology, which are key areas for future technological and industrial development in Australia.

ANSTO's existing neutron guide hall (pictured) will be significantly enhanced by the Neutron Beam Expansion Program

Electron Microscope Building

The Electron Microscopy Building will provide world-class facilities for research and innovation in nuclear science and technology by providing a dedicated building to house ANSTO's current and future suite of electron microscopes in a stand-alone location. This new facility will enable ANSTO to conduct world class nuclear materials and radiation research. It will also advance ANSTO's research into the behaviour of materials in extreme environments, including high temperature, stress and radiation conditions which are encountered in advanced power generation systems such as supercritical steam, Generation IV and fusion nuclear power generation plants as well as future innovative radioactive waste systems.

Lu-177 Production Suite Project

The new Lu-177 production suite hot cells

The Lutetium-177 (Lu-177) Production Suite Project will provide ANSTO Health with the capabilities to manufacture the radiopharmaceutical Lu-177. Lu-177 is used in the treatment of a variety of cancers, in particular for the treatment of neuroendocrine tumours which it is estimated 35 in every 100,000 Australians are living with. This radioisotope is currently only available to Australian patients through import and is undergoing evaluation as part of clinical trials.

The main components of the project are a refurbished manufacturing zone within an existing building to house the production

The new ANSTO Health building

equipment, a purpose built hot cell line and specialised process equipment supplied predominantly by ITG. The plant design represents an evolution and improvement on the ITG plant, with engineering contributions from ANSTO and joint development with vendors to achieve this.

ANSTO Health GenTech Storage and Washing Area and Waste Handling and Storage Area Project

The GenTech Storage and Washing Area and Waste handling and Storage major capital project comprises a significant extension to ANSTO Health's existing Radiopharmaceuticals Processing Facility building. The extension facilitates two distinct and functionally separate purposes, specifically a waste handling and storage area to service the existing facilities waste streams and a centralised and semi-automated GenTech storage and washing area for efficient processing of returned GenTech containers.

Intermediate Level Waste (ILW) Return Project

The ILW Program is being undertaken to enable ANSTO to meet Australia's commitments relating to the return of Australia's nuclear waste (HIFAR spent fuel) that has been conditioned in France and the United Kingdom. There are three components to the Program: firstly the construction of an Interim Waste Store (IWS) to accommodate the returned ILW at Lucas Heights, secondly the return of the waste from France, and lastly the return of the waste from the United Kingdom.

PERFORMANCE AGAINST STRATEGIC OBJECTIVES

Key Performance Indicators	2012-13	2013-14
Facility availability		
• Neutron Beam instruments - % days operated per day's beamline availability	**67%**	**72%**
• Total availability of OPAL – % of days at power	**73%**	**97%**
• Planned availability of OPAL - % of actual operating to scheduled operating time	**97%**	**98%**
• Accelerators - average % of days operated per planned operation	**77%**	**79%**
Radiopharmaceutical doses		
• Potential Doses	**2,420,765**	**2,371,654**

Australian National Audit Office

INDEPENDENT AUDITOR'S REPORT

To the Minister for Industry

Report on the Financial Statements

I have audited the accompanying financial statements of the Australian Nuclear Science and Technology Organisation for the year ended 30 June 2014, which comprise: a Statement by the Directors, Chief Executive Officer and Group Chief Financial Officer; the Statement of Comprehensive Income; Statement of Financial Position; Statement of Changes in Equity; Statement of Cash Flows; Schedule of Commitments; Schedule of Contingencies; and Notes to and forming part of the Financial Statements, including a Summary of Significant Accounting Policies and other explanatory information.

Directors' Responsibility for the Financial Statements

The directors of the Australian Nuclear Science and Technology Organisation are responsible for the preparation of the financial statements that give a true and fair view in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997,* including the Australian Accounting Standards, and for such internal control as is necessary to enable the preparation of financial statements that give a true and fair view and 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 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 Australian Nuclear Science and Technology Organisation's preparation of the financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Australian Nuclear Science and Technology Organisation's internal control. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of accounting estimates made by the directors, 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.

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

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.

Opinion

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

(a) have been prepared in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997,* including the Australian Accounting Standards; and

(b) give a true and fair view of the matters required by the Finance Minister's Orders including the Australian Nuclear Science and Technology Organisation's financial position as at 30 June 2014 and its financial performance and cash flows for the year then ended.

Report on Other Legal and Regulatory Requirements

With the exception of PETNET Australia Pty Ltd, Synchrotron Light Source Australia Pty Ltd and ANSTO Nuclear Medicine Pty Ltd, I have not acted as auditor of, or audited, the financial statements of subsidiaries so identified in note 7D to the financial statements. I have audited the financial information of the subsidiaries that is relevant to the consolidated financial statements of ANSTO.

Australian National Audit Office

Kristian Gage

Acting Executive Director

Delegate of the Auditor-General

Canberra

15 August 2014

Statement by Directors 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 2014 are based on properly maintained financial records and give a true and fair view of the matters required by the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997 as amended.*

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 become due and payable.

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

James McDowell
Acting Chairman
15 August 2014

Adi Paterson
Chief Executive Officer
15 August 2014

Peter Arambatzis
Group Chief Financial Officer
15 August 2014

Consolidated statement of comprehensive income for the year ended 30 June 2014

	Notes	Consolidated 2014 $'000	2013 $'000
EXPENSES			
Employee benefits	6A	**142,684**	126,447
Suppliers	6B	**67,380**	55,744
Depreciation and amortisation	6C	**65,873**	65,887
Write down and impairment of assets	6D	**1,701**	2,387
Grants	6E	**3,700**	6,035
Finance costs	6F	**16,795**	14,760
Foreign exchange losses	6G	**2,090**	1,324
Losses from asset sales	6H	**77**	1,410
TOTAL EXPENSES		**300,300**	273,994
LESS:			
OWN-SOURCE INCOME			
Own-source revenue			
Sale of goods and rendering of services	5B	**67,835**	60,358
Interest	5D	**4,081**	3,314
Grants	5C	**27,552**	12,881
Other revenue	5H	**2,282**	685
Total own-source revenue		**101,750**	77,238
Gains			
Gains from sale of assets	5E	**86**	22
Foreign exchange gains	5F	**2,059**	2,264
Reversal of previous asset write-downs and impairments	5G	**-**	5,000
Total gains		**2,145**	7,286
Total Own-source income		**103,895**	84,524
Net cost of services		**196,405**	189,470
Revenue from Government	5A	**163,011**	157,605
(Deficit) before income tax on continuing operations		**(33,394)**	(31,865)
Income tax benefit (expense)	23	**75**	(270)
(Deficit) after income tax on continuing operations		**(33,319)**	(32,135)
(Deficit) after income tax		**(33,319)**	(32,135)
(Deficit) attributable to the Australian Government		**(33,319)**	(32,135)
OTHER COMPREHENSIVE INCOME			
Items that will not be reclassified subsequently to Net cost of Services			
Changes in asset revaluation reserves	10	**23,742**	(87)
Items that may be reclassified subsequently to Net cost of services			
Exchange differences on translation of foreign operations	10	**2**	229
Total other comprehensive income (deficit) after income tax		**23,744**	142
Total comprehensive (deficit) attributable to the Australian Government		**(9,575)**	(31,993)

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

Consolidated balance sheet as at 30 June 2014

	Notes	Consolidated 2014 $'000	Consolidated 2013 $'000
ASSETS			
Financial assets			
Cash and cash equivalents	7A, 21	**3,782**	3,899
Trade and other receivables	7B, 21	**16,549**	15,334
Investments	7C, 21	**135,692**	103,083
Total financial assets		**156,023**	122,316
Non-financial assets			
Land and buildings	8A	**308,189**	302,631
Infrastructure, plant and equipment and major facilities	8B	**756,708**	760,808
Inventories	8C	**20,589**	21,636
Intangibles	8D	**73,944**	73,485
Deferred tax assets	8E	**1,005**	930
Other non-financial assets	8E	**4,180**	2,692
Total non-financial assets		**1,164,615**	1,162,182
Total assets		**1,320,638**	1,284,498
LIABILITIES			
Payables			
Suppliers	9E, 21	**16,417**	13,860
Employees	9F, 21	**6,987**	6,204
Grants	9G, 21	**707**	682
Other	9H,21	**16,642**	14,501
Total payables		**40,753**	35,247
Provisions			
Employee provisions	9A	**38,649**	35,714
Decommissioning provision	9B	**274,678**	286,568
NTP Provision	9C	**49,717**	48,680
Other	9D	**49**	47
Total provisions		**363,093**	371,009
Total liabilities		**403,846**	406,256
Net Assets		**916,792**	878,242
EQUITY			
Contributed equity	10	**608,981**	560,856
Reserves	10	**505,394**	481,984
Retained (deficit)	10	**(197,583)**	(164,598)
Total equity		**916,792**	878,242

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

Consolidated statement of cash flows for the year ended 30 June 2014

	Notes	Consolidated 2014 $'000 Inflows (Outflows)	2013 $'000 Inflows (Outflows)
OPERATING ACTIVITIES			
Cash received			
Sales of goods and rendering of services		**97,121**	92,440
Interest		**4,079**	3,155
Receipts from Government		**163,011**	157,605
Total cash received		**264,211**	253,200
Cash used			
Employees		**(138,966)**	(123,163)
Suppliers		**(74,145)**	(69,736)
Total cash used		**(213,111)**	(192,899)
NET CASH FLOWS FROM OPERATING ACTIVITIES	11	**51,100**	60,301
INVESTING ACTIVITIES			
Cash received			
Proceeds from sale of property, plant and equipment		**919**	433
Proceeds from investment sales		**441,800**	435,337
Total cash received		**442,719**	435,770
Cash used			
Purchase of property, plant and equipment and intangibles		**(67,655)**	(104,772)
Purchase of investments		**(474,409)**	(466,031)
Total cash used		**(542,064)**	(570,803)
NET CASH USED BY INVESTING ACTIVITIES		**(99,345)**	(135,033)
FINANCING ACTIVITIES			
Cash received			
Appropriation - contributed equity		**48,125**	71,500
Receipts from ASCo closure		**-**	3,706
NET CASH FLOWS FROM FINANCING ACTIVITIES		**48,125**	75,206
NET INCREASE IN CASH HELD		**(120)**	474
EFFECTS OF EXCHANGE CHANGES ON THE BALANCE OF CASH HELD IN FOREIGN CURRENCIES		**3**	14
Cash and cash equivalents at the beginning of the reporting period		**3,899**	3,411
Cash and cash equivalents at the end of the reporting period		**3,782**	3,899

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

Consolidated statement of changes in equity for the year ended 30 June 2014

	Consolidated					
	Retained Deficit		Asset Revaluation Reserve		Other Reserves	
	2014 $'000	2013 $'000	**2014 $'000**	2013 $'000	**2014 $'000**	2013 $'000
Opening Balance	**(164,598)**	(130,962)	**468,169**	468,256	**13,815**	12,085
Comprehensive income						
Deficit for the period	**(33,319)**	(32,135)	**-**	-	**-**	-
Other comprehensive income		-				
Foreign currency translation	**-**		-	-	**2**	229
Revaluation increment	**-**		**23,742**	(87)	**-**	-
Total comprehensive income	**(33,319)**	(32,135)	**23,742**	(87)	**2**	229
Transaction with Owners						
Distributions to owners						
Returns on Capital						
Dividends	**-**	-	**-**	-	**-**	-
Contributions by Owners						
Appropriation (equity injection)	**-**	-	**-**	-	**-**	-
Sub-total Transactions with Owners	**-**	-	**-**	-	**-**	-
Transfers between equity components	**334**	(1,501)	**-**	-	**(334)**	1,501
Closing balance as at 30 June	**(197,582)**	(164,598)	**491,911**	468,169	**13,483**	13,815
Closing balance attributable to Australian Government	**(197,582)**	(164,598)	**491,911**	468,169	**13,483**	13,815

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

AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION
CONSOLIDATED STATEMENT of CHANGES in EQUITY
for the year ended 30 June 2013

	Consolidated			
	Contributed Equity/Capital		Total Equity	
	2014 $'000	2013 $'000	**2014 $'000**	2013 $'000
Opening Balance	**560,856**	489,356	**878,242**	838,735
Comprehensive income				
Deficit for the period	**-**	-	**(33,319)**	(32,135)
Other comprehensive income				
Foreign currency translation	**-**	-	**2**	229
Revaluation increment	**-**	**-**	**23,742**	(87)
Total comprehensive income	**-**	-	**(9,575)**	(31,993)
Transaction with Owners				
Distributions to owners				
Returns on Capital				
Dividends	**-**	-	**-**	-
Contributions by Owners				
Appropriation (equity injection)	**48,125**	71,500	**48,125**	71,500
Sub-total Transactions with Owners	**48,125**	71,500	**48,125**	71,500
Transfers between equity components		-	**-**	-
Closing balance as at 30 June	**608,981**	560,856	**916,793**	878,242
Closing balance attributable to Australian Government	**608,981**	560,856	**916,793**	878,242

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

Consolidated schedule of commitments not recognised as liabilities as at 30 June 2014

	Notes	Consolidated 2014 $'000	2013 $'000
BY TYPE			
Commitments receivable			
Other commitments receivable			
GST recoverable from Australian Taxation Office on Commitments		**11,225**	4,226
Total other commitments receivable		**11,225**	4,226
Commitments payables			
CAPITAL COMMITMENTS			
Infrastructure, plant and equipment	(c)	**111,732**	31,378
Total capital commitments		**111,732**	31,378
OTHER COMMITMENTS			
Replacement Research Reactor Project (OPAL)	(a)	**165**	371
Operating lease	(b)	**1,596**	1,747
Fuel elements purchase		**8,492**	9,783
Mo-99 plates purchase		**1,495**	3,209
Total other commitments		**11,748**	15,110
Net commitments by type		**112,255**	42,262
BY MATURITY			
Capital commitments payable			
One year or less		**11,801**	5,631
From one to five years		**99,931**	25,747
		111,732	31,378
OTHER COMMITMENTS			
One year or less		**1,941**	3,875
From one to five years		**3,183**	4,598
Over five years		**6,624**	6,637
Total other commitments		**11,748**	15,110
Other commitments receivable			
One year or less		**2,140**	1,885
From one to five years		**9,085**	2,341
		11,225	4,226
Net commitments by maturity		**112,255**	42,262

(a) A contract was executed on 13 July 2000 between ANSTO and INVAP SE for the design, construction and commissioning of a replacement research reactor at Lucas Heights. The remaining amount of $0.165 million (2013: $0.371 million) is included in commitments.

(b) ANSTO has a twenty five year lease contract with Central Sydney Area Health Services that will expire on 29 Jan 2025 with an annual rental payable of $137,000 (2013: $137,000).The annual rental is subject to review every three years.

(c) The majority of the committed funds on the ANM Program are related to the award of the design development and construction contract of the Mo99 facility to Watpac Constructions on 24 January 2014 for about $82.965 million. Contracts were also awarded to SyMo and Mo99 equipment suppliers. Some smaller contracts were awarded to owner's engineers (consultants).

The amounts reported as commitments payable includes GST where relevant. Recoveries due from the Australian Taxation Office in relation to commitments payable are disclosed as commitments receivable.

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

Schedule of contingencies as at 30 June 2014

Unquantifiable Contingencies

At 30 June 2014, 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 are however covered by the Department of Finance and Deregulation provision dealing with asbestos related claims against any Commonwealth Authorities including ANSTO in the event of any litigation or claim for compensation.

Contingent Liabilities

On 25 June 2012, Cyclopharm Limited's wholly owned subsidiary, CycloPet Pty Ltd., commenced proceedings against ANSTO and PETNET Australia Pty Ltd, the wholly owned subsidiary of ANSTO in the Federal Court of Australia alleging anticompetitive conduct.

ANSTO and PETNET Australia Pty Ltd will strongly defend the case and are managing litigation claim exposure under the Professional Indemnity section of the 2013-14 Comcover policy. The parties are scheduled to attend a mediation meeting in August 2014 and court proceedings are currently listed for a hearing commencing in September 2014.

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

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

Note	Description
1	Objectives of Australian Nuclear Science and Technology Organisation
2	Summary of significant accounting policies
3	Events subsequent to reporting date
4	Reporting of outcomes
5	Revenue
6	Expenses
7	Financial assets
8	Non-financial assets
9	Liabilities
10	Equity
11	Cash flow reconciliation
12	Government funding
13	Board membership
14	Remuneration of members of the Board
15	Remuneration of senior executives
16	OPAL Nuclear Research Reactor
17	Insurances
18	Remuneration of auditors
19	Related party disclosures
20	Trust money
21	Financial instruments
22	Operating lease arrangements
23	Income tax expense (benefit)
24	Other comprehensive income
25	Information relating to ANSTO ('the parent entity")
26	Transfer of financial balances from ASCo closure
27	Fair Value Measurements

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

1 Objectives of Australian Nuclear Science and Technology Organisation

Australian Nuclear Science and Technology Organisation (ANSTO) is an Australian Government controlled entity. The objectives of ANSTO are detailed in the body of this Annual Report.

ANSTO has only one outcome as reflected in the 2013-14 Portfolio Budget Statement as indicated below:

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

ANSTO's activities contributing towards the outcome are classified as departmental. Departmental activities involve the use of assets, liabilities, revenues and expenses controlled or incurred by ANSTO in its own right. Administered activities involve the management or oversight by ANSTO, on behalf of the Government, of items controlled by the Government. ANSTO does not have any administered activities.

The continued existence and operations of the Australian Nuclear Science and Technology Organisation (ANSTO) and its present programs is dependent on Government policy and on continuing funding by the Commonwealth Government for ANSTO's administration and programs.

Reference to ANSTO, means ANSTO and its controlled entities ('ANSTO Consolidated') except for under taxation note 2(s).

2 Summary of significant accounting policies

(a) Basis of preparation of the Financial Statements

The financial statements and notes are required by clause 1(b) of Schedule 1 to the *Commonwealth Authorities and Companies Act 1997 (CAC Act)* and are general purpose financial statements.

They have been prepared:

i. having regard to the provisions of the Australian Nuclear Science and Technology Organisation *(ANSTO)* Act 1987 *(as amended)*
ii. in accordance with:
. Finance Minister's Orders (FMOs) for reporting periods ending on or after 1 July 2011; and
. Australian Accounting Standards and Interpretations issued by the Australian Accounting Standard Board (AASB) that apply for the reporting period.

The financial statements have been prepared on an accruals basis and in accordance with the historical cost convention, except for certain assets which are stated 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 report is presented in Australian dollars and values are rounded to the nearest thousand dollars unless otherwise specified.

Unless an alternative treatment is specifically required by an Accounting Standard or the FMOs, assets and liabilities are recognised in the Balance Sheet when and only when it is probable that future economic benefits will flow to ANSTO or a future sacrifice of economic benefits will be required and the amounts of the assets or liabilities can be reliably measured. However, assets and liabilities arising under executory contracts are not recognised unless required by an Accounting Standard. Liabilities and assets that are unrecognised are reported in the Schedule of Commitments or the Schedule of Contingencies.

Unless alternative treatment is specifically required by an Accounting Standard, income and expenses are recognised in the Statement of Comprehensive Income when and only when the flow, consumption or loss of economic benefits has occurred and can be reliably measured.

(b) Significant Accounting Judgements and Estimates

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

- The fair value of land and buildings.
- The fair value of OPAL and other plant and equipment and their useful life.
- Decommissioning costs provision.
- 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.

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

(c) Statement of Compliance

Australian Accounting Standards require a statement of compliance with International Financial Reporting Standards (IFRSs) to be made where the financial report complies with these standards. Some Australian equivalents to IFRSs and other Australian Accounting Standards contain requirements specific to not-for-profit entities that are inconsistent with IFRS requirements. ANSTO is a not-for-profit entity and has applied these requirements, so while this financial report complies with Australian Accounting Standards including Australian Equivalents to International Financial Reporting Standards (AEIFRSs) it does not comply with IFRS in all respects

(d) Adoption of new Australian Accounting Standard requirements

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

The following new standards/revised standards/Interpretations or amending standards were issued prior to the signing of the statement by the directors, which were applicable to the current reporting period.

Standard/Interpretation	Nature of change in accounting policy, transition provisions, and adjustment to financial statement
AASB 119 Employee Benefits (2011) and AASB 2011-10 Amendments to Australian Accounting Standards arising from AASB 119 (2011)	In the current year, the company has applied AASB 119 (as revised in 2011) 'Employee Benefits' and the related consequential amendments for the first time. The revised AASB119 changes the definition of short-term benefits only that are expected to be settled wholly within 12 months after the end of the annual reporting period in which employees render the services are classified as short-term employee benefits The adoption of this amending standard does not have any material impact on the financial statements.
AASB 113 Fair Value Measurement	AASB13 establishes a single source of guidance under Australian Accounting Standards for all fair value measurements. AASB 13 does not change when a company is required to use fair value, but rather provides guidance on how to measure fair value under Australian Accounting Standards. AASB 13 defines fair value as an exist price. As a result of the guidance in AASB 13, the company re-assessed its policies for measuring fair values. The adoption of this amending standard does not have any material impact on the financial statements.

Future Australian Accounting Standard Requirements

No new standards/revised standards/Interpretations or amending standards were issued by the Australian Accounting Standards Board prior to the signing of the statement by the directors and chief financial officer, which are expected to have a financial impact on ANSTO for future reporting periods.

(e) Reporting by outcomes

A comparison of current and prior years' figures by outcome as specified in the Portfolio Budget Statements relevant to ANSTO, is presented in Note 4.

(f) Revenue recognition

Revenue from Government
Funding received or receivable from the Department of Industry (DOI) (appropriated to ANSTO as a CAC Act body) is recognised as Revenue from Government unless it is in the nature of an equity injection.

Equity injections
Amounts that are designated as equity injections for a year are recognised directly in contributed equity in that year.

Operating revenue from goods and services
Revenue from the sale of goods 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 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 balance date. Allowance is made when collectability of the debt is no longer probable.

Revenue received in advance
Revenue received in advance is initially brought to account as "unearned revenue" and subsequently recognised as revenue when earned.

Contract revenue
Revenue from the rendering of a service is recognised by reference to the stage of completion of each contract. The stage of completion is determined by reference to the proportion that the completed physical contract work bears to the estimated total physical contract work.

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

Gains from sale of assets
Revenue is recognised when control of the asset has passed to the buyer.

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 no 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.

Core operations
All material revenues described in this note are revenues relating to the core operating activities of ANSTO. Details of revenue amounts are given in Note 5.

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.

Parental Leave Payments Scheme
Amounts received under the Parental Leave Payments Scheme not yet paid to employees are presented gross as cash and a liability (payable). Amounts received and not paid at 30 June 2014 amounted to $9,959 (2013: $7,769).

(g) Employee benefits

Benefits
Liabilities for services rendered by employees are recognised at the reporting date to the extent that they have not been settled.

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.

The nominal amount is calculated with regard to the rates expected to be paid on settlement of the liability.

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 balance date. The leave liabilities are calculated on the basis of employees' remuneration, including employer superannuation contribution rates to the extent that the leave is likely to be taken during service rather than paid out on termination.

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

ANSTO has contracted the Australian Government Actuary to provide an agency-specific set of probability factors to be used for estimation of long service leave liability. Based on their report of May 2014, the ANSTO specific probability factors are not materially different to the Department of Finance Standard probability factors and discount factor in estimating the long service leave liability. ANSTO have adopted the Department of Finance Standard probability and discount factor rates in calculating the 30 June 2014 long service leave liability.

ANSTO has used the Department of Finance shorthand method in valuation of the liability for long service leave.
The estimate of the present value of the liability takes into account attrition rates and pay increases through promotion and inflation.

The nominal amount is calculated with regard to the rates expected to be paid on settlement of the liability.

General leave
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 and the average general leave taken by employees is less than the annual entitlement.

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. The total provision in the financial statements for for 6 staff (2013: 3) amounted to $589,000 (2013: $323,000).

(h) Superannuation

ANSTO contributes to the Commonwealth Superannuation (CSS) and the Public Sector (PSS) superannuation schemes or PSS accumulation plan (PSSap) which provide retirement, death and disability benefits to employees.

The CSS and PSS are defined benefit schemes for the Commonwealth while the PSSap is a defined contribution scheme. Contributions to the schemes are at rates calculated to cover existing and emerging obligations. Applicable contribution rates in 2014 were 15.7% (2013 17.3%) of salary (PSS), 17.9% (2013 19.2%) of salary (CSS), and 15.4% (2013 15.4%) of salary (PSSap). An additional 3% is contributed to PSS and CSS for employer productivity benefits. The Enterprise Agreement signed in March 2012 provided that all ANSTO employees under the agreement who contributed to non Commonwealth superannuation schemes, are to receive a contribution equivalent to 15.4% of salary. For those staff who do not contribute to any of these schemes and are not covered by Enterprise Agreement, ANSTO contributed an amount equivalent to 9.25% of salary to the Australian Government Employees Superannuation Trust fund or to the complying fund nominated by the employee.

ANSTO makes employer contributions to the employees' superannuation scheme at rates determined by 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 liability for superannuation recognised as at 30 June represents outstanding contributions for the final fortnight of the year. Contributions during the year are detailed in Note 6A.

(i) Leases

Operating leases payments are expensed on a straight-line basis which is representative of the pattern of benefits derived from the leased assets.

(j) Cash

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

(k) Financial instruments

ANSTO classifies its financial assets in the following categories:
• 'financial assets as at fair value through profit or loss'
• 'held-to-maturity investments',
• '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 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 balance 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.

• Available for sale 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.

Financial Liabilities
Financial liabilities are classified as either financial liabilities 'at fair value through profit or loss' or other financial liabilities.

Financial liabilities 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 yield basis.

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

Supplier and other payables
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).

(l) Contingent Liabilities and Contingent Assets

Contingent liabilities and contingent assets are not recognised in the balance sheet but are reported in the relevant schedules and 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.

(m) 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.

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

(n) Buildings, infrastructure, plant and equipment and major facilities

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.

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 cost and Asset Revaluation Reserve in accordance with the Department of Finance Accounting Guidance Note.

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
Fair values for each class of asset are determined as shown below:

Asset Class	Fair value measured at
Land	Market Value
Building	Market Value
Site infrastructure	Market Value
Electrical infrastructure	Market Value
Plant and equipment	Market Value
National and major facilities	Market Value

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 the 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 valuation are carried out by qualified parties, independent of ANSTO. The valuations were performed by independent valuers of the Australian Valuation Officers (AVO), Mr. Simon O'Leary (registered Valuer No. 1128), Mr. Christofer Fratzia (registered Valuer No. 3794) and Mr. Kashyap Budhbhatti at 30 June 2012, based on the asset list at 31 October 2011.

Depreciation and amortisation
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.

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

	2014	2013
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
National and major facilities	**5 to 40 years**	5 to 40 years

The depreciation rates (useful lives) of ANSTO's buildings, infrastructure, plant and equipment and major facilities have been reviewed during the year and found to be appropriate.

The aggregate amount of depreciation allocated for each class of asset during the reporting period is disclosed in Note 6C.

Recoverable amount test
Those assets carried at cost (less accumulated depreciation) are reviewed to determine whether this is in excess of the recoverable amount. If an excess exists as at the reporting date, the asset is written down to its recoverable amount. In assessing recoverable amounts, the relevant cashflows have been discounted to their present value.

Impairment
All assets were assessed for impairment at 30 June 2014. 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 cashflows 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.

(o) Inventories

Stores are valued at purchase cost on a first-in-first-out basis. Provision is made for obsolete inventory and diminution in value.

Inventories of Cobalt-60 and enriched uranium are valued on the basis of lower of cost and net realisable value.

Stocks of reactor fuel are valued at average purchase price.

Heavy water is valued at lower of cost and net realisable value.

Finished goods and work in progress are valued at cost of direct materials and labour plus attributable costs that are capable of being allocated on a reasonable basis.

(p) Intangibles

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.

There is no material internal software development.

Software and licences are reported at cost.

Intellectual property
ANSTO and NTP Radioisotopes (SOC) Limited (NTP) have signed the Intellectual Property 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 grant to ANSTO an exclusive, irrevocable, perpetual licence to use, exploit, reproduce and modify the current IP and the future IP. The IP includes copyright designs, patents, know-how and trade secrets and confidential information owned by NTP and used in its own production plant. It includes the provision of all IP to assist ANSTO in the design, construction and operation of a large scale Mo-99 plant.

The IP Agreement makes provision for ANSTO to pay the sum of US$60M (capped) to NTP for the IP. The payment's will continue at 22.5% of the sales volume up to the date of the commissioning and operation of the new Mo-99 plant at which time the percentage will decrease to 15% until full payment of the US$60M. The payment will include any sums paid under the initial Commercial Agreement relating to IP to enhance the current production facility.

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 $51.2 million and a financial liability for the future payments required in relation to the asset.

The current $49.7 million liability has been derived from calculating the estimated commission to be paid to NTP based on expected future sales and then discounted back at 4.3% to arrive at 30 June 2014 dollars.

This IP was initially recognised as it's Fair Value and is subsequently at cost less impairment whilst the liability is fair valued each year.

Intellectual property treated as intangible assets and acquired separately is measured on initial recognition at cost.

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.

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

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

Amortisation rates applying to intangibles are as follows:

	2014	2013
Purchased software	2 - 7 years	2 - 7 years
Licences	**3 years**	3 years
Intellectual property	**indefinite life**	indefinite life

The amortisation rates (useful lives) of ANSTO's software and licences have been reviewed during the year and found to be appropriate.

No amortisation is applied to Intellectual Property as this is assessed as having an indefinite useful life.

The aggregate amount of amortisation allocated for each class of asset during the reporting period is disclosed in Note 6C.

Impairment
All assets were assessed for impairment at 30 June 2014. 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.

(q) 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 2014 there were 119 patents (75 at 30 June 2013) registered to ANSTO and no associated costs are recognised as an asset (nil at 30 June 2013).

(r) 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 balance 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 did not enter into speculative forward exchange contracts during the reporting period.

(s) 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.
ANSTO's subsidiaries are subject to normal taxation except for Synchrotron Light Source Australia Pty Ltd which is a tax exempt entity being charity institution.

ANSTO Inc. a USA company, is subject to US tax laws. No Deferred Tax Asset has been recognised at 30 June 2014 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.

Revenues, expenses and assets are recognised net of GST except:
• where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
• for receivable and payables.

Subsidiaries
Unbooked deferred tax assets in relation to unrecouped tax losses including timing difference in the subsidiaries is $1 thousand (2013: $32 thousand).
The total deferred tax assets recognised in relation to PETNET Australia Pty Ltd for 30 June 2014 is $939 thousand (2013: $930 thousand).
The total deferred tax assets recognised in relation to ANSTO Nuclear Medicine Pty Ltd for 30 June 2014 is $65 thousand (2013: nil).

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 the balance sheet date.

Deferred income tax is provided on all temporary differences at the balance sheet 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.

Unrecognised deferred income tax assets are reassessed at each balance sheet 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 the balance 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.

(t) Principles of consolidation

ANSTO has investments in a number of companies (refer Note 7D) over which it has control. These companies have been established for the purpose of (i) commercialisation of ANSTO's intellectual property, (ii) a requirement for ANSTO to operate in the industry as in the case of ANSTO Inc., an operation in the U.S.A. or (iii) a requirement for ANSTO to operate in another science industry as in the case Synchrotron Light Source Australia Pty Ltd.

(u) Interest in joint venture

A joint venture is a joint arrangement whereby ANSTO and the other parties that have joint control (i.e the contractually agreed sharing of control of an arrangement, which exists only when decisions about the relevant activities require the unanimous consent of the parties sharing control) of the arrangement have rights to the net assets of the arrangement.

ANSTO has an investment in Element 42 LLC (refer Note 7E) over which it has shared control.

(v) Comparatives

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

(w) Rounding

Amounts are rounded to the nearest one thousand dollars except in relation to:
- remuneration of members of the Board
- remuneration of executives
- audit fees

3 Events subsequent to reporting date

No events have arisen since the end of the financial year which require disclosure or the financial statements to be adjusted.

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

4 Reporting of Outcomes

ANSTO operates mainly within Australia, and mainly in the nuclear scientific research industry.
Reporting by outcomes:

ANSTO has only one outcome.

Major Classes of Departmental Revenues and Expenses by Outcome - Consolidated

	Consolidated	
	2014	2013
	$'000	$'000
Operating revenues		
Revenue from Government	**163,011**	157,605
Sale of goods and services	**67,835**	60,358
Interest	**4,081**	3,314
Gain from sale of assets	**86**	22
Reversal of previous impairments	**0**	5,000
Other	**31,893**	15,830
Income tax benefits	**0**	-
Total operating revenues	**266,906**	242,129
Operating expenses		
Employees	**142,684**	126,447
Suppliers	**67,380**	55,744
Depreciation and amortisation	**65,873**	65,887
Finance costs	**16,795**	14,760
Write-down and impairment of assets	**1,701**	2,387
Other	**5,867**	8,769
Total operating expenses	**300,300**	273,994

Major Classes of Departmental Assets and Liabilities by Outcome - Consolidated

	Consolidated	
	2014	2013
	$'000	$'000
Assets		
Cash and cash equivalents	**3,782**	3,899
Trade and other receivables	**16,549**	15,334
Investments	**135,692**	103,083
Land and buildings	**308,189**	302,631
Infrastructure, plant and equipment	**756,708**	760,808
Inventories	**20,589**	21,636
Intangibles	**73,944**	73,485
Tax assets	**1,005**	930
Other	**4,180**	2,692
Total assets	**1,320,638**	1,284,498
Suppliers	**16,417**	13,860
Employees payables	**6,987**	6,204
Grants	**707**	682
Other payables	**16,642**	14,501
Employee provisions	**38,649**	35,714
Decommissioning provision	**274,678**	286,568
Other provisions	**49,766**	48,727
Total liabilities	**403,846**	406,256

Notes:

The net costs include intra - government costs that would be eliminated in calculating the actual Budget outcome.

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

	Notes	Consolidated 2014 $'000	2013 $'000
5 Revenue			
5A. Revenue from Government			
CAC Act payments from Dept of Industry		**163,011**	157,605
5B. Sale of goods and rendering of services			
Radioisotope sales		**37,839**	29,378
Services and contract research		**18,015**	20,725
Silicon irradiation		**5,860**	3,703
CSIRO site support		**1,060**	1,092
Training courses		**291**	374
Land management		**3,556**	3,462
AINSE interactions		**1,214**	1,624
Total sales of goods and rendering of services		**67,835**	60,358
5C. Grants		**27,552**	12,881
5D. Interest - Bank		**4,081**	3,314
5E. Gains from sale of assets			
Proceeds from sale of assets		**779**	215
Carrying value of assets sold		**(693)**	(193)
Gain from disposal of infrastructure, plant and equipment		**86**	22
5F. Foreign exchange gains - non speculative		**2,059**	2,264
5G. Reversals of Previous Assets Write-downs and Impairments			
Reversal of Impairment Losses		**-**	5,000
5H. Other revenue:			
Asset free of charges		**2,282**	685
Total other revenue		**2,282**	685
Total own-source revenue		**103,895**	84,524
Total revenues from ordinary activities		**266,906**	242,129
5I. Sales of goods and rendering of services			
Goods		**37,839**	29,378
Services		**29,996**	30,980
Total sales of goods and rendering of services	5B	**67,835**	60,358
Provision of goods to:			
Related entities		**-**	-
External entities		**37,839**	29,378
Total sales of goods		**37,839**	29,378
Rendering of services to:			
Related entities		**7,438**	2,138
External entities		**22,558**	28,842
Total rendering of services		**29,996**	30,980

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

	Notes	Consolidated 2014 $'000	2013 $'000
6 Expenses			
The breakdown of operating expenses is:			
6A. Employee benefits:			
Wages and salaries		**108,758**	95,461
Superannuation		**19,508**	18,263
Leave and other entitlements		**13,980**	12,091
Separation and redundancy		**438**	632
Total employee benefits		**142,684**	126,447
6B. Supplier expenses:			
Goods from related entities		**-**	-
Goods from external entities		**34,211**	23,712
Services from related entities		**27,931**	27,317
Workers compensation premiums - related		**974**	731
Services from external entities		**4,264**	3,978
Operating lease rentals - external		**-**	6
Total supplier expenses		**67,380**	55,744
6C. Depreciation and amortisation			
Depreciation of property, plant and equipment (a)	8B	**62,165**	61,815
Impairment of property, plant and equipment (a)	8B	**(253)**	415
Amortisation of intangible assets - licence	8D	**816**	556
Amortisation of intangible assets - design fees	8D	**315**	367
Amortisation of intangible assets - software	8D	**2,830**	2,734
Total depreciation and amortisation		**65,873**	65,887
6D. Write-down and impairment of assets			
Financial assets:			
Write-down of receivables		**199**	1,992
Non financial assets:			
Materials - write off obsolete stock		**22**	47
Fixed assets write-down		**1,480**	348
Total write-down of assets		**1,701**	2,387
6E. Grants		**3,700**	6,035
6F. Finance costs			
Unwinding of discount on decommissioning costs		**16,795**	14,760
		16,795	14,760
6G. Foreign exchange losses			
Foreign exchange loss - non speculative			
-realised		**754**	490
-unrealised		**1,336**	834
		2,090	1,324
6H. Losses from asset sales			
Proceeds from sale of assets		**140**	218
Carrying values of assets sold		**(217)**	(1,628)
Total losses from asset sales		**77**	1,410
Total operating expenses		**300,300**	**273,994**

(a) Depreciation and impairment of property, plant and equipment:

The aggregate amounts of depreciation expensed and impairment during the reporting period for each depreciable class of property, plant and equipment are as follows:

Buildings on freehold land	**10,415**	10,306
Plant and equipment	**21,265**	22,051
Infrastructure	**3,445**	3,299
National and major facilities	**27,040**	26,159
	62,165	61,815
Add (less): Impairment (reversal)	**(253)**	415
Total depreciation and amortisation	**61,912**	62,230

		Consolidated	
		2014	2013
		$'000	$'000
7 Financial assets			
7A. Cash and cash equivalents			
Cash on hand or on deposit		**3,782**	3,899
Total cash and cash equivalents		**3,782**	3,899
7B. Trade and other receivables			
Goods and services			
Goods and services - related entities		**2,946**	592
Goods and services - external parties		**11,212**	12,606
Total receivables for goods and services		**14,158**	13,198
Other receivables			
Interest accrued		**453**	451
Other		**1,259**	3,027
GST receivable from the Australian Taxation Office		**747**	666
Total other receivables		**2,459**	4,144
Less impairment allowance account:			
Goods and services		**68**	2,008
Total impairment allowance	(b)	**68**	2,008
Total trade and other receivables (net)	(a)	**16,549**	15,334
Receivable are expected to be recovered in:			
No more than 12 months		**16,549**	13,702
More than 12 months		**-**	1,632
Total trade and other receivable (net)		**16,549**	15,334

(a) Total receivables are aged as follows:

Age analysis of trade and other receivables (net)		
Current	**12,794**	9,454
Overdue:		
Less than 30 days	**2,721**	2,429
30 to 60 days; and	**597**	1,161
60 to 90 days	**154**	586
More than 90 days	**283**	1,704
Total receivables (gross)	**16,549**	15,334

(b) The provision for doubtful debts represents certain debts aged more than 90 days (2013: aged more than 90 days).

The Impairment allowance is aged as follows:		
Age analysis of trade debtors		
30 to 60 days; and	**-**	981
More than 90 days	**68**	1,027
Total impairment allowance account	**68**	2,008

Reconciliation of the Impairment Allowance Account:

Opening Balance	**2,008**	108
Amount provided	**-**	1,992
Amount reversed	**(1,940)**	(92)
Closing Balance	**68**	2,008

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

	Consolidated	
	2014	2013
	$'000	$'000
7C. Investments		
Bank bills	**125,543**	80,972
Term deposit	**5,149**	17,111
Investment in Australain Synchrotron Holding Company Pty Limited	**5,000**	5,000
Investment in ANSTO Inc.	**-**	-
Investment in ANSTO Nuclear Medicine Pty Ltd.	**-**	-
Investment in PETNET Australia Pty Limited	**-**	-
Investment in Synchrotron Light Source Australia Pty Ltd	**-**	-
Total investments	**135,692**	103,083

7D. Investment in subsidiaries

The details of the subsidiaries of ANSTO are:

Name	**Place of Incorporation**	**% Owned**	**Investment**	
			2014	2013
			$	$
ACN 120 875 498 Pty Limited (formerly Australian Membrane Technologies Pty Limited)	Australia	0%	**-**	1
PETNET Australia Pty Ltd	Australia	100%	**10,957,588**	10,957,588
Synchrotron Light Source Australia Pty Ltd	Australia	100%	**1**	1
ANSTO Inc.	Delaware U.S.A.	100%	**-**	-
ANSTO Nuclear Medicine Pty Ltd	Australia	100%	**2**	-
			10,957,591	10,957,590

ANSTO Inc. was incorporated in Delaware, USA on 27 October 1999. At 30 June 2014: US$100 (2013: 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.

ANSTO assessed the carrying value of the ANSTO investment in PETNET, including a review of the cash flow projections. The resulting PETNET valuation based on a discount rate of 14.62% (2013, 14.20%) and 12 years (2013,13 years) cash flow plus the value of cash on hand (surplus asset) was $10,958 thousand (2013, $10,958 thousand) compared to a carrying value of the investment of $10,958 thousand (2013, $14,458 thousand), giving a nil impairment (2013, impairment of $3,500 thousand).

In March 2012, the Australian and Victorian Governments had secured the future of the Australian Synchrotron through a $100 million, four- year funding arrangement. Following that announcement, ANSTO on 26 October 2012 was appointed as the operator of the Australian Synchrotron effective from 1 January 2013. Synchrotron Light Source Australia Pty Ltd (SLSA) a wholly-owned subsidiary of ANSTO was incorporated on 14 August 2012 as the company that replaced the Previous operator of the Australian Synchrotron. There is on going discussions regarding the future support of the Synchrotron after 2016.

Following the deregistration of ACN 120 875 498 Pty Limited (formerly Australian Membrane Technology Pty Limited) with ASIC on 22nd June 2014, ANSTO Investment with the company of $1 has been written off this year.

For the financial year ended 30 June 2014 the financial statements of ANSTO Inc. were audited by Galusha, Higgings & Galusha, P.C..

7E. Investment in joint venture

Name	**Place of Incorporation**	**% Owned**
Element 42 LLC	Delaware U.S.A.	50%

Element 42 LLC. was incorporated in Delaware, USA on 1 June 2010. At 30 June 2014 ANSTO's investment with Element 42 LLC : US$600 (2013: US$600). Element 42 LLC has not traded.

7F. Investment - other

Name	Place of Incorporation	% Owned	Investment 2014 $	Investment 2013 $
Clarity Pharmaceuticals Pty Ltd	Australia	3%	-	-
Advance Polymetrik Pty Ltd	Australia	0%	-	-
			-	-

Clarity Pharmaceuticals Pty Ltd. was incorporated in New South Wales, Australia on 17 September 2010. Current Shareholding 100,000 shares (4.19%)

Advance Polymetrik Pty Ltd was incorporated in Victoria, Australia on 20 December 2001. ANSTO had Current Shareholding 100,000 shares, 2.83% (2013: 3.84%).

As the company had returned the capital on 22 October 2013 and subsequently dissolved, ANSTO has recognised the write down of the Investment to nil in the current year.

	Consolidated 2014 $'000	Consolidated 2013 $'000
8 Non-financial assets		
8A. Land and buildings		
Land - 30 June fair value	**97,200**	97,200
	97,200	97,200
Buildings - 30 June fair value	**196,372**	159,098
Less accumulated depreciation	**22,217**	11,858
	174,155	147,240
Building under construction	**36,834**	58,191
Total buildings	**210,989**	205,431
Total land and buildings	**308,189**	302,631
8B. Infrastructure, plant and equipment and major facilities		
8B(i). Plant and equipment		
Plant and equipment - 30 June fair value	**326,873**	303,459
Less accumulated depreciation	**159,194**	137,541
	167,679	165,918
Plant and equipment under construction	**128,431**	155,214
Total plant and equipment	**296,110**	321,132
8B(ii). Infrastructure		
Electrical/site services facilities - 30 June fair value	**31,329**	28,580
Less accumulated depreciation	**6,744**	3,299
	24,585	25,281
Total infrastructure	**24,585**	25,281
8B(iii). Major national and major research facilities		
Major national research facilities - 30 June fair value	**15,194**	14,525
Less accumulated depreciation	**1,555**	1,229
	13,639	13,296
Major research facilities- 30 June fair value	**6,147**	6,147
Less accumulated depreciation	**528**	324
	5,619	5,823
OPAL nuclear research reactor - 30 June fair value	**466,823**	419,915
Less accumulated depreciation	**50,068**	24,639
	416,755	395,276
Total major national and major research facilities	**436,013**	414,395
Total infrastructure, plant and equipment and major facilities	**756,708**	760,808
Total land, buildings, infrastructure, plant and equipment and major facilities	**1,064,897**	1,063,439

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

Movement summary 2013-14 for all consolidated assets irrespective of valuation basis (excluding intangibles)

	Land	Buildings	Total Land and Buildings	Infrastructure, plant, equipment national and major facilities	Total
	$'000	$'000	$'000	$'000	$'000
Gross value as at 1 July 2013	97,200	217,289	314,489	927,820	1,242,309
Additions - new assets	-	11,565	11,565	45,212	56,777
Additions - new assets (free of charge)	-	-	-	2,282	2,282
Revaluation Adjustment	-	76	76	116	192
Decommissioning Cost	-	117	117	0	117
Transfers/reclassifications	-	4,652	4,652	1,403	6,055
Asset written-off	-	(493)	(493)	(776)	(1,269)
Disposals	-	-	-	(1,260)	(1,260)
Gross value as at 30 June 2014	97,200	233,206	330,406	974,797	1,305,203
Accumulated depreciation/ amortisation 1 July 2013	-	11,858	11,858	1 67,012	178,870
Depreciation/amortisation	-	10,719	10,719	51,446	62,165
Impairment losses	-	-	-	293	293
Asset written-off		(56)	(56)	(70)	(126)
Impairment losses reversal	-	(304)	(304)	(242)	(546)
Adjustment for disposals	-	-	-	(350)	(350)
Accumulated depreciation/ amortisation 30 June 2014	-	22,217	22,217	218,089	240,306
Net book value as at 30 June 2014	97,200	210,989	308,189	756,708	1,064,897

Movement summary 2012-13 for all consolidated assets irrespective of valuation basis (excluding intangibles)

	Land	Buildings	Total Land and Buildings	Infrastructure, plant, equipment national and major facilities	Total
	$'000	$'000	$'000	$'000	$'000
Gross value as at 1 July 2012	97,200	193,348	290,548	848,309	1,138,857
Additions - new assets	-	15,713	15,713	82,802	98,515
Revaluation increment / (decrement)	-	(77)	(77)	1,350	1,273
Revaluation Adjustment	-	-	-	(222)	(222)
Decommissioning Cost	-	8,791	8,791	526	9,317
Transfers/reclassifications	-	(138)	(138)	138	
Impairment of asset		(348)	(348)	(3,116)	(3,464)
Disposals	-	-	-	(1,967)	(1,967)
Gross value as at 30 June 2013	97,200	217,289	314,489	927,820	1,242,309
Accumulated depreciation/ amortisation 1 July 2012	-	9,144	9,144	107,864	117,008
Depreciation/amortisation	-	10,306	10,306	51,509	61,815
Impairment losses	-	-	-	415	415
Transfers/reclassifications	-	(7,592)	(7,592)	7,592	-
Revaluation Adjustment	-	-	-	(222)	(222)
Adjustment for disposals	-	-	-	(146)	(146)
Accumulated depreciation/ amortisation 30 June 2013	-	11,858	11,858	167,012	178,870
Net book value as at 30 June 2013	97,200	205,431	302,631	760,808	1,063,439

	Consolidated	
	2014	2013
	$'000	$'000
8C. Inventories		
Raw materials and stores-not held for resale		
Stores - at cost	**14,733**	13,125
Cobalt-60 sources - at net realisable value	**145**	165
Reactor fuel and heavy water - at average purchase price	**4,484**	7,456
	19,362	20,746
Work in progress - at cost	**705**	496
Finished goods - at cost	**522**	394
Total inventories	**20,589**	21,636
8D. Intangibles		
Licences at cost	**3,385**	2,678
Less accumulated amortisation	**2,483**	1,667
	902	1,011
Design fees at cost	**1,568**	1,568
Less accumulated amortisation	**1,039**	724
	529	844
Intellectual property at cost	**51,210**	51,210
Less accumulated amortisation	**-**	-
	51,210	51,210
Intangibles under construction	**13,256**	12,862
Software at cost	**39,586**	36,344
Less accumulated amortisation	**31,539**	28,786
	8,047	7,558
Total intangibles	**73,944**	73,485

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

Movement summary 2013-14 for all consolidated intangibles irrespective of valuation basis

	Licenses	Design Fees	Intellectual Property	Software	Total
	$'000	$'000	$'000	$'000	$'000
Gross value as at 1 July 2013	2,678	1,568	51,210	49,206	104,662
Additions - new assets	551	-	-	10,327	10,878
Transfer/Reclassification	156			(6,211)	(6,055)
Asset write off		-	-	(480)	(480)
Disposals	-	-	-	-	-
Gross value as at 30 June 2014	3,385	1,568	51,210	52,842	109,005
Accumulated depreciation/ amortisation 1 July 2013	1,667	724	-	28,786	31,177
Depreciation/amortisation	816	315	-	2,830	3,961
Transfer/Reclassification	-	-	-	-	-
Asset write off	-	-	-	(77)	(77)
Adjustment for disposals	-	-	-	-	-
Accumulated depreciation/ amortisation 30 June 2014	2,483	1,039	-	31,539	35,061
Net book value as at 30 June 2014	902	529	51,210	21,303	73,944

Movement summary 2012-2013 for all consolidated intangibles irrespective of valuation basis

	Licenses	Design Fees	Intellectual Property	Software	Total
	$'000	$'000	$'000	$'000	$'000
Gross value as at 1 July 2012	1,224	1,562	1,125	44,409	48,320
Additions - new assets	1,454	6	-	4,797	6,257
NTP - IP	-	-	50,085	-	50,085
Transfer/Reclassification	-	-	-	-	-
Decommissioning Cost		-	-	-	-
Disposals	-	-	-	-	-
Gross value as at 30 June 2013	2,678	1,568	51,210	49,206	104,662
Accumulated depreciation/ amortisation 1 July 2012	1,111	357	-	26,052	27,520
Depreciation/amortisation	556	367	-	2,734	3,657
Transfer/Reclassification	-	-	-	-	-
Write back of accumulated depreciation	-	-	-	-	-
Accumulated depreciation/ amortisation 30 June 2013	1,667	724	-	28,786	31,177
Net book value as at 30 June 2013	1,011	844	51,210	20,420	73,485

Note:
No indicators of impairment were found for intangible assets.
No Intangibles are expected to be sold or disposed of within the next 12 months.

	Consolidated	
	2014	2013
	$'000	$'000
8E. Other non-financial assets		
Deferred tax asset	1,005	930
Prepayments	4,180	2,692
	5,185	3,622

	Consolidated	
	2014	2013
	$'000	$'000
9 Liabilities		
Provision		
9A. Employee provisions		
Annual leave	**12,485**	12,531
Long service leave	**26,164**	23,183
	38,649	35,714
Employee provisions are expected to be settled in:		
No more than 12 months	**6,987**	6,204
More than 12 months	**31,662**	29,510
Total employee provisions	**38,649**	35,714
9B. Decommissioning provisions		
Decommissioning cost (b)	**274,678**	286,568
	274,678	286,568
9C. Provision for intellectual property payment		
Provision for intellectual property payment	**49,717**	48,680
	49,717	48,680
9D. Other		
Other claims (a)	**49**	47
	49	47
Total provision	**363,093**	371,009
Payables		
9E. Suppliers		
Trade creditors	**16,417**	13,860
Total suppliers	**16,417**	13,860
Supplier payables expected to be settled within 12 months		
Related entities	**194**	763
External parties	**16,223**	13,097
Total suppliers	**16,417**	13,860
9F. Employees		
Accrued salaries and wages	**3,544**	3,033
Redundancy payment	**589**	323
Incentives	**2,854**	2,848
	6,987	6,204
9G. Grants		
Non-profit entities	**707**	682
	707	682
9H. Other		
Revenue received in advance	**16,639**	14,359
Other Payables	**3**	142
	16,642	14,501
Total payables	**40,753**	35,247

Notes:
(a) This provision relates to sales rebates.

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

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

9I. Provision movement reconciliation

	Provision for Decommissioning Costs $'000	Provision for intellectual property payment $'000	Provision for Other Claims $'000
Carrying amount 1 July 2012	**263,011**	**-**	**45**
Provisions not required		-	
Additional provisions made	9,317	48,680	2
Amounts used	(3,629)	-	-
Change in accounting estimate	3,109	-	-
Unwinding discount	14,760	-	-
Closing balance 30 June 2013	**286,568**	**48,680**	**47**
Carrying amount 1 July 2013	**286,568**	**48,680**	**47**
Provisions not required	**-**	**-**	**-**
Additional provisions made	**722**	**-**	**2**
Amounts used	**(5,797)**	**-**	**-**
Change in accounting estimate	**(23,550)**	**977**	**-**
Unwinding discount	**16,735**	**60**	**-**
Closing balance 30 June 2014	**274,678**	**49,717**	**49**

	Consolidated	
	2014	2013
	$'000	$'000
10 Equity		
Contributed equity		
Replacement research reactor equity injections		
Balance 1 July	**385,836**	385,836
Balance 30 June	**385,836**	385,836
Other equity injections		
Balance 1 July	**175,020**	103,520
Equity injections from Government	**48,125**	71,500
Balance 30 June	**223,145**	175,020
Total contributed equity	**608,981**	560,856
Reserves, including movements		
Asset revaluation reserve		
Balance 1 July	**468,169**	468,256
Revaluation - Decommissioning	**23,550**	(1,360)
Revaluation - Assets	**192**	1,273
Balance 30 June	**491,911**	468,169
OPAL depreciation reserve		
Balance 1 July	**9,061**	9,061
Balance 30 June (a)	**9,061**	9,061
Regional security of radioactive reserve		
Balance 1 July	**160**	228
Transferred to retained deficit (b)	**(160)**	(68)
Balance 30 June	**-**	160
Low Dose Nuclear Waste Repository		
Balance 1 July	**1,074**	1,074
Transferred to retained deficit (c)	**(1,074)**	-
Balance 30 June	**-**	1,074
Intermediate low level waste (ILLW) return		
Balance 1 July	**3,221**	1,652
Transferred from retained deficit (d)	**900**	1,569
Balance 30 June	**4,121**	3,221
Foreign currency reserve		
Balance 1 July	**299**	70
Movement (e)	**2**	229
Balance 30 June	**301**	299
Total reserves	**505,394**	481,984

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

		Consolidated	
		2014	2013
		$'000	$'000
10 Equity (continued)			
Retained deficit			
Retained deficit 1 July		**(164,598)**	(130,962)
Transfer from regional security of radioactive reserve	(b)	**160**	68
Transfer from Low Dose Nuclear Waste Repository	(c)	**1,074**	-
Transfer to Intermediate low level waste (ILLW) return	(d)	**(900)**	(1,569)
(Deficit) for the period		**(33,319)**	(32,135)
Retained deficit 30 June		**(197,583)**	(164,598)
Total equity		**916,792**	878,242

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

(b) Regional security of radioactive materials reserve
This reserve relates to RSRS/NRSE project that has now been closed and remaining balance was transferred to retained deficit.

(c) Low Dose Nuclear Waste Repository
This reserve relates to funding for low level waste facility at ANSTO for its own use and used by other Commonwealth agencies.

This reserve has now been fully utilised.

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

(e) Foreign currency reserve
This reserve relates to foreign currency translation at balance date.

11 Cash flow reconciliation

	Notes	Consolidated 2014 $'000	2013 $'000
Reconciliation of net cost of services to net cash from (used by) operating activities:			
Net cost of services		**(196,405)**	(189,470)
Revenue from Government		**163,011**	157,605
Income tax (expense) benefit		**75**	(270)
Adjustment for Non-cash items			
Depreciation/amortisation		**65,873**	65,887
Reversal of write-down of Investment		**-**	(5,000)
Net (gain) loss on disposal of non-financial assets		**(9)**	4,852
Write-down and impairment of assets		**1,701**	(3,639)
Unrealised foreign exchange (gain) loss		**1,336**	834
Unwinding of Discount - decommissioning costs		**16,795**	16,559
Asset free of charge		**(2,282)**	(685)
Movement in assets and liabilities			
Assets			
(Increase)/Decrease in trade goods and services receivables		**(4,393)**	2,265
Decrease/(Increase) in other receivables		**1,768**	(2,179)
(Increase) in GST receivables		**(81)**	(89)
(Increase) in accrued interest		**(2)**	(159)
(Increase)/Decrease in prepayments		**(1,488)**	55
Decrease in inventories		**1,047**	611
Liabilities			
Increase/(Decrease) in payables		**2,557**	(926)
Increase in employee entitlements		**3,718**	3,284
Increase in revenue received in advance		**2,305**	9,262
Increase in deferred income tax		**(75)**	270
Increase in other provision		**900**	1,806
(Decrease) in decommissioning cost provision		**(5,251)**	(520)
(Decrease) in interest bearing liabilities		**-**	(52)
Net cash from operating activities		**51,100**	60,301

12 Government funding

Revenue from Government		**163,011**	157,605
Government equity injection		**45,125**	48,500
Education Investment Fund equity injection		**3,000**	23,000
		211,136	229,105

Appropriations are made to the Department of Industry which are then paid to ANSTO.

ANSTO does not receive any Departmental Capital Budget (DCB).

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

13 Board membership

The members of the Board during the financial year and to the date of the report on the statements were:

Member	Appointed	Term Concluded	Reappointed	Term Concludes
P Greenfield	25 July 2010	24 July 2014		
A Scott	29 September 2011			28 September 2016
D Copolov	28 June 2012			27 June 2016
E Smyth	14 March 2013			13 March 2018
S Pond	1 July 2010	30 June 2014		
J Ryan	24 February 2011	9 October 2013		
J Raper	28 June 2012			27 June 2016
J McDowell	12 December 2013			12 December 2018
P Dobson	24 April 2014			23 April 2019
A Paterson	1 March 2009	28 February 2014	1 March 2014	28 February 2017

J Ryan resigned on 9 October 2013.

For the 2013-14 financial year the aggregate remuneration paid to members of the Board is disclosed in Note 14.

14 Remuneration of members of the Board

	Consolidated 2014 Number	2013 Number
The number of non-executive directors of ANSTO included in these figures are shown below in the relevant remuneration bands:		
Remuneration between		
$0 to $29,999	**2**	2
$30,000 to $59,999	**6**	5
$60,000 to $89,999	**1**	1
Total	**9**	8
Total remuneration received or due and receivable by directors of the entity	**334,006**	319,647

Remuneration of the Chief Executive Officer is included in Note 15: Remuneration of senior executives.

15 Remuneration of senior executives

Note 15A: Senior Executive Remuneration Expense for the Reporting Period

	Consolidated 2014 $	2013 $
Short-term employee benefits:		
Salary	**2,794,108**	4,331,295
Performance bonuses	**491,412**	752,500
Motor vehicle and other allowance	**32,780**	40,907
Total short-term employee benefits	**3,318,300**	5,124,702
Post-employment benefits:		
Superannuation	**372,538**	585,184
Total post-employment benefits	**372,538**	585,184
Other long-term benefits:		
Annual leave accrued	**235,095**	347,460
Long-service leave	**77,523**	135,513
Total other long-term benefits	**312,618**	482,973
Termination benefits	**-**	-
Total	**4,003,456**	6,192,859

Notes:

1. Note 15A is prepared on an accrual basis (therfore the performanc bonus expense disclosed above may differ from the cash 'Bonus paid' in Note 15B).

2. Note 15A excludes acting arrangements and part-year service where remuneration expensed for a senior executive was less than $195,000.

Note 15B: Average Annual Remuneration Packages and Bonus Paid for Substantive Senior Executives as at the end of the Reporting Period

	Consolidated as at 30 June 2014					
Average annual reportable remuneration[1]	**Substantive Senior Executives No.**	**Reportable salary[2] $**	**Contributed Superannuation[3] $**	**Reportable allowances[4] $**	**Bonus paid[5] $**	**Total reportable remuneration $**
Total remuneration (including part-time arrangements):						
$225,000 to $254,999	-	-	-	-	-	-
$255,000 to $284,999	1	218,118	25,000	-	28,476	271,594
$285,000 to $314,999	3	214,292	34,167	-	47,664	296,123
$315,000 to $344,999	1	240,104	44,402	-	48,223	332,729
$345,000 to $374,999	2	275,026	39,427	-	53,540	367,993
$375,000 to $404,999	1	293,859	25,000	-	60,840	379,699
$405,000 to $434,999	1	323,843	35,346	-	58,277	417,466
$525,000 to $554,999	-	-	-	-	-	-
$615,000 to $644,999	1	510,064	25,000	-	87,024	622,088
Total number of substantive senior executives	10					

	Consolidated as at 30 June 2013					
Average annual reportable remuneration[1]	**Substantive Senior Executives No.**	**Reportable salary[2] $**	**Contributed Superannuation[3] $**	**Reportable allowances[4] $**	**Bonus paid[5] $**	**Total reportable remuneration $**
Total remuneration (including part-time arrangements):						
$225,000 to $254,999	2	169,065	29,960	-	25,504	224,529
$255,000 to $284,999	5	204,761	32,067	-	36,046	272,874
$285,000 to $314,999	1	226,673	29,130	-	41,969	297,772
$315,000 to $344,999	3	239,804	34,205	-	44,045	318,054
$345,000 to $374,999	2	273,998	27,150	-	53,558	354,706
$375,000 to $404,999	1	313,488	32,933	-	52,671	399,092
$405,000 to $434,999	-	-	-	-		-
$525,000 to $554,999	1	419,851	39,091	-	80,466	539,408
$615,000 to $644,999	-	-	-	-	-	-
Total number of substantive senior executives	15					

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

Notes

1. This table reports substantive senior executives who perform controlling operational activities which directly impact the economic function and viability of the entity, received remuneration during the reporting period. Each row is an averaged figure based on headcount for individuals in the band.

2. 'Reportable salary' includes the following:
a) gross payments (less any bonuses paid, which are separated out and disclosed in the 'bonus paid' column);
b) reportable fringe benefits (at the net amount prior to 'grossing up' for tax purposes);
c) reportable employer superannuation contributions; and
d) exempt foreign employment income.

3. The 'contributed superannuation' amount is the cost to the entity for the provision of superannuation to substnative senior executives in that reportable remuneration band during the reporting period.

4. 'Reportable allowances' are the average actual allowances paid as per the 'total allowances' line on individuals' payment summaries.

5. 'Bonus paid' represents average actual bonuses paid during the reporting period in that reportable remuneration band. The 'bonus paid' within a particular band may vary between financial years due to various factors such as individuals commencing with or leaving the entity during the financial year.

Note 15C: Average Annual Reportable Remuneration Paid to Other Highly Paid Staff during the Reporting Period

	Consolidated as at 30 June 2014					
Average annual reportable remuneration[1]	**Staff No.**	**Reportable salary[2] $**	**Contributed Superannuation[3] $**	**Reportable allowances[4] $**	**Bonus paid[5] $**	**Total $**
Total remuneration (including part-time arrangements):						
$195,000 to $224,999	**24**	**168,654**	**29,235**	**-**	**9,864**	**207,753**
$225,000 to $254,999	**9**	**181,338**	**30,147**	**-**	**23,123**	**234,608**
$255,000 to $284,999	**2**	**229,550**	**27,917**	**-**	**11,827**	**269,294**
$285,000 to $314,999	**3**	**230,267**	**32,741**	**-**	**38,207**	**301,215**
$315,000 to $344,999	**3**	**252,858**	**29,560**	**-**	**39,815**	**322,233**
Total	**41**					

	Consolidated as at 30 June 2013					
Average annual reportable remuneration[1]	**Other highly paid staff No.**	**Reportable salary[2] $**	**Contributed Superannuation[3] $**	**Reportable allowances[4] $**	**Bonus paid[5] $**	**Total $**
Total remuneration (including part-time arrangements):						
$180,000 to $209,999	15	166,645	28,112	8	15,882	210,647
$210,000 to $239,999				-		-
$240,000 to $269,999	1	187,765	36,481	-	31,895	256,141
$270,000 to $299,999	2	241,915	27,559	-	33,143	302,617
$300,000 to $329,999		-	-	-	-	-
Total	18					

Notes

1. This table reports staff:
   a) who were employed by the entity during the reporting period;
   b) whose reportable remuneration was $195,000 or more for the financial period; and
   c) were not required to be disclosed in Tables 17B or director disclosures.

Each row is an averaged figure based on headcount for individuals in the band.

2. 'Reportable salary' includes the following:
   a) gross payments (less any bonuses paid, which are separated out and disclosed in the 'bonus paid' column);
   b) reportable fringe benefits (at the net amount prior to 'grossing up' for tax purposes);
   c) reportable employer superannuation contributions; and
   d) exempt foreign employment income.
3. The 'contributed superannuation' amount is the average cost to the entity for the provision of superannuation benefits to substantive senior executives in that reportable remuneration band during the reporting period.
4. 'Reportable allowances' are the average actual allowances paid as per the 'total allowances' line on individuals' payment summaries.
5. 'Bonus paid' represents average actual bonuses paid during the reporting period in that reportable remuneration band. The 'bonus paid' within a particular band may vary between financial years due to various factors such as individuals commencing with or leaving the entity during the financial year.

16 OPAL Nuclear Research Reactor

In the 2013-14 financial year, the OPAL research reactor operated for 294 days at high power, which translates to a total availability of 81% and a planned availability against the schedule of 97%. OPAL continues to demonstrate it remains one of the world's most highly available multipurpose research reactors.

Successful production of reactor based radio-pharmaceuticals, neutron activation analysis for scientific research, and irradiation of neutron transmutation doped silicon was achieved during the year. The efficiency of the delivery of these products and services was enhanced through the ANSTO wide operational excellence initiative.

The Cold Neutron Source, which supplies important low energy neutrons for research, has operated with a planned availability of 99%, which is much greater than in previous years. This improvement is owed to a number of engineering improvements.

ANSTO plans to operate the reactor for about 300 days in 2014-15.

17 Insurances

Insurance risks, including professional indemnity, general liability, industrial special risk for property used substantially for commercial purposes, directors and officers, and travel, are placed through Comcover, the Government's insurable risk managed fund.

Workers compensation is insured through Comcare Australia and by virtue of statute under the *Safety Rehabilitation and Compensation Act 1988.*

A Deed of Indemnity between the Commonwealth Government and ANSTO, under which the government has formally agreed to indemnify ANSTO and ANSTO Officers from any loss or liability arising from claims caused by ionising radiation, remains in place until August 2018. This indemnity does not specify that subsidiaries are included.

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

	Consolidated	
	2014	2013
	$'000	$'000
18 Remuneration of auditors		
Amounts received or due and receivable by ANAO for:		
An audit or review of the financial report of the entity and any other entity in the consolidated entity	**245,500**	223,500
Other services in relation to the entity and any other entity in the consolidated entity		
- assurance related	**-**	28,875
- special audits required by regulators	**5,000**	5,000
- other non-audit related	**-**	23,100
Amounts received or due and receivable by entities other than the ANAO for:		
An audit or review of the financial report of the entity and any other entity in the consolidated entity	**8,372**	7.600
Other services in relation to the entity and any other entity in the consolidated entity		
- other non-audit related (a)	**51,545**	-
	310,417	288,075

(a) In 2014, the Department of Industry has requested and paid for the due diligence work on Australian Synchrotron Holding Company (ASHCo).

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

19 Related party disclosures

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.

	Consolidated	
20 Trust money		
	2014	2013
	$'000	$'000
ANSTO receives monies from trade creditors as security deposits for contracts to be performed. These monies are held in a Trust Account and refunded to the respective trade creditors on satisfactory completion of the contract.		
Balance 1 July	**8**	8
Add: receipts	**-**	-
Deduct: payments	**-**	-
Balance 30 June	**8**	8

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

21 Financial instruments

(a) Categories of financial instruments

Financial Instruments	Notes	Consolidated			
		Carrying Amount 2014 $'000	**Fair Value 2014 $'000**	Carrying Amount 2013 $'000	Fair Value 2013 $'000
Financial assets					
Loans and receivables					
Cash at bank	7A	**3,782**	**3,782**	3,899	3,899
Investment held to maturity	7C	**130,692**	**130,692**	98,083	98,083
Investment	7C	**5,000**	**5,000**	5,000	5,000
Receivables for goods and services	7B	**14,090**	**14,090**	11,190	11,190
Interest accrued	7B	**453**	**453**	451	451
Other	7B	**1,259**	**1,259**	3,027	3,027
Total financial assets (recognised)		**155,276**	**155,276**	121,650	121,650
Total financial liabilities					
At amortised cost					
Trade creditors	9E	**16,417**	**16,417**	13,860	13,860
Employees	9F	**6,987**	**6,987**	6,204	6,204
Grant received in advance	9G	**707**	**707**	682	682
Other	9H	**16,642**	**16,642**	14,501	14,501
Total financial liabilities (recognised)		**40,753**	**40,753**	35,247	35,247

(b) Net income from financial assets

Financial Instruments	Notes	Consolidated	
		2014 $'000	2013 $'000
Financial assets			
Loans and receivables			
Cash at bank		**77**	77
Investment held to maturity		**4,004**	3,237
Net Income from financial assets		**4,081**	3,314

(c) Net expenses from financial liabilities

There were no expenses from financial liabilities for 2014 (2013: $0).

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

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 revenue received in advance, all of which are short-term in nature, are in accord with their carrying amounts.

(d) Credit risk exposures

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 7B. ANSTO has assessed the risk of the default on payment and has provided for doubtful debts account as per note 7B(b).

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

21 Financial instruments (cont.)

(e) Liquidity risk

ANSTO financial liabilities are payables and other interest bearing liabilities. The exposure to liquidity risk is based on the notion that the Organisation 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 the Organisation and internal policies and procedures put in place to ensure there are appropriate resources to meet its financial obligations.

Consolidated							
Financial Instruments	**Notes**						
		Consolidated					
2014		**Carrying Amount**	**On Demand**	**1 Year or Less**	**1 to 2 Years**	**More than 2 years**	**Total Contractual Cash Flows**
		$'000	**$'000**	**$'000**	**$'000**	**$'000**	**$'000**
Financial liabilities							
Trade creditors	9E	**16,417**	**-**	**16,417**	**-**	**-**	**16,417**
Employees	9F	**6,987**	**-**	**6,987**	**-**	**-**	**6,987**
Grant received in advance	9G	**707**	**-**	**707**	**-**	**-**	**707**
Other	9H	**16,642**	**-**	**16,642**	**-**	**-**	**16,642**
Total financial liabilities (recognised)		**40,753**	**-**	**40,753**	**-**	**-**	**40,753**

		Consolidated					
2013		Carrying Amount	On Demand	1 Year or Less	1 to 2 Years	More than 2 years	Total Contractual Cash Flows
		$'000	$'000	$'000	$'000	$'000	$'000
Financial liabilities							
Trade creditors	9E	13,860	-	13,860	-	-	13,860
Employees	9F	6,204	-	6,204	-	-	6,204
Grant received in advance	9G	682	-	682	-	-	682
Other	9H	14,501	-	14,501	-	-	14,501
Total financial liabilities (recognised)		35,247	-	35,247	-	-	35,247

21 Financial instruments (cont.)

(f) Market risk - consolidated

(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	Consolidated					
	Change in variable		Effect on		Effect on	
	2014	2013	**0.60%**	**-0.60%**	1.20%	-1.20%
			Profit or loss	**Equity**	Profit or loss	Equity
$'000			**2014 $'000**	**2014 $'000**	2013 $'000	2013 $'000
Investment held to maturity	**130,692**	98,083				
Interest	**0.60%**	1.20%	**784**	**784**	1,177	1,177
Interest	**-0.60%**	-1.20%	**(784)**	**(784)**	(1,177)	(1,177)

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 60 basis points (2013: 120 basis points) shock level was selected as a 'reasonably possible' change in market interest rate.

60 basis points is managements best estimate of future volatility.

(ii) Foreign currency rate
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	Consolidated					
	Change in variable		Effect on		Effect on	
	2014	**2013**	**11.50%**	**-11.50%**	15.70%	-15.70%
			Profit or loss	**Equity**	Profit or loss	Equity
$'000			**2014 $'000**	**2014 $'000**	2013 $'000	2013 $'000
USD Currency	**437**	325				
Foreign currency	**11.50%**	15.70%	**50**	**50**	51	51
Foreign currency	**-11.50%**	-15.70%	**(50)**	**(50)**	(51)	(51)

The method used to arrive at the possible risk of 11.5% (2013, 15.7%) 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 USD and EURO currencies. This information is then revised and adjusted for reasonableness under the current economic circumstances.

11.5% (2013, 15.7%) is managements best estimate of future USD foreign exchange volatility.

(g) Reconciliation of level 3 fair value hierarchy

	Investments	
	2014 $'000	2013 $'000
Opening balance	**5,000**	**-**
Total gains or losses for the period recognised in profit and loss	**-**	5,000
Closing Balance	**5,000**	5,000

The investment in the Australian Synchrotron Holding Company of $5M is assessed as not requiring impairment testing due to the certainty regarding future funding with the changed circumstances resulting in securing $100M funding to June 2016 and ANSTO being chosen as the preferred operator from 1 January 2013 and ongoing discussions regarding future support of the Synchrotron.

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

	Consolidated	
	2014	2013
	$'000	$'000
22 Operating lease arrangements		
Payment recognised as expense		
Minimum lease payments	**193**	193
	193	193
Operating lease commitments		
One year or less	**137**	137
From one to five years	**685**	685
Over five years	**629**	766
	1,451	1,588

ANSTO has a twenty five year lease contract with Central Sydney Area Health Services that will expire on 29 January 2025 with an annual rental payable of $137,000 (2011: $137,000).The annual rental is subject to review every three years.

23 Income tax expense (benefit)		
Current year tax charge	**274**	122
Timing difference	**(303)**	329
Over provision in respect of prior years	**104**	(721)
Total income tax expense (benefit)	**75**	(270)

ANSTO's subsidiaries are subject to normal taxation except for Synchrotron Light Source Australia Pty Ltd which is a tax exempt entity being charitable institution.

Unbooked deferred tax assets in relation to unrecouped tax losses including timing difference in the subsidiaries is $1 thousand (2013: $32 thousand)

The total deferred tax assets recognised in relation to PETNET Australia Pty Ltd for 30 June 2014 is $939 thousand (2013:$930 thousand).

The total deferred tax assets recognised in relation to ANSTO Nuclear Medine Pty Ltd for 30 June 2014 is $65 thousand (2013:nil).

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

	Consolidated	
	2014	2013
	$'000	$'000
24 Other comprehensive income		
Changes in asset revaluation reserves		
Revaluation - Decommissioning	**23,550**	(1,360)
Revaluation - Assets	**192**	1,273
Total revaluation adjustments in other comprehensive income	**23,742**	(87)

25 Information relating to ANSTO ('the parent entity')

ANSTO only presents the financial statements on a Consolidated basis. A summary of ANSTO (parent company only) financial information is as follows:

	FINANCIAL YEAR	
	2014	2013
	$'000	$'000
Current assets	**147,323**	114,489
Non-current assets	**1,153,645**	1,151,534
Total assets	**1,300,968**	1,266,023
Current liabilities	**29,344**	24,812
Non-current assets	**356,692**	364,771
Total liabilities	**386,036**	389,583
Contributed equity	**608,981**	560,856
Retained surplus	**(198,867)**	(166,018)
Asset revaluation reserve	**491,636**	468,086
Other reserve	**13,182**	13,516
Total equity	**914,932**	876,440
Profit or loss of the parent entity	**(33,184)**	(34,581)
Total comprehensive income of the parent entity	**(9,633)**	(34,476)

Notes to and forming part of the Financial Statements for the year ended 30 June 2014

25 Information relating to ANSTO ('the parent entity') (cont.)

Contingent Liabilities

On 25 June 2012, Cyclopharm Limited's wholly owned subsidiary, CycloPet Pty Ltd., commenced proceedings against ANSTO and PETNET Australia Pty Ltd, the wholly owned subsidiary of ANSTO in the Federal Court of Australia alleging anticompetitive conduct.

ANSTO and PETNET Australia Pty Ltd will strongly defend the case and are managing litigation claim exposure under the Professional Indemnity section of the 2013-14 Comcover policy. The parties are scheduled to attend a mediation meeting in August 2014 and court proceedings are currently listed for a hearing commencing in September 2014.

26 Transfer of financial balances from ASCo closure

On 22 March 2013, $2,718 thousand of cash was transferred from ASCo on phase 1 of the transfer of operations to SLSA. This included employee leave entitlements, contributions in advance, accrued revenue and prepayments. On 5 April 2013 $987 thousand of cash was transferred from ASCo on its closure and this represented surplus balance.

	FINANCIAL YEAR	
	2014 $'000	2013 $'000
Cash	**-**	3,705
Accrued revenue	**-**	64
Prepayments (current and non-current)	**-**	104
Payables	**-**	(247)
Contributions in advance	**-**	(1,909)
Employee entitlements – annual leave	**-**	(1,080)
Employee entitlements – long service leave	**-**	(637)
	-	-

Note 27: 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.

Note 27A: Fair Value Measurement

Fair value measurements at the end of the reporting period by hierarchy for assets and liabilities in 2014

	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	308,189		-	308,189
Infrastructure, plant and equipment	756,708		21,277	735,431
Total non-financial assets	**1,064,897**		**21,277**	**1,043,620**
Liabilities:				
Decommissioning provision	274,678			274,678
NTP provision	49,717			49,717
Total liabilities	**324, 395**			**324,395**

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

Note 27B: 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 in 2014				
	Category (Level 2 or Level 3)	Fair value $'000	Valuation technique(s)[1]	Inputs used
Non-financial assets:				
Land	3	97,200	Market Approach	adjusted market transactions (zoning, access, existing use, size, topography, location)
Buildings	3	210,989 -	Depreciated Replacement Cost (DRC)	Replacement Cost New
Infrastructure, plant and equipment	2 3	21,277 735,431	Market Approach Depreciated Replacement Cost (DRC)	Consumed economic benefit / Obsolescence of asset adjusted market transactions Replacement Cost New Consumed economic benefit /Obsolescence of asset

1. There has been no changes to valuation techniques.

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 at 31 March 2011. 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 the 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, where practicable, regardless of the timing of the last specific valuation. The entity has engaged Australian Valuation Solutions (AVS) to provide written assurance that the models developed comply with AASB 13.

Land
Infrastructure, Plant & 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 cost (Depreciated Replacement Cost or 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.

Note 27C: Reconciliation for recurring Level 3 fair value measurements
Recurring Level 3 fair value measurements - reconciliation for assets

	Land and Buildings **2014 $'000**	Infrastructure, plant and equipment **2014 $'000**	Total **2014 $'000**
Open balance	**299,292**	**758,593**	**1,057,885**
Total gains/(losses) recognised in net of services	(29,035)	(67,537)	(96,572)
Total gains/(losses) recognised in other comprehensive income	76	116	192
Purchases	38,135	46,951	85,086
Sales	(279)	(2,692)	(2,971)
Closing balance	**308,189**	**735,431**	**1,043,620**

CORPORATE GOVERNANCE

ANSTO Statement on Corporate Governance

ANSTO is an Australian Government statutory authority with its own Board that is 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.

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

As a Government statutory authority, ANSTO's operations and governance arrangements (for the reporting period 2013-14) were also subject to the provisions of the *Commonwealth Authorities and Companies (CAC) Act 1997* and the Regulations issued pursuant to that Act.

In October 2013, ANSTO prepared and lodged an annual '*CAC Act – Compliance Report*' with the Minister for Finance and ANSTO's responsible Minister (covering the reporting period 2012/2013). This report confirmed ANSTO's compliance with the *CAC Act* and Regulations and the General Policy Orders of the Commonwealth Government applicable to ANSTO. In addition, the report confirmed ANSTO's ongoing financial sustainability.

As a Commonwealth statutory authority, ANSTO has established a corporate governance framework that meets existing legislative requirements. In doing so, ANSTO strives to apply the principles of good corporate governance and to continuously improve its corporate governance practices.

ANSTO's governance structures and processes are underpinned by its corporate values and it's 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.

The Public Governance, Performance and Accountability Act 2013 (PGPA Act), together with its accompanying rules and guidance came into effect from 1 July 2014 and replaced the *CAC Act*. Under the *PGPA Act*, ANSTO is classified as a corporate Commonwealth entity.

The *PGPA Act* promotes high standards of governance, performance and public accountability and establishes a core set of obligations that apply to all 'officials' within Commonwealth entities.

ANSTO is actively working through the requirements of the *PGPA Act* and the associated Rules.

Responsible Minister

In 2013/14 the Ministers responsible for ANSTO were the Minister for Innovation, Industry, Science, Research and Tertiary Education, and subsequently the Minister for Industry.

Under the *ANSTO Act* and *CAC Act* the relevant Minister has the power to 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 general policies of the Commonwealth.

In this regard, the previous Minister provided the ANSTO Board with a *Statement of Expectations* relating to the Board's role in setting the strategic direction of the organisation, the governance of the organisation and the provision of information to the Minister. This *Statement of Expectations* was acknowledged by the Board through a *Statement of Intent*.

A *Public Research Agency Charter* was also signed by the then Minister and the Board. This document recognises that the primary functions of ANSTO are to conduct scientific research and development in relation to the applications of nuclear science and technology; to deliver specialised

advice, scientific services and products to government, universities, other research organisations, international organisations and businesses, and to operate unique nuclear facilities.

The Charter also provided clear guidance to ANSTO and its individual researchers on the provision of scientific advice and engaging in public debate.

Nuclear liability

A *Deed of Indemnity* (executed on 27 August 2008, for a period of ten-years) commits the Commonwealth Government to meeting any damages awarded against ANSTO, its employees and contractors for damage caused by ionising radiation. This indemnity is supplemental to ANSTO's coverage under cover provided with the Commonwealth's insurance body, Comcover. Neither that Deed nor its predecessor (executed in 1998) has been invoked.

Ministerial directions

No Ministerial Directions, issued under either the *ANSTO Act* or *CAC Act*, were received by the ANSTO Board in 2013-14.

There are a number of existing Ministerial Directions received by the ANSTO Board in previous years that continue to apply to ANSTO's operations (for the reporting period 2013-14). These directions require ANSTO to comply with the following Commonwealth policies:

- Commonwealth Fraud Control Guidelines
- Commonwealth Procurement Rules
- *CAC Act* Compliance Reporting
- Australian Government Employment Bargaining Framework

In addition to these Directions, ANSTO has elected to comply with the following 'General Policy Orders' of the Commonwealth Government:

- Australian Government Foreign Exchange Risk Management Guidelines
- Australian Government Cost Recovery Guidelines
- Australian Government Competitive Neutrality Guidelines
- Protective Security Policy Framework

Notification of 'Significant' Events

Under sections 15 and 16 of the *CAC Act* and in accordance with the Minister's *Statement of Expectations*, ANSTO was required to provide the Minister with written notification of specified events and, more generally, to keep the responsible Minister informed of its operations and those of its subsidiaries.

During the period 2013/14, one such notification was provided to the Minister. This notification related to the incorporation of ANSTO Nuclear Medicine (ANM) Pty Ltd.

ANSTO Board

ANSTO is governed by a Board which is responsible to the Australian Government for the overall direction, performance and governance of the organisation.

ANSTO's Corporate Governance framework supports the effective operation of the ANSTO Board in executing its statutory and fiduciary duties under relevant Acts, particularly the ANSTO and CAC Acts.

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

The responsibilities and duties of the Board and its relationship with Executive Management are set out in a Board Charter.

The principal governance responsibilities of the Board are to:

- select, appoint and monitor the performance of the Chief Executive Officer;
- 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.

The operation and performance of the ANSTO Board was also governed by the *CAC Act*, which established a range of integrity, accountability and governance arrangements that were to be adopted by all CAC agency Boards.

A key obligation under the *CAC Act* was the need for Board members to disclose any material personal interests in a matter that was being considered by the Board. The *CAC Act* also prohibited participation, deliberation and decision-making by any member on such matters. As reported in the ANSTO '*CAC Act – Compliance Report*', the Board was satisfied that it has discharged its duties and obligations in accordance with the relevant *CAC Act* requirements.

The effectiveness and performance of the Board and the individual members of the Board are evaluated annually. The Board Chairperson leads the evaluation process.

The remuneration and allowances payable to members of the Board, including the Chief Executive Officer, are determined by the Australian Government Remuneration Tribunal. Remuneration of members of the Board is disclosed in ANSTO's Annual Report.

Related entity transactions

During the reporting period the ANSTO Board did not make any related entity decisions as per the Commonwealth Authorities (Annual Reporting) Orders 2011.

Composition of the Board

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

The Chief Executive Officer manages the affairs of ANSTO, subject to the directions of, and in accordance with, policies determined by the Board. Senior management attends Board meetings as required to report on matters relevant to their individual areas of responsibility.

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 the interests of their role and duties on the Board. Newly appointed Board members are inducted in the organisation's operations and activities, and their duties and responsibilities as a Board member of a Commonwealth Statutory Authority.

The Board meets regularly in accordance with a formally approved timetable and agenda. Six Board meetings were held during the 2013-14 financial year. Details of the number of Board meetings attended by each member during the financial year 2013-14 are outlined in **Table 1**.

Board committees

The ANSTO Board operates a Risk and Audit Committee (RAC), in accordance with *CAC Act* requirements and corporate governance best practice, and a Remuneration Committee.

Risk and Audit Committee

The overall purpose of the RAC is to provide independent assurance and assistance to the Board in relation to ANSTO's risk, control and compliance environment and its external accountability responsibilities.

The RAC assists the Board in overseeing:

- the integrity of the organisation's risk and compliance management processes, including the effective management of key organisational risks;
- compliance with legal and regulatory requirements;
- safety, environmental and quality systems and their performance;
- the quality and integrity of the organisation's financial reporting;
- the qualification and independence of the external auditors;
- the scope and effectiveness of the external audit function; and
- the effectiveness of the organisation's internal controls and internal audit function.

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. Membership of the RAC consists of at least three members drawn from the Board, at least one member of which must have specific accounting and financial management experience with an understanding of accounting and auditing standards in a public sector environment.

The Chair of the ANSTO Board, the Chief Executive Officer, Chief Financial Officer, the Senior Manager, Governance, Risk, Compliance and Assurance (who holds the position of Head of Internal Audit) and representatives from ANSTO management who are not members of the committee, may attend all or part of each RAC meeting as observers, by invitation of the committee chair.

Representatives from the Australian National Audit Office (ANAO) and their contracted service provider (currently Deloitte) also attend each RAC meeting, by invitation of the committee chair.

Table 1

Member	Eligible to attend	Attended
Dr Paul Greenfield AO (Chairman)	6	6
Professor David Copolov OAM	6	5
Ms Penelope J Dobson	1	1
Mr Jim W McDowell (Deputy Chair)	3	3
Dr Susan Pond AM	6	6
Professor Judy A Raper	6	5
Mr John Ryan PSM	2	2
Ms Erica Smyth	6	6
Professor Andrew M Scott	6	6
Dr Adrian Paterson (Chief Executive Officer)	6	5

Critically, from a governance perspective, the RAC:

- considers the organisation's compliance with regulatory obligations; in particular those imposed on the organisation by its regulators, and obtains assurances from management that appropriate controls are in place to ensure compliance
- meets the organisation's external and internal auditors and executive management regularly to consider key risks which may influence the achievement of the organisation's objectives, reviews the audit plans prepared by external and internal auditors, and reviews accounting, auditing, financial reporting, corporate governance and compliance matters;
- assesses the independence of the external auditor and approves the external auditor's annual Engagement Letter; and
- assesses the performance of the internal audit function, approves the Internal Audit Charter and annual work plan and reviews all Internal Audit reports.

The Risk and Audit Committee meets four times a year, in addition to an annual Board Risk Workshop. Details of the number of RAC meetings attended by each member during the financial year 2013-14 are provided in **Table 2**.

Remuneration Committee

The overall purpose of the Remuneration Committee is to:

- review and monitor the overall remuneration policies and practices of ANSTO;
- recommend adjustments to the Chief Executive's remuneration package to the Board;
- consult with the Chief Executive in the setting of remuneration packages for senior ANSTO executives; and
- consider any other matter referred to the committee by the Board.

The role, purpose and responsibilities of the committee are set out in the Remuneration Committee Charter.

The Remuneration Committee members for the period 2013-14 were Dr Paul Greenfield (Chair), Dr Susan Pond (to April 2014) and Mr Jim McDowell (from April 2014). The Chief Executive Officer and other ANSTO managers attend committee meetings or relevant parts by invitation of the committee chair.

The committee met on one occasion during the 2013-14 financial year.

External Audit

Under Section 8 of the CAC Act, the Commonwealth Auditor-General, through the ANAO, is the external auditor for ANSTO. For the year 2013-14, the ANAO contracted with Deloitte Australia to undertake the ANSTO external audit. In accordance with auditing standards, Deloitte Australia is only able to provide ANSTO with external audit services.

Risk management

The Board is responsible for the governance of ANSTO's strategic and operational risks This is achieved through formal processes which include the development and implementation of dedicated policies and plans for the systematic and disciplined evaluation and improvement of the effectiveness of ANSTO's risk management, internal control, compliance, governance and assurance processes.

Table 2

Member	Eligible to attend	Attended
Dr Susan Pond AM (Chair)	4	4
Professor David Copolov OAM	4	3
Ms Penelope J Dobson	1	1
Mr Jim W McDowell	2	2
Professor Judy A Raper	4	3
Mr John Ryan PSM	2	2
Professor Andrew M Scott	4	4
Ms Erica Smyth	4	4

ANSTO's management is accountable to the Board for designing, implementing and monitoring the risk management system and its integration into the day-to-day activities of the organisation.

The Board recognises that developing and implementing ANSTO's risk management system and its related strategies requires careful consideration and a balance between risk and opportunity. In this regard, the Board ensures that it understands the implications of risks taken by management, as well as the potential impact of risk-taking on the organisation's stakeholders. This objective is achieved though the regular receipt and review of the register of the organisation's key risks. Particular attention is focused on those risks that may negatively impact the sustainability and reputation of the organisation. The Board also receives regular assurance reports and briefings regarding the implementation of the risk management plan and the risk management maturity of the organisation.

ANSTO's enterprise-wide risk management process pursues the following principal objectives:

- to ensure that significant business risks are systematically identified, analysed and managed to acceptable levels based on risk appetite levels as approved by the Board;
- to achieve an optimal risk-reward balance; and
- to ensure that risk management is embedded in all decision making processes, including planning, projects, operations and disposals.

The organisation's enterprise-wide risk management process is guided by the following key principles:

- clear assignment of responsibilities and accountabilities;
- a common enterprise-wide risk management framework;
- a set of enabling risk management capabilities through measurement, standardisation of risk management processes and systems, a common risk language and risk management training;
- the identification of uncertain future events that may influence the achievement of business plans and organisational objectives; and
- the integration of risk management activities within the organisation and across its value chains.

ANSTO's integrated risk management approach entails the determination and development of risk profiles at

organisational, divisional, functional and process levels. In this context, risks are considered at:

- organisational level through the management of strategic risks that may impact the organisation's ability to achieve its strategic objectives on a sustainable basis;
- divisional and functional levels in achieving objectives that are closely aligned to the ANSTO group strategy; and
- process level to include the management of operational, financial, project, compliance and legal risks that may have an impact on people and the environment.

Business Resilience

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

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

Legal and Regulatory Compliance

ANSTO operates within a complex and highly regulated business environment. In recognition of this environment, ANSTO has established and continues to improve and strengthen a comprehensive range of strategies, policies, systems, 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 has been achieved through the on-going activities of the Governance, Risk, Compliance and Assurance (GRCA) function.

In the year 2013-14, ANSTO further evaluated and improved its compliance strategies.

The Board, through the RAC, monitors the implementation and improvement of ANSTO's legal and regulatory compliance framework.

Business Ethics and Fraud Control

The ANSTO Board and Chief Executive Officer have approved an ANSTO Code of Ethics that provides all ANSTO employees and contracted staff with a framework for ethical decision-making and which 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. These guides address matters such as: managing conflicts of interest; harassment and bullying; gifts and benefits; hospitality; insider trading; and, email and internet usage.

ANSTO's ethical values and standards are reinforced through the induction training provided to new employees; training / awareness courses and programs for managers and staff (that includes targeted 'protective security' training); staff engagement surveys; and through the ANSTO Enterprise Agreement.

Oversight of ANSTO's ethics programs and strategies is through the GRCA function within the Office of the Chief Executive Officer.

The Australian Government, through the *Commonwealth Fraud Control Guidelines (CFCG) 2011* issued pursuant to section 28 of the *CAC Act*, places a legal obligation on ANSTO to establish a comprehensive fraud and corruption prevention program.

The CFCG articulates the government's expectations for the implementation of effective fraud control measures by Commonwealth agencies. The key expectation is the obligation, placed on the ANSTO Board, to be satisfied that ANSTO complies with the mandatory requirements of the guidelines, most notably the:

- conduct of fraud risk assessments
- development and maintenance of a fraud control policy and plan
- development and fostering of ethical conduct standards
- implementation of fraud / ethics training and awareness programs
- establishment of appropriate systems to detect fraud, particularly in areas of high risk
- establishment and operation of appropriate channels for reporting suspected fraud
- establishment and operation of appropriate systems to assess, investigate and determine reported incidents of alleged or suspected fraud (including the adoption of appropriate 'investigation standards')
- referral of matters to law enforcement agencies

In accordance with the obligations under the CFCG, 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 specific fraud control and ethics policies, standards and procedures that serve to minimise the incidence of fraud and other forms of unacceptable behaviour. Procedures and processes for fraud prevention, detection, reporting and investigation standards support this obligation.

The Public Interest Disclosure Act 2013 (PID Act) came into effect on 15 January 2014 and aims to promote integrity and accountability in the Australian Public Sector by encouraging the disclosure of information about actual or suspected wrongdoing, protecting people who make disclosures and ensuring that disclosures are properly investigated and dealt with. ANSTO has established a PID Scheme (including a PID reporting scheme) consistent with the requirements of *PID Act* and the guidance provided by the Commonwealth Ombudsman.

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 Chief Executive Officer with independent and objective assurance and advisory services that 'add value' and which 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 approved by the RAC.

A comprehensive report on the findings and recommendations arising from each internal audit engagement is presented to the RAC. Follow-up reviews are conducted to ensure that all internal audit recommendations and 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 administratively to the Chief Executive Officer.

The Head of Internal Audit attends executive management meetings and also has unrestricted access to Board and Committee minutes and submissions.

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

Internal Control and 'Combined' Assurance

The Board is ultimately responsible for the internal control system which is designed to provide reasonable assurance regarding the achievement of business objectives relating to the effectiveness and efficiency of ANSTO's operations, the reliability of financial reporting and compliance with applicable laws and regulations.

ANSTO, through the GRCA function within the Office of the Chief Executive Officer, continues to develop its 'combined assurance' model that identifies, describes and 'maps' all groups, persons and functions, both internal and external to ANSTO, that provide 'assurance' that ANSTO's functions, operations, systems and processes are being managed in a controlled, compliant, efficient and effective manner.

This mapping of the assurance landscape is designed to provide the RAC and executive management with greater insight into the functions and activities across ANSTO's operations where the failure of internal controls could give rise to 'material' strategic, operational or compliance risk, and to provide an understanding of the depth and breadth of assurance arrangements covering such functions and activities.

This analysis is used to:

- identify gaps in assurance coverage and duplication of assurance effort
- help assess, improve and report (to the Board) the overall effectiveness of ANSTO's Internal Control environment
- monitor the ongoing development of ANSTO's Governance, Risk, Compliance, Business Ethics and Combined Assurance frameworks
- assist in the framing of future Internal Audit plans and engagements

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 2013-14 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.

Indemnities and insurance premiums for officers

ANSTO's insurance coverage with Comcover includes professional indemnity and directors' and officers' liability. Certain sections of the *CAC 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. Steps have been taken during the incorporation of Synchrotron Light Source Australia Pty Ltd to ensure that the entity is within the scope of ANSTO's insurance cover for 2013-14.

APPENDIX 1

Equality of Employment Opportunity

ANSTO's 2012-2014 Certified Enterprise Agreement reaffirmed the organisation's commitment to:

1. Supporting staff achieve a balance in their work and personal life including reviewed working from home and phased retirement provisions
2. Providing a positive working environment through preventing workplace bullying and harassment
3. Recognising the value of diversity in the workplace and making all reasonable endeavours to improve diversity of ANSTO's workforce, including Aboriginal Torres Strait Islander employees, employees with a disability and employees from a culturally and linguistically diverse background.

The Enterprise Agreement also contains extended maternity leave and paid paternity leave entitlements.

Family services and Childcare Centre

ANSTO KU Children's Centre, was opened on 6 September 2013. KU is an employer-sponsored centre, offering child care services to ANSTO staff as a priority as well as members of ANSTO subsidiaries and the wider community. ANSTO staff and its subsidiaries also have the ability to salary package the centres fees.

It has been architecturally designed with a strong consideration for the surrounding environment and creating a facility that will deliver quality care synonymous with the reputation of KU centres across Australia.

The following represents ANSTO intake on available spaces. The numbers may vary due to the varied nature of child care and not all children attending every day.

Places	ANSTO	Community
0-2	16	5
2-3	18	5
3-6	25	18

Gender Equity at ANSTO

Gender equity is about creating workplace and employment opportunities for all staff (both male and female) ensuring ANSTO remains an employer of choice in the scientific community. ANSTO has introduced a Gender Equity Committee, endorsed by the Board and executive management.

APPENDIX 1

Equality of Employment Opportunity

Objectives of the Committee

The aim of ANSTO's gender equity strategy is to achieve broadly equal outcomes for both male and female employees. The five year strategy will review a variety of employment practices which include (but is not limited to) ensuring that ANSTO employment opportunities attract both male and females applicants, enables balanced succession planning opportunities for senior management roles, and introduces balanced, family-friendly policies and working arrangements that are accessible to both men and women.

The strategy will be driven by the Gender Equity Committee which has been supported by the CEO, has endorsed by the Board including support and input from executives.

Next steps

Five teams are working on each of the five objectives in the Gender Equity Strategy; culture, framework, flexibility, outreach and recognition.

Women in Engineering

Traditionally, women have been under-represented in engineering. ANSTO is actively recruiting women and has a set goal of boosting female enrolments to 25 per cent by 2020. In February, ANSTO hired two female apprentices in engineering. Expanding ANSTO's recruitment strategies (in line with the objectives of ANSTO's Gender Equity Program), encourage both male and female applicants, delivering an increase in applications from highly skilled applicants of both genders.

Health and Wellbeing Programs

ANSTO's Health and Wellbeing Programs continued to offer benefits for employees. A number of health promotion activities have been undertaken, which include annual flu vaccines, participate in promotion of surveillance regarding bowel cancer (through provision of bowel screening kits in conjunction with the Rotary club community initiative); site physio service as part of early intervention for injury management and return to work; and a health Programme that focuses on work place conditioning for workers. We also offer a fully functioning health centre with a registered nurse and fully functioning treatment room Monday to Friday as part of early intervention and wellness service to workers.

Harassment Prevention and Management

ANSTO is committed to the prevention of workplace harassment, discrimination and bullying. This is communicated to staff through our recruitment and induction process, induction process and site wide bullying and harassment sessions which cover information in the Maintaining a Workplace Free from Harassment, Bullying or Discrimination policy.

APPENDIX 1

Equality of Employment Opportunity

Business Ethics

ANSTO is conducting an analysis of policies, codes and procedures that define, guide and influence workplace ethical behaviour and culture to identify the most important and frequent ethical issues facing ANSTO staff and management and evaluate the way in which current policies and systems deal with them

ANSTO, like all Commonwealth Government agencies, has an obligation to establish, foster and maintain the highest standards of ethical behaviour. This obligation extends to all employees of ANSTO, and is a core responsibility of the ANSTO Board.

An effective ethics framework encompasses the ethical tone and culture of an organisation and is a key governance attribute of high performing, successful and trusted organisations. A focused approach on ethics is a fundamental aspect of good management practice.

ANSTO is continually working to foster and enhance its compliance capabilities and ethical leadership. ANSTO has appointed the St James Ethics Centre to review ANSTO's business ethics culture and systems. A random sample survey phase has been completed. The final phase of the review will be undertaken in July 2014, and will involve small focus groups.

Talent Management

ANSTO recognises the importance of supporting our employees to be successful in their job performance and pursue their career aspirations. To assist individuals in their personal development, ANSTO has developed a Talent Management Framework, which is fair and equitable, for the development of our employees. It balances individual development needs in line with organisational requirements to create a sustainable and healthy talent pipeline for the future.

Equality of employment opportunity for 2013-14			
	Number employed	% of total staff	Average salary
Female	340	30%	$ 74,464.46
Male	809	70%	$ 97,829.13
People with disabilities	9	1%	$ 76,430.22
Aboriginal and Torres Strait Islander	6	1%	$ 85,709.33
Non-english speaking background	297	26%	$ 97,682.49

APPENDIX 2

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

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

APPENDIX 2

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

(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

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

(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

APPENDIX 2

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

(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 WHSE Policy, Corporate strategic plans and core values. 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. Targets and objectives for safe, secure and sustainable operations are managed through documented operational and business plans.

Environmental protection is formally considered when planning and undertaking major capital works and any proposed radiation facilities are assessed for referral to the Department of Sustainability, Environment, Water, Population and Communities under the EPBC Act. Proposals for new (or modifications to existing) facilities or processes also undergo a rigorous internal safety, regulatory and environmental assurance process.

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. This standard requires that environmental risks and legal requirements are understood, managed and mitigated; an effective measurement and review system is in operation; and that there is an organisational commitment to continual improvement. Our environmental monitoring program also operates within a quality framework that is certified to the ISO 9001:2000 standard for Quality Management Systems.

ANSTO has developed a 5-year Environmental Management Strategy which was endorsed by the Board in August 2013. The Executive Committee for Workplace Health Safety and Environment supports the implementation of this strategy and provides oversight of the environmental management system.

Environmental performance indicators

ANSTO is reducing its environmental footprint by minimising waste and monitoring the consumption of resources such as fuel, electricity and water, and by recycling consumables.

The performance indicators below show that ANSTO's power and water consumption have remained steady and that less waste was discharged to sewer or sent to landfill than the previous year. The volume of wastewater was lower than usual due to the 5 week reactor shutdown and low rainfall. Improved segregation of construction/demolition waste meant a higher proportion of this waste could be recycled, reducing the amount going to landfill. Recycling of waste paper, cardboard and containers by staff continues to increase.

Besides recycling paper, cardboard and co-mingled containers, ANSTO also recycles metals, garden waste, concrete, batteries, toner cartridges, mobile phones and redundant computer equipment.

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Resource Usage[1]	Units	2011-12	2012-13	2013-14	% Difference
Electricity	GWh	37.95	35.41	37.51	6%
Water	m^3	283,090	277,803	279,915	<1%
Waste Disposal					
Waste sent to landfill	tonnes	268.6	277.6	227.98	-18%
Liquid effluent discharged to sewer	m^3	118,421	101,449	89,162	-12%
Recycled Waste[2]					
Cardboard	tonnes	21.2	21.3	32.26	51%
Co-mingled containers	tonnes	7.0	7.65	8.60	12%
Paper	tonnes	12.54	21.24	34.12	61%

1 Data for the Lucas Heights & Camperdown sites (excluding tenants).

2, Data for Lucas Heights site only (includes tenants).

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 2013-14 demonstrate that ANSTO's authorised releases of radioactive material to the air and sewer were effectively controlled, complied with regulatory limits and had minimal impact on humans or the environment.

Liquid effluent discharges within limits

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

A total of 89,162 m^3 of waste water (trade waste and sewage) was treated, tested and 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. Analysis of marine biota (fish, seaweed and barnacles) growing at Potter Point confirmed that ANSTO's discharges are not detectable in the local marine environment.

Compliance with airborne discharge authorisation

Air ventilated from laboratories and facilities which handle radioactive materials is treated and/or filtered prior to discharge and is continuously monitored. Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) sets limits for airborne radioactive discharges from ANSTO facilities and whilst some periodic trending levels were exceeded for one facility, all airborne emissions were within the annual operating compliance limits.

Public doses low

Computer modelling is used to estimate the potential radiation dose to people from operations at the Lucas Heights site. The model inputs include the individual 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 2013-14 was 0.0025 mSv. This is less than 0.3 per cent of the annual public dose limit of 1 mSv established by ARPANSA. Doses from ANSTO's airborne emissions in 2013-14 remain well below the 0.02 mSv performance objective, despite increased production of beneficial medical isotopes (**see Figure 1**).

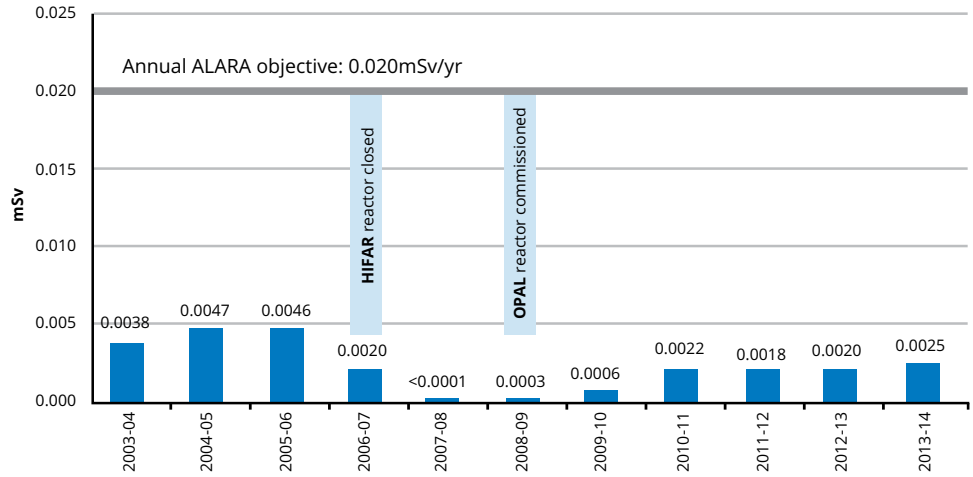

Figure 1: Maximum annual effective dose from LHSTC airborne discharges at the 1.6 km boundary of ANSTO's buffer zone.

APPENDIX 3

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

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.

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 (mSv)

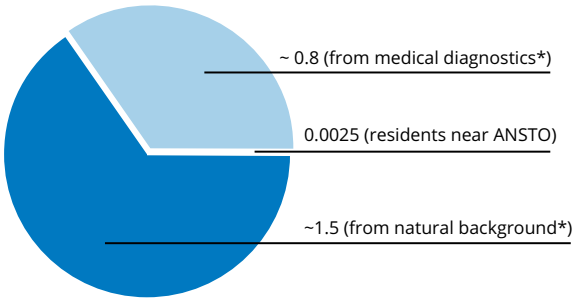

Figure 2: Average annual doses received by Australians from various sources compared to the maximum potential airborne dose to ANSTO local residents in 2013-14.

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 January 2007, and are well below the level considered safe for Australian drinking water. Gross alpha and beta measurements were also below the levels required for surface waters under the previous *NSW Protection of the Environment Operations Act 1997*. In fact, most results are below the radioactivity screening levels in the Australian Drinking Water Guidelines.

An extensive network of shallow and deep groundwater wells is maintained 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 underground fuel storage tanks is also analysed for hydrocarbons, to check for evidence of any leaking tanks, however none have been detected to date.

***Reference for figure 2:**

Webb, D., Solomon S., Thomson J., 1999. Background radiation and medical exposure levels in Australia. Radiation protection in Australasia, Volume 16(1), whole issue.

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

Detailed reporting

Reports on airborne and liquid effluent discharges are submitted to the relevant regulatory authorities on a quarterly basis. Results and findings from our environmental monitoring program are available to the public on the ANSTO website. In addition, ANSTO reports environmental radiation dose-rates recorded in the nearby suburb of Engadine via the ANSTO webpage, which is the only on-line station of its type in Australia. The Lucas Heights weather data are also available on ANSTO's website.

All safety and environmental incidents are reported, investigated and actioned via ANSTO's Event Reporting and tracking system.

ANSTO reports annually to the Energy Efficiency in Government Operations (EEGO) and National Greenhouse and Energy Reporting (NGER) programs, also to the Department of Sustainability, Environment, Water, Population and Communities about any of its activities that fall under the National Environmental Protection Measures. Overall, ANSTO commits significant resources to effectively monitor, manage and report on its environmental impacts and responsibilities.

Ecologically sustainable development (ESD)

ANSTO integrates ESD principles into management processes by including environmental risk assessments at the project planning phase. Major capital projects include environmental impact statements and environmental protection plans. We have implemented an improved building code with minimum 4.5 star NABERS rating for new and renovated office accommodation, to improve the energy and water efficiency of buildings and have installed numerous water tanks for collection of rainwater. The ANSTO building code will guide the sustainable development of ANSTO sites into the future.

ANSTO activities that contribute to ESD include our research into significant environmental issues such as air quality, natural water systems and water resource management, wetland health, climate variability, and global warming impacts such as rising sea levels and temperatures. This research provides practical, science-based advice to inform decision makers, creating opportunities to conserve resources and sustain our fragile environment.

We monitor our carbon footprint and participate in the Sustainability Advantage Program run by the NSW Office of Environment and Heritage.

ANSTO encourages staff to cycle, carpool or take public transport to get to work and to walk rather than drive around the site – to this end, footpaths and pedestrian crossings have been installed and/or upgraded. ANSTO provides staff with a carpooling website and mini-bus services between our site and local railway stations. ANSTO also has numerous tracks, bike racks, lockers and shower facilities for use by the avid walker/cyclist.

The buffer zone around the Lucas Heights site comprises developed areas, various landfill sites as well as natural bushland and waterways. The area is managed through a program of regular inspections, maintenance of walking trails, culling of feral animals and weed reduction programs.

APPENDIX 3

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

The ANSTO online 'swap shop' continues to provide a forum for staff to pass on unwanted goods or find goods they are seeking. From furniture to chemicals to analytical equipment, by exchanging useful products staff can help save time, money and most importantly, the environment by reducing waste going to landfill.

The ANSTO Content Server project is facilitating the move to paperless offices by providing a secure platform for electronic document control and storage, which will reduce the demand for paper hardcopy records.

By utilising our assets and infrastructure more effectively, we will increase scientific productivity thereby enhancing the environmental sustainability of our operations. To this end, ANSTO has invested in the development of an electronic Laboratory Equipment Database tool.

ANSTO's support of nuclear non-proliferation ideals and the development of nuclear safeguards through its collaborative research with bodies such as the International Atomic Energy Agency and the Comprehensive Test Ban Treaty Organisation, also accords with ESD principles.

Finally, ANSTO's commitment to sound environmental management and ecologically sustainable development means that special emphasis is placed on reducing our environmental footprint by minimising waste and the consumption of resources and by recycling consumables. 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

Safety commitment

ANSTO remains committed to the target of zero harm to its workforce and ensures that senior Work, Health and Safety (WH&S) leadership is an important aspect in achieving continuous WH&S improvement. During 2013-14 the Work, Health and Safety and Environment (WHS&E) Senior Executive Committee provided continued leadership and oversight in this respect with the endorsement of several key safety-related projects eg. electrical upgrades, contamination surveys, asbestos management plan.

ANSTO also recognises the advantages of an agile and flexible workforce aligned to the business' WH&S requirements. To this end the WHS and Human Resource (HR) units were merged allowing a consolidation of the two groups and the formation of a solution focused service. This will allow WH&S responsibilities and functions to be closely aligned with the human resource capabilities. This will further progress and highlight the importance of line management accountability for the WH&S aspects of the business. A dedicated WH&S reporting and compliance resource was defined in the HR WH&S structure. This will ensure proactive trend analysis, strategy development and effective communication of relevant WH&S information throughout the organisation.

The practice of occupational hygiene is a fundamental part of WH&S risk assessment. The occupational hygiene capabilities have been improved with additional capital investment.

A key element of ANSTO's proactive approach is the implementation of the 2010-2015 Safety Strategy with 27 out of the 36 identified actions now completed. Improvements made include: the establishment of a process for assessing, categorising and assuring safety related impacts of organisational change; the establishment of a model for the use of expert groups within ANSTO to share best practice and support safety processes.

In the later part of 2013-14 several key programs and initiatives were developed, these included the Mindful Leadership Program and the cross training of workers in WHS. The aims of these programs are up skill line management and workers, encouraging a proactive WH&S workforce.

Work Health and Safety Act 2011

ANSTO continued with the update, development and implementation of key WH&E Standards and Practices during 2013-14. ANSTO continued its asset renewal program with the construction of new facilities during 2013-14. The WH&S group continued to provide safety oversight to these projects which were completed without serious injury.

The WH&S communication to all workers was improved by providing; a risk based WH&S focus program, a renewed poster program, intranet stories, specific talking points to encourage discussion and the development of a tenant landing page which provides key safety information to tenants and external contractors. Key WH&S hazards communicated to workers during 2013-14 included hazardous work, health and wellbeing, vehicle safety and chemical hazards.

A project was initiated to improve the WH&S pre-qualification of contractors which includes hosted software and a dedicated resource to implement and administer the system.

APPENDIX 4

Work Health and Safety Act 2011

Early intervention strategies implemented by the ANSTO Health Centre have seen a decrease in the number of Lost Shift Minor injuries. The program focuses on providing early assessment and treatment to reduce the consequences of these minor injuries. This has proved successful in preventing further injury and meeting ANSTO's goal of returning workers to normal duties, as a productive team member as soon as possible. During 2013-14 the ANSTO rehabilitation program was certified against the *SRC Act* demonstrating effective procedures and programs are in place.

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). A review has been undertaken of the format and information presented in the WH&S reports to ensure they meet the requirements of the business and facilitate decision making. The implementation of the Governance Risk and Compliance project has progressed and will consolidate the existing event recording and reporting processes into one system. 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.

Recorded events

Workers are encouraged to report all events within ANSTO's 'No Blame – Full disclosure' principle. ANSTO's ongoing commitment to improving our reporting culture is reflective in the number of events reported this year 952, compared to 795 for 2012-13 and 761 for 2011-12.

The number of Opportunities for Improvements (OFIs) is also a key measure of ANSTO's reporting culture. OFIs as a percentage of all events have remained relatively consistent at approximately 83 per cent over the last three years. Actual OFIs for 2013-14 (792) compared to 2012-13 (660) and 2011-12 (637).This data helps to identify emerging WH&S trends and hazards allowing the implementation of controls early in the hazard identification process.

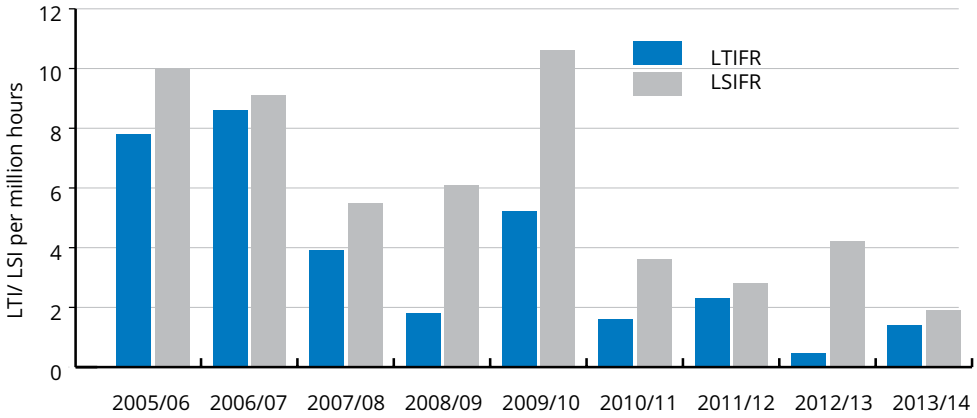
Lost shift and lost time injuries

Key indicators of Safety performance are the LSIFR and LTIFR. The decrease in LSIFR is a result of senior management leadership and the success of the early intervention strategies. The marginal increase in LTIFR in 2013-14 to 1.4 from 0.46 in 2012-13 and compared to 2.3 in 2011-12 represents the sensitivity of this indicator as a performance measure where small numbers of lost time injuries (LTIs) are recorded. Refer to the chart below.

APPENDIX 4

Work Health and Safety Act 2011

Lost Time and Shift Injury Frequency Rate



Safety Alerts

Safety Alerts are issued where a site wide safety hazard is identified and immediate action is required. The number of Safety Alerts communicated to workers for 2013-14 was eight. This is compared with 2011-12 (12) and 2012-13 (4). Safety Alerts for 2013-14 included, lifting equipment, chemical safety, electrical safety, personal protective equipment, fit for purpose/ ageing equipment and driver safety.

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

Everyone in the world is exposed to ionising radiation from natural sources. People may also be exposed to radiation from non-natural sources, including nuclear medical procedures for diagnosis and treatment of certain illnesses. Personal radiation exposure ('dose') is measured in sieverts (Sv), however, typical annual exposures are so small that they are usually expressed in units of one thousandth of a sievert, known as a millisievert (mSv).

According to the most recent data from ARPANSA, the average dose an Australian receives from natural background radiation (excluding medical sources) is 1.5 mSv per year. Federal and state regulations require that a member of the public should receive no more than 1 mSv per year from radiation sources in addition to background radiation and medical procedures. The regulatory limit for radiation workers is 20 mSv per year, averaged over five years, with no more than 50 mSv in any one year.

This is derived from recommendations made by the International Commission on Radiation Protection (ICRP) that have specified three basic principles for radiation protection, which are applied at ANSTO:

1. All exposures to ionising radiation shall have a positive net benefit

2. All exposures shall be maintained as low as reasonably achievable (ALARA), accounting for social and economic factors

3. All exposures shall be less than the relevant statutory limit.

APPENDIX 4

Work Health and Safety Act 2011

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. To this end ANSTO has imposed its own annual dose constraint of 15 mSv to any member of staff.

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 2013 show that the radiation doses received by ANSTO workers remain significantly below regulatory limits. In 2013 the average effective dose across all ANSTO workers was 0.4mSv.

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

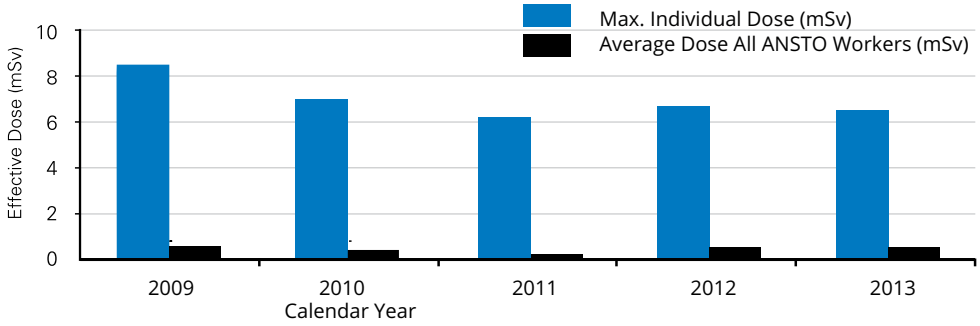
Calendar Year					
Effective Dose	2009	2010	2011	2012	2013
Max. Individual Dose(mSv)	7.75	7.17	6.9	6.6	6.44
Average Dose All ANSTO Workers(mSv)	0.5	0.4	0.5	0.4	0.4
Collective Effective (mSv)	422	358.6	446.6	407.7	416.4

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

Table 2: Distribution of individual effective dose

Calendar Year					
Effective Dose Range	2009	2010	2011	2012	2013
0 to 0.99mSv	768	833	854	914	893
1 to 1.99mSv	37	22	66	32	40
2 to 4.99mSv	33	26	22	18	20
5 to 9.99mSv	7	7	5	4	2
>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 2014, ANSTO has received 11 requests for information under the FOI Act.

ANSTO is required to publish information to the public as part of the Information Publication Scheme (IPS). The IPS is part of recent reforms to the *FOI Act* designed to promote open and transparent communication of government information.

Set out below is the information required to be published by ANSTO under Section 8 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. ANSTO is reviewing and updating this plan.

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.

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 pages 106-109 of this report and a link to this information including information about ANSTO's purpose, Board composition, Corporate Plan and Research 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 be found on ANSTO's website at www.ansto.gov.au/AboutANSTO/About.

5. **ANSTO's Annual Report**

   A link to this annual report and annual reports of previous years can be found on ANSTO's website at www.ansto.gov.au/AboutANSTO/About.

6. **Details of arrangements for members of the public to comment on specific policy proposal 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.

APPENDIX 5

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 documentations exempt from production under the FOI Act)

During 2013-14 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 3199 (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, information available for the public, including our annual reports, information on safety, research reports, educational books and leaflets, and DVDs. ANSTO also provides access to a searchable database of all of ANSTO's science publications, as well as an online archive for older publications.

APPENDIX 6

Index of compliance with reporting guidelines

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

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ACRONYMS

ACAS	Australian Collaboration for Accelerator Science
AINSE	Australian Institute of Nuclear Science and Engineering
AM	Member of the Order of Australia
ANSTO	Australian Nuclear Science and Technology Organisation
ANM	Project Australian Nuclear Medicine project
ANTARES	Australian National Tandem Research Accelerator
AO	Officer of the Order of Australia
AOFSRR	Asia Oceania Forum for Synchrotron Radiation Research
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ATSE	Australian Academy of Technological Sciences and Engineering
BATAN	Indonesia's National Nuclear Energy Agency
CAC Act	Commonwealth Authorities and Companies Act 1997
CARR	China Advanced Research Reactor
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
CFCG	Commonwealth Fraud Control Guidelines 2011
CIAE	China Institute of Atomic Energy
CRC-P	Cooperative Research Centre for Polymers
CRPs	Cooperative Research Projects
DSTO	Defence Science and Technology Organisation
EIF	Education Investment Fund
FNCA	Forum for Nuclear Cooperation in Asia
FOI Act	The Freedom of Information Act 1982
FSANZ	Food Standards Australia New Zealand
GATRI	Gamma Technology Research Irradiator
GICNT	Global Initiative to Combat Nuclear Terrorism
Go8	Group of Eight
GRCA	Governance, Risk, Compliance and Assurance
HEU	Highly Enriched Uranium
HIFAR	High Flux Australian Reactor
IAEA	International Atomic Energy Agency
IMBL	Imaging and Medical Beamline
ILW	Intermediate Level Waste
INLEX	International Expert Group on Nuclear Liability
KONICOF	Korea Nuclear International Cooperation Foundation

LED	Light emitting diode
LEU	Low enriched uranium
LIEF	Linkage, Infrastructure, Equipment and Facilities
Lu-177	Lutetium-177
Mo-99	Molybdenum-99
MOU	Memorandum of understanding
NDF	National Deuteration Facility
NIF	National Imaging Facility
NMR	Nuclear Magnetic Resonance
NSW	New South Wales
NTD	Neutron transmutation doping
NYSF	National Youth Science Forum
OAM	Medal of the Order of Australia
OLEDs	organic light emitting diodes
OPAL	Open Pool Australian Light-water research reactor
PET	Positron emission tomography
PSM	Public Service Medal
RCA	Regional Collaborative Agreement
SANS	Small angle neutron scattering
SINAP	Shanghai Institute of Applied Physics
SMEs	Small to medium-sized enterprises
STAR	Small Tandem for Applied Research
UNSW	University of New South Wales
US	United States

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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-
Neutron beam instrument scientist Joseph Bevitt

Bottom row left-

The ANSTO designed GenTech Generator and clinician

Bottom row middle-

ANSTO Graduate Eliza Wells (left) and Dr Karina Meredith undertaking groundwater testing at Rottnest Island

Bottom row right-

Researcher Daniel King's work is helping to develop safer nuclear fuels

Australian Government

ansto

Locations

Lucas Heights Campus

Camperdown Campus

Clayton Campus

Website

www.ansto.gov.au