



Australian Government



Nuclear-based science benefiting all Australians

ANNUAL REPORT

2005-06





ANSTO scientific facilities

- 10MW HIFAR MULTIPURPOSE RESEARCH REACTOR
- NEUTRON DIFFRACTION AND SCATTERING FACILITIES
- ANTARES 10MV TANDEM ACCELERATOR
- STAR 2MV TANDETRON ACCELERATOR
- ELEMENTAL ANALYSER – ISOTOPE RATIO MASS SPECTROMETER
- WATER TUNNEL FACILITY
- GAMMA IRRADIATION FACILITIES
- CERAMIC POWDER CHARACTERISATION FACILITIES
- COLLOIDAL CHARACTERISATION FACILITIES
- HOT AND COLD ISOSTATIC PRESSES
- TRANSMISSION AND SCANNING ELECTRON MICROSCOPES
- SCANNING PROBE MICROSCOPE
- SCANNING LASER DILATOMETER
- NUCLEAR MAGNETIC RESONANCE SPECTROMETERS
- PLASMA IMMERSION ION IMPLANTATION FACILITIES
- SECONDARY ION MASS SPECTROMETER
- MATERIALS TESTING LABORATORY
- ORE PROCESSING AND WASTE TREATMENT FACILITIES
- RADIOANALYTICAL LABORATORIES
- RADIOPHARMACEUTICAL DEVELOPMENT FACILITIES



Australian Government

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ANNUAL REPORT
2005-06



Chairman's Letter

11 September 2006

The Hon Julie Bishop MP
Minister for Education, Science and Training
Parliament House
CANBERRA ACT 2600

Dear Minister

In accordance with Section 9 of the *Commonwealth Authorities and Companies Act 1997* (CAC Act), I am pleased to present the Annual Report of the Australian Nuclear Science and Technology Organisation for the period 1 July 2005 to 30 June 2006.

This Annual Report includes a Report of Research and Operations, the content and preparation of which the Board is responsible for under Section 9 of the CAC Act.

Yours sincerely



Ian D Blackburne
Chairman

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About ANSTO

The Australian Nuclear Science and Technology Organisation (ANSTO) is Australia's national nuclear research and development organisation and the centre of Australian nuclear expertise.

With approximately 860 staff, ANSTO is responsible for delivering specialised advice, scientific services and products to government, industry, academia and other research organisations. We do so through the development of new knowledge, the delivery of quality services and the provision of support for business opportunities.

ANSTO's nuclear infrastructure includes the research reactor HIFAR (High Flux Australian Reactor), particle accelerators, radiopharmaceutical production facilities, and a range of other unique research facilities. HIFAR is Australia's only nuclear reactor. It is used to produce radioactive products for use in medicine and industry, as a source of neutron beams for scientific research and to irradiate silicon for semiconductor applications. A replacement for HIFAR, OPAL – the Open Pool Australian Light-water reactor – is in its commissioning phase.

ANSTO also operates the National Medical Cyclotron, an accelerator facility used to produce certain short-lived radioisotopes for nuclear medicine procedures.

ANSTO also manages access to overseas synchrotron facilities for Australian scientists.

ANSTO's main site is located 40 km south west of Sydney's central business district, occupies 70 hectares and is surrounded by a 1.6 km buffer zone.

ANSTO's general purpose is prescribed by the *Australian Nuclear Science and Technology*

Organisation Act 1987 (ANSTO Act) and is translated into action through corporate drivers of vision, mission and strategic goals.

ANSTO's vision

ANSTO's vision is to be recognised as an international centre of excellence in nuclear science and technology for the benefit of Australia.

ANSTO's mission

Our mission is to:

- Support the development and implementation of government policies and initiatives in nuclear and related areas, domestically and internationally
- Operate nuclear science and technology based facilities, for the benefit of industry and the Australian and international research community
- Undertake research that will advance the application of nuclear science and technology
- Apply nuclear science, techniques and expertise to address Australia's environmental challenges and increase the competitiveness of Australian industry
- Manufacture and advance the use of radiopharmaceuticals which will improve the health of Australians.

ANSTO's core values

Underpinning the vision and mission are ANSTO's core values:

Safety, Security and Environmental Sustainability: protecting human health, safeguarding our operations and minimising our environmental footprint



Honesty, Openness and Integrity: building trust within our organisation and with stakeholders

Innovation, Collaboration and Responsiveness: creating and embracing new ideas, promoting learning and development, recognising trends, understanding stakeholder needs and fostering cooperation and teamwork

Competence and Professionalism: maintaining high standards of expertise and delivery to internal and external customers

These core values are fundamental in all our activities and underpin the way in which we will deliver on our strategic directions.

ANSTO's strategic directions

ANSTO's strategic directions form the basis for the organisation's research and operations:

Deliver Excellence in Nuclear Science and Technology

We will be the source of significant new discoveries, producing new knowledge, capabilities and technologies. While some of these will be applied to our own operations, others will be developed through targeted research, with the benefit distributed widely by outreach activities which encourage adoption and commercialisation.

Focus our Capabilities to Support Issues of National Importance

We will focus our facilities, activities, expertise and collaboration on areas that contribute to Australia's priorities, especially in support of its nuclear, research, industry, environmental, health, security and international relations policies.

About ANSTO

Maximise Return on Investment in Expertise and Specialised Facilities

ANSTO will operate world-class nuclear facilities at a level of efficiency that ensures a high return on investment for the Australian Government, our customers and our collaborative partners.

Promote Understanding of the Benefits of Nuclear Science and Technology

Through effective communication and engagement with industry, research and the wider community, we will increase support for our work and encourage the further adoption of applications of nuclear science and technology.

Responsible Minister

The responsible Minister is the Minister for Education Science and Training. From 26 January 2006 this was the Hon Julie Bishop, MP, and prior to that the Hon Dr Brendan Nelson, MP.

Statement of compliance

This report is written with reference to the guidelines provided for the presentation of Government documents, published by the Department of the Prime Minister and Cabinet in April 2004 (as amended) and the *Commonwealth Authorities and Companies (Report of Operations) Orders 2005*.



The Hon Julie Bishop, MP,
Minister for Education, Science
and Training.

Executive Management

As at 1 September 2006

Dr Ian Smith

Executive Director

Dr Ron Cameron

Chief of Operations

Dr George Collins

Chief of Research

Dr John Bartlett

Acting Head, Institute of Materials and Engineering Science

Mr Doug Cubbin

General Manager, Finance and Administration

Dr Peter Holden

Acting Head, Institute for Environmental Research

Mr Con Lyras

General Manager, Technical Services and Facilities Management

Mrs Cait Maloney

General Manager, Safety and Radiation Services

Vacant

Head, Radiopharmaceutical Research Institute

Dr Bob Ring

General Manager, ANSTO Minerals

Dr Robert Robinson

Head, Bragg Institute

Dr Greg Storr

General Manager, Reactor Operations

Mr Ian Turner

General Manager, ANSTO Radiopharmaceuticals and Industrials

Members of the Board



Dr Ian D Blackburne

BSc, PhD, MBA, FTSE,
FAICD

Past Chairman

Chairman 1 July 2001 – 30
June 2006

Company director, former
chief executive, scientist

Appointed 1 July 2001
Term concluded 30 June
2006



Mr Michael A Eager

BE (Mining), FAusIMM

Acting Chairman since 1
July 2006

Deputy Chairman since 26
June 2002

Company director, mining
engineer

Appointed 1 January 2002
Term concludes 31
December 2006



Mr Grahame Cook

PSM BEc, AIMM

Deputy Secretary,
Department of Education,
Science and Training

Appointed 13 June 2001
Resigned 31 December 2005



**Dr Carrie (Carmel) J
Hillyard**

BSc (Hons), PhD, FTSE

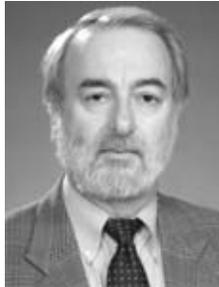
Partner, CM Capital
Investments, Company
director, biotechnologist

Appointed 21 July 1999
Reappointed 22 July 2004
Term concludes 21 July 2009



Dr Agatha van der Schaaf

MB, BS, BMedSc, FRACP
Nuclear Physician,
Department of Nuclear
Medicine, Sir Charles
Gairdner Hospital
Appointed 25 July 2002
Term concludes 24 July 2007



Dr Klaus Schindhelm

BE, PhD, FIEAust
Senior Vice President,
Applied Research Global,
ResMed Ltd
Appointed 20 March 2003
Term concludes 19 March
2008



Dr Ian Smith

BE, PhD, FTSE, FIEAust,
FPENZ, FIM, CPEng
Executive Director, ANSTO
Appointed 17 May 2004
Term concludes 16 May 2008



**Dr Ziggy (Zygmunt)
Switkowski**

BSc, PhD, FAICD
Appointed 1 January 2006
Stood aside on 6 June 2006
to take-up the appointment
of Chairman of the Prime
Minister's Taskforce
undertaking the Review of
Uranium Mining Processing
and Nuclear Energy in
Australia
Term concludes 31
December 2010

Chairman's Report



Welcome to ANSTO's Annual Report for 2005-2006 and my last report as Chairman.

There have been some tremendous changes at ANSTO during my time as Chairman. In my first Chairman's Report, I wrote about ANSTO having just been granted a licence to construct the Replacement Research Reactor (RRR) by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) in April of 2002. Now OPAL and the associated Bragg Institute, the emerging centre of excellence for neutron scattering research, are close to being fully operational. I also noted back in 2002, some of the confusion in the public mind about the role of ANSTO and in particular, research reactors. So it is gratifying to report that due to the efforts of ANSTO staff in providing educational resources for schools, promoting tours of ANSTO to the public, media work and various community initiatives and forums, as well as the efforts of

the Australian Government in this area, the public is now better informed than ever about ANSTO's work and nuclear technology generally.

While debates about nuclear power and technology continue to gather momentum in Australia, an important part of ANSTO's work should not be overlooked. That is the on-going leadership role ANSTO takes in the region and at home, particularly with regard to security, counter terrorism and radiation safety.

In the past year, ANSTO has conducted two special three-day Radiological Crime Scene Investigations Workshops, designed to pass on practical skills in how to deal with radiological contamination to State and Federal forensic services personnel, counter-terrorism units, crime scene investigators and HAZMAT (Hazardous Materials) response teams.

In the wider region, ANSTO works through the IAEA (International Atomic Energy

Agency) in training and support in matters of radiation safety. An important example of this is the work ANSTO undertakes through the Regional Security of Radioactive Sources (RSRS) project. This project aims to assist countries in the South East Asia and Pacific region to secure radioactive sources appropriately and to improve their security arrangements. An example of this was ANSTO's key role in removing a disused cobalt-60 source from Papua New Guinea. Cobalt-60 is a widely used source for medical and industrial applications. Such sources have been associated with accidents where there have been serious injuries due to loss of control over the source. An extension to this project received funding in the recent Federal Budget as part of the Government's Regional Counter-Terrorism Package to initiate another regional support program.

With regards to ANSTO's own security, a team from the United States Department of Energy (USDOE) visited ANSTO in December to conduct a review of our security arrangements. The USDOE noted that the OPAL reactor would exceed IAEA standards. ANSTO's physical protection standards have been further enhanced this year with the recent opening of its New Main Entrance.

ANSTO's experience in international nuclear matters, its scientific expertise and practical experience in constructing and operating nuclear facilities means it is well placed – as it is intended to be – to provide advice on nuclear matters at all stages of the nuclear fuel cycle. For example, ANSTO has supported the Department of Education, Science and Training in the planning stages for

the Commonwealth Radioactive Waste Management Facility. Our recently appointed ANSTO board member, Dr Ziggy Switkowski, has currently stepped aside from ANSTO board duties in order to head up the Prime Minister's Taskforce to review uranium mining processing and nuclear energy in Australia.

During my time as Chairman, ANSTO has established four new research institutes: the Institute of Materials and Engineering Science, the Radiopharmaceutical Research Institute, the Institute for Environmental Research and the Bragg Institute, Australia's leading centre for neutron and X-ray research. By nurturing a dedicated research culture, these institutes foster excellence, stimulate the exchange of ideas, facilitate engagement with the wider scientific community and attract external researchers.

ANSTO's excellence in research was particularly highlighted by the recent Research Performance Assessment (RPA), where it was demonstrated that the majority of ANSTO researchers were shown to be in the top 25 per cent internationally, as judged by the quality of their publications.

ANSTO's operations have also been refocused and all of ANSTO's research and operations are guided by the current strategic directions that were implemented last July. I am pleased to advise that our move to focus commercial interaction with industry through the new business unit, Access ANSTO, has led to some early indicators that this approach will add value to ANSTO's strategic directions. During 2005-06 our interactions with external industry partners increased by over 23% to

Chairman's Report

2 149 collaborations and services agreements. This generated income in excess of \$14.7 million across all areas and built a number of new strategic partnerships with domestic and international companies.

We also strengthened our focus on an early partnering approach for commercialising our non-core discovery research inventions. This has led to strong industry interest in a number of patented technologies, including CeramiSphere, an encapsulation and controlled release technology; a novel nanoparticulate membrane bioreactor for the treatment of waste water; and for the SarAr cryptate technology, a platform technology for use in cancer treatments.

On behalf of the Board I would like to note our appreciation of the energetic and talented people that make up ANSTO and in particular their work towards making that ambitious project, the OPAL reactor, a reality for all Australians. The benefits of Australia having its own research reactor, an enhanced supply of radiopharmaceuticals and industrials, its own advanced research facilities and an influential place in nuclear matters in the region and throughout the world cannot be overstated.

With the current surge in interest in nuclear power and technology both here and overseas, the commissioning of OPAL, the tremendous research facilities housed by ANSTO's research institutes and the potential for ANSTO's significant involvement with the complementary research facility of the Australian Synchrotron, the future for ANSTO

is more exciting than ever. As I finish my term as Chairman, I would like to wish ANSTO all the very best for this future.



Ian D Blackburne
Chairman

Executive Director's Report



This year has been a year of external recognition, progress and consolidation for ANSTO. Perhaps most notable is the significant progress that has been made in line with our stated vision, that is, to be recognised as an international centre of excellence in nuclear science and technology for the benefit of Australia.

ANSTO's OPAL reactor and Bragg Institute are leading the way in achieving such recognition. The year began with the arrival of ANSTO's first Federation Fellow, and expatriate scientist, Professor Jill Trehwella. Professor Trehwella was successfully lured back to Australia with the promise of ANSTO's state-of-the-art facilities to join the Bragg Institute. Professor Trehwella is now just one of a number of elite Australian and international scientists that have moved to Australia from overseas to work at ANSTO.

Excellence and national and international recognition of ANSTO facilities and people have continued to be the themes of the year. In November, sixteen grants involving ANSTO researchers were announced by the Australian Research Council. In the same month, approximately 750 neutron scattering scientists from 38 countries visited Sydney for the Eighth International Conference on Neutron Scattering, which included a number of presentations from ANSTO scientists and a visit to OPAL and the Neutron Guide Hall.

In December Bragg Institute researcher Dr Shane Kennedy was presented with the 2005 AINSE (Australian Institute of Science and Engineering) Gold Medal for his research in condensed-matter physics using neutron scattering. In January Professor Ann Henderson-Sellers, the head of ANSTO's Environmental Research Institute, left Australia to take up the position of Executive Director of

the United Nation's World Climate Research Programme in Geneva. While this was a loss to ANSTO, it illustrates the recognition of the calibre of ANSTO personnel at the highest international levels.

ANSTO is also recognised internationally in the area of radiation safety and nuclear safeguards. A number of international training programs have been run by either ANSTO or with significant ANSTO involvement. These include February's joint ANSTO/US workshop on searching for lost or orphaned radioactive sources and equipment delivery that provided twenty two expert participants with invaluable hands-on training. ANSTO's role in national and international counter terrorism is growing and ANSTO continues to provide advice on nuclear matters to the Australian Government.

There has been increasing attention on nuclear issues this year, particularly with regard to the potential savings that can be made in carbon dioxide emissions that contribute to climate change, by using nuclear power instead of fossil fuels. ANSTO has provided expert advice to this debate, providing evidence during the hearings of the House of Representatives Standing Committee on Industry and Resources, which inquired into the strategic importance of Australia's uranium resources. The evidence covered matters relating to nuclear power in the world today - its advantages (costs, safety, security and emissions) and challenges; energy demand and carbon dioxide mitigation; and radioactive waste management. ANSTO also commissioned and published on its website a report by nuclear expert Professor Gittus on the economics of introducing nuclear power to Australia.

With much of the focus of this year's Science Meets Parliament (SmP) on nuclear technology and Australia's future energy needs, ANSTO

chose to be a Gold Sponsor and support this event in 2006. SmP is organised each year by the Federation of Australian Scientific and Technological Societies, and is an extremely useful opportunity for Australian scientists to meet politicians and discuss their work.

Throughout the year ANSTO scientists have received significant recognition, including popular media attention for research work ranging from collecting sediment cores from the Galapagos Islands to collecting ice cores in Antarctica. ANSTO was awarded the Public Relations Institute of Australia National and State Marketing Communication Awards of Excellence for its e-magazine *Velocity* and a commendation for communication work on 2005's spent nuclear fuel shipment.

There is however, another area of ANSTO's work, that does not receive wide recognition outside of nuclear experts, and that is simply the day to day, routine functions involved in the on-going operations of the HIFAR reactor at very high levels of availability, now in its 49th year of continuous, safe, operation.

It has also been a year of consolidation, after the considerable planning and consultative stages that characterised 2004-05 when the current strategic directions were identified. The strategic directions are now part of ANSTO's balanced scorecard approach which represents the combined effort of all parts of ANSTO in achieving the outcomes defined in the strategic directions. Performance indicators are our main points of focus under the strategic directions, and are a mixture of externally informed and internally focussed benchmarks.

ANSTO has also recently completed its Research Performance Assessment, as part of the preparation of the Australian Government's Research Quality Framework (RQF), and that

Executive Director's Report

report has been sent to Minister Bishop. A summary can be found in this annual report.

In order to improve the effectiveness and efficiency of the delivery of services to the broader organisation by ANSTO's Corporate Services, an external review was undertaken and the recommendations arising from that review are currently being put into place.

Overall ANSTO has performed well this year in meeting its planned objectives and in rising to the challenge of a new focus on nuclear research, power and technology in Australia and internationally.

I am sure all of ANSTO will join me in thanking Dr Ian Blackburne for his significant contributions to ANSTO during his time as Chairman and I wish him all the best for the future. As we progress toward the goal of having a safe, modern research reactor fully operational in Australia, I would also like to recognise the hard work and dedication showed by ANSTO's staff over the past year.



Ian Smith
Executive Director

Highlights

July 2005

- Federation Fellow, Professor Jill Trehwella, commenced her joint appointment with the University of Sydney and ANSTO's Bragg Institute.
- Careers in Science, a national collaborative effort driven by ANSTO, was launched. The initiative aims to encourage more students to consider careers in science and undertake science subjects in years 11 and 12.
- The ANSTO research performance assessment process began, with the call for individual evidence portfolio submissions.
- The Australian Government announced a list of possible locations for the siting of a future Commonwealth Radioactive Waste Management Facility.

August 2005

- ANSTO scientist Dr Henk Heijnis returned from the Galapagos Islands where he worked with a team collecting sediment core samples to study the islands' historical ecology and climatology.
- Key members of Argentina's Federal parliament visited the OPAL construction site to inspect the progress made by INVAP, the Argentine company that designed and supervised construction of the reactor.
- The new small angle X-ray scattering (SAXS) instrument and X-ray reflectometer were launched. These are co-located in the OPAL neutron guide hall to enhance the complementarity of the X-ray and neutron techniques.
- The first complete neutron-beam instrument for the OPAL reactor, the quasi-laue diffractometer KOALA, arrived from France.

September 2005

- ANSTO conducted a successful major emergency exercise, Operation Phoenix, in conjunction with local emergency response agencies.
- OPAL achieved International Organisation for Standardisation (ISO 9001) Quality and ISO 14001 Environmental accreditation.
- ANSTO and the University of Melbourne signed a memorandum of understanding to enhance collaborative research between the two institutions.

October 2005

- ANSTO experts conducted a training course on radiation safety and security in Port Moresby, the first of its kind held overseas.
- ANSTO exhibited at *Science in the City* at the Australian Museum, The Telegraph Careers Expo and the Sutherland Shire Home Show.
- Bragg Institute staff attended the First Australia-Taiwan Meeting on Neutron Scattering Science, discussing the design of the Taiwanese-funded cold 3-axis spectrometer to be built at OPAL.
- ANSTO made the neutron and X-ray reflectivity data refinement package, *Motofit*, available to users through an open-source licence. International take-up and acceptance is high.
- The Engineering Services Development Workshop was presented with an ANSTO award for their outstanding work in occupational health and safety (OH&S).
- Dr George Collins was appointed as ANSTO's Chief of Research.

Highlights

November 2005

- The Australian Research Council announced 16 grants involving ANSTO researchers.
- ANSTO ran a three-day Radiological Crime Scene Investigations Workshop to train counter-terrorism units in dealing with radiological contamination. The workshop is the first to train responders using actual radioactive materials.
- ANSTO scientists departed for Antarctica, on an expedition to gather samples that will assist in understanding the sources of Earth's current rising methane levels. The team spend nearly three months collecting ice cores to analyse methane in trapped air bubbles.
- Aquarisk, unique environmental risk assessment software, was launched commercially by Hearne Scientific. The tool is the result of research into the biological impact of acid rock drainage and release of metals into the environment from processes such as mining.
- ANSTO received the Public Relations Institute of Australia National and State Marketing Communication Award of Excellence for the e-magazine, *Velocity*.
- Approximately 750 neutron scatterers from 38 countries in six continents descended on Sydney for the Eighth International Conference on Neutron Scattering, including a visit to the new OPAL reactor.

December 2005

- ANSTO released its second Corporate Social Responsibility Report.
- ANSTO's *Pocket Guide to Safety* was launched to ensure all staff have easy access to safety information.

- ANSTO played a key role in removing a disused cobalt-60 source from Papua New Guinea and returning it to ANSTO for safe storage.
- Deuterium was liquefied for the first time in the OPAL cold neutron source.
- Bragg Institute researcher Dr Shane Kennedy received the 2005 AINSE Gold Medal for his research in condensed-matter physics using neutron scattering.
- ANSTO signed a new memorandum of understanding with AINSE governing the relationship between the two organisations for the next five years, including access to ANSTO's facilities and research expertise for university academics and research students.

January 2006

- Professor Ann Henderson-Sellers of the Institute of Nuclear Geophysics took up a position as Executive Director of the World Climate Research Programme in Geneva.

February 2006

- ANSTO scientists discussed their research with federal politicians at Science meets Parliament.
- The Australian ITER Forum was awarded an International Science Linkages grant to host an international workshop in October 2006. ANSTO and AINSE are members of the Forum which is seeking to promote Australian participation in the International Thermonuclear Experimental Reactor, ITER.
- Twenty-two experts participated in a joint ANSTO and US workshop on orphan source search and equipment delivery.
- Cold commissioning of OPAL commenced. This involves testing all reactor systems and equipment without fuel being loaded.

- ANSTO organised the 30th Annual Condensed Matter and Materials Meeting in Wagga Wagga.

March 2006

- Twenty ANSTO staff were awarded Australia Day achievement medals for 35 years of service, a significant contribution to public service and the life of the nation.
- The ANSTO/WorleyParsons joint venture was short-listed to operate the Australian Synchrotron.
- AINSE launched two research fellowships jointly valued at \$130 000 a year. The fellowships are designed to attract high profile early-career neutron science researchers into positions in Australian universities.
- Executive members of the Northern Land Council visited ANSTO to gain understanding of radioactive waste management.
- Independently facilitated Community Discussions were held at a local venue to encourage interaction and transparency between ANSTO and the local community.
- *Gumtree*, the graphical user interface developed for controlling the neutron scattering instruments on OPAL, won the inaugural Eclipse Foundation Community Award for best open source rich client platform
- ANSTO and the National Central University (Taiwan) signed an agreement covering detailed arrangements for OPAL's cold-neutron 3-axis spectrometer, SIKA.
- *future vision*, ANSTO's main science overview publication for the next two years was released and distributed to all federal and Australian state politicians, key community stakeholders and the CEOs of Australia's top 1 000 companies.

- A series of segments on ANSTO and its science screened on the SBS TV program *School Torque*.

- The 20 metre long, 2.5 metre diameter vacuum vessel for the state-of-the-art small-angle neutron scattering instrument QUOKKA was delivered.

April 2006

- ANSTO's Technical Advisory Committee (TAC) met to prepare the final report of ANSTO's Research Performance Assessment, collating information from 57 international assessors and reviews of each of ANSTO's research institutes.
- The Australian Synchrotron Research Program's new soft X-ray end station was launched at the National Synchrotron Radiation Research Centre in Taiwan. The end-station will be transferred to the soft X-ray beam line at the Australian Synchrotron in Melbourne in 2008.

May 2006

- Cold commissioning tests for the OPAL reactor were completed.
- The HIFAR core was fully converted to low enriched uranium fuel.
- ANSTO hosted the IAEA Expert Advisory Group regional meeting on strategic planning for sustainability of national nuclear institutions.
- Minister for Education, Science and Training, the Hon Julie Bishop, MP, toured OPAL and was presented with a report on the economics of introducing nuclear power to Australia.
- ANSTO launched customised physics and chemistry school tours to complement the NSW school syllabus and free online Careers

Highlights



in Science lesson plans to help teachers encourage students to develop their own unique scientific aspirations.

- ANSTO submitted an updated operating licence application to ARPANSA.

June 2006

- Federal member for Hughes the Hon Danna Vale, MP, officially opened ANSTO's \$10.6 million new main entrance facility.
- The final report of ANSTO's Research Performance Assessment was delivered to the Minister. An aggregation of individual assessments places approximately 60% of ANSTO researchers in the top 25% of their fields internationally.
- The vacuum vessel for the secondary flight path of the new OPAL reflectometer instrument PLATYPUS was delivered.
- *SCOPE*, Channel 10's science program for children, featured ANSTO.

- ANSTO became a foundation investor in the Australian Synchrotron.
- Dr Ian Blackburne retired as Chairman of the ANSTO Board after serving his five year term.

OPAL milestones

July 2006

- ARPANSA granted ANSTO an operating licence for the OPAL reactor.
- OPAL staff received formal accreditation and authorisation certificates.

August 2006

- OPAL fuel was loaded for the first time.
- OPAL achieved its first criticality from fission neutrons.

REPORT OF RESEARCH AND OPERATIONS



Introduction



Introduction – Research

Major developments in 2005-06

Our research efforts this year have been characterised by a renewed emphasis on excellence as well as genuine engagement with the broader Australian research community – both qualities being much in evidence in the assessment of our research performance undertaken as part of our 2004-07 triennium funding agreement.

At the beginning of the process, most ANSTO researchers elected to prepare evidence portfolios for assessment by independent experts in terms of research quality and impact. These assessments, which established that 60 per cent of ANSTO research staff rank in the top 25 per cent internationally in their field, then fed into reviews of ANSTO's four research institutes. The external review panels for each institute were able to make valuable

recommendations on how research performance could be improved and which investments could hasten that improvement.

In addition to producing recommendations that ANSTO will implement over the next 12 months, the research performance assessment yielded a number of indirect benefits, among them the strengthening of relationships between ANSTO researchers and the national and international experts on the institute review panels. As a result, new collaborations are already flourishing and ANSTO researchers are benefiting from ongoing advice. Such was the value from the research performance assessment that ANSTO will undertake a similar assessment in four years' time.

In another example of our increased participation in the wider Australian research community, ANSTO substantially augmented the available number of post-doctoral fellowships from nine at the beginning of the

Report of Research and Operations

financial year to 41 at the year's end. These three-year placements include 15 that are either fully or partly funded by other research organisations. We have been encouraged by the quality of candidates and 24 of these fellowships have been filled as we start the new financial year.

Over 2005-06 ANSTO has also worked more closely with industry on the application of our research as seen in the growth of consulting, contract and sponsored research. Several case studies later in this report highlight specific examples of how ANSTO research has produced tangible gains for industry. ANSTO has also become more proactive in seeking funding for projects with direct end-user application, for example, the support received from the Prime Minister & Cabinet National Security Science and Technology Unit for work with the Australian Federal Police and Australian Customs.

At the close of the reporting period, ANSTO is preparing for a major change as we farewell 50 year-old HIFAR and move into the hot commissioning stage for the OPAL reactor and its world-class suite of neutron scattering instruments. This is an exciting development, especially as it is occurring at the same time as the commissioning of a complementary facility, the Australian Synchrotron in Melbourne. To deliver the best outcomes for Australia, ANSTO's challenge over the coming years will be to ensure that our human research capability supporting those instruments matches our increased technical capability.

National Research Priorities

Our five research themes closely align with Australia's National Research Priorities (NRPs)

as discussed below. Individual projects within the themes relate to specific NRP associated priority goals, and some projects advance more than one priority.

Plans for 2006-07

ANSTO's plans for the coming financial year relate strongly to a number of priority goals under the National Research Priorities.

In **Neutron and X-ray science** we will move from construction to operation of the Neutron Beam Instrument program at OPAL supporting significant research towards priority goals of Breakthrough science and Frontier technologies within the NRP of *Frontier Technologies for Building and Transforming Australian Industries*. This will be supported by a new project that plans for future expansion and growth of our neutron scattering instrumentation. Growth in the application of neutron and X-ray scattering to understanding the structure of bio-molecules will be facilitated by the development of biodeuteration facilities and our general protein characterisation capability.

Research in **Isotopes in earth systems** will continue to focus on applications of isotopic techniques for monitoring climate change and water management aligned with the priority goals of *Responding to climate change and variability* and *Water – a critical resource* within the NRP of *An Environmentally Sustainable Australia*. Underpinning this will be a strengthening of our capabilities in environmental radiochemistry.

Within the **Health** theme we are preparing for significant growth in base capabilities (particularly biology) foreshadowing the

Introduction

commencement of new programs within the Radiopharmaceuticals Research Institute. These programs are directed towards the priority goal of *Ageing well, ageing productively* within the NRP of *Promoting and Maintaining Good Health*. A number of ANSTO patented innovations which also contribute to this goal have moved into commercial development.

New initiatives in the **Materials** theme are associated with advanced nuclear systems initially exploring how ANSTO might be involved in Generation IV relevant research (the next generation of nuclear power generation plants). These initiatives and increased research on uranium ore processing not only fulfil ANSTO's legislative requirement to undertake research relevant to the nuclear fuel cycle but also contribute to the priority goals of *Advanced materials* and *Transforming existing industries* in the NRPs of *Frontier Technologies for Building and Transforming Australian Industries* and *An Environmentally Sustainable Australia* respectively.

There will be continued growth of counter-terrorism research, nuclear detection and forensic related research in the **National Interest and Capability Enhancement** theme in support of the priority goal of *Protecting Australia from terrorism and crime* within the NRP of *Safeguarding Australia*. We will also strengthen our knowledge and capabilities for evaluation and involvement in Advanced Nuclear Technologies in response to the growing acceptance of their ability to contribute to the priority goal of *Reducing and capturing emissions in transport and energy generation* as part of the NRP of *An Environmentally Sustainable Australia*.

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Neutron and X-ray science



Liliana Morales is part way through a post-doctoral fellowship with the Bragg Institute. She came to ANSTO following completion of doctoral research in magnetic materials in her native Argentina. At the Bragg Institute, Liliana's studies concern the structure and magnetic properties of cobalt-based Ruddlesden-Popper phases using neutron and X-ray powder diffraction techniques. It is, she says, a great place to work. Liliana is at present writing several papers on her research at ANSTO that she will submit for publication during the second half of this year.

Projects and activities in this theme contribute significantly to goals within the National Research Priority of *Frontier Technologies for Building and Transforming Australian Industries*. In particular, the priority goals of *Breakthrough science, Frontier technologies and Advanced materials*.

Developing world-class neutron beam instruments

Activity

This project, which began in 2000, concerns the building of a suite of eight world-class neutron beam instruments for the new OPAL reactor. Building of a ninth instrument by the National Science Council of Taiwan is also underway. Scientists from ANSTO, universities, research institutes and industry will use the instruments to characterise matter on the atomic, molecular and nano-scales.

Output

This year we focused mainly on delivery and installation of instrument components. Progressive expenditure reached \$26 million.

Outcomes

With these neutron beam instruments, Australian scientists will be able to gain valuable insights into the atomic and molecular structure of modern materials. The instruments, together with the scientific expertise of the Bragg Institute operating staff, will facilitate cutting-edge discoveries. The facilities will also attract leading international research collaborations and provide opportunities to develop OPAL's full scientific potential.

Future

In 2006-07, our focus will shift from assembly to commissioning. Seven instruments will be ready soon after the OPAL reactor is in full operation in 2007, with the eighth and ninth instruments being ready three years later.

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Characterisation of Biomolecules

Activity

We are characterising the role that biomolecules, particularly proteins, play in biological processes by studying the relationship between biomolecular structure and function using neutron and X-ray scattering techniques.

Outputs

Success in competition for peer-reviewed access has enabled neutron and X-ray scattering experiments to be carried out at several overseas facilities in addition to those at ANSTO. This work is clarifying the relationship between the molecular structure and function of several biomaterials including biodegradable plastics, sol-gel based biocatalysts, biogenic silica (templated structures) and biosensors.

Outcomes

By developing expertise in the biological applications of neutron and X-ray scattering, the project team is engaging Australasian bioscientists in the use of neutron beam instruments being installed for the OPAL reactor. To further facilitate the use of neutron scattering, we are developing the ANSTO Biodeuteration Facility to service the needs of the growing bioscience community.

Future

We aim to have the new ANSTO Biodeuteration Facility operating by 2007, which will allow us to undertake a range of collaborative projects. These projects will enable optimal use of the new OPAL neutron beam instruments for biological applications.

Managing access to instruments

Activity

Under this project we facilitate Australian researchers' access to the ANSTO neutron-beam instrumentation at HIFAR. Preparatory to OPAL coming online, we are working to increase the prospective user base and improve business processes for assessing, approving and scheduling customers' beam time proposals.

Output

We continued to develop the web portal through which customers can submit their beam time proposals for ANSTO's review, approval and scheduling. In late 2006 we will use the portal for the first call for experimental proposals to be conducted on the new OPAL instruments in 2007.

Outcomes

ANSTO's unique scientific tools, which allow the structure and dynamics of solids and liquids to be studied at the molecular level, enable researchers to solve complex problems in a wide range of fields including plastics, minerals, engineering, pharmaceuticals, electronics and biology.

Future

At the end of 2006, we will close down the HIFAR instruments which have served the Australian scientific community for so long. In the future, research access to the new world-class neutron beam instruments at OPAL will be by peer review based on merit. There will be no charge for beam time if research results are published in open literature. Access for proprietary work, on the other hand, will be available on a fee-for-service basis.

Isotopes in earth systems



For joint ANSTO and University of Sydney post-doctoral fellow **Elicia Wong**, collaboration is at the heart of her research on biosensing. She is coordinating the diverse efforts of four organisations towards the development of different biosensors. The University of Sydney brings expertise in determining the electrochemical processes that occur at the biomimetic surface; the University of Washington and the Genomic Research Centre, Taiwan, provide the biomaterials; and ANSTO supplies the capability to characterise the biomimetic surface using neutron and X-ray scattering techniques. The research aim is to bioengineer a physical transducer into a viable biosensor. Commercial applications include the detection of genetic mutations in humans.

Projects and activities in this theme contribute to goals within the National Research Priority of *An Environmentally Sustainable Australia*.

Accelerator Science Project

Activity

The Accelerator Science Project applies ion beam analysis techniques, accelerator mass spectrometry (AMS) and secondary ion mass spectrometry to solve problems within the environmental and materials sciences. We also tailor ion beams to address specific problems for external research, government and industry clients including the International Atomic Energy Agency. We are responsible for the safe, efficient and effective operation of accelerators at ANSTO.

Outputs

We completed external grant and commercial contracts worth over \$500 000 to ANSTO,

including iodine-129 AMS analysis of soil sediments for Japanese customers, quantification of air-borne smoke from domestic heating for the Environmental Protection Authority Victoria and a study of the emissions from metals refining processes in Western Australia. We also trained international researchers, postdoctoral fellows, and postgraduate and undergraduate students in quality leading-edge accelerator-based nuclear techniques and their applications.

Outcomes

Overall, we enhanced ANSTO's international reputation in nuclear and atomic science. We also contributed to improved environmental management through two very different projects – one relating to a rescue strategy for the endangered honey possum and the other to the long-term tracking of lead and manganese in Sydney's air.

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Future

We plan to:

- undertake new radiation damage studies for detection systems for microdosimetry
- apply novel X-ray and synchrotron methods to gain a better understanding of hyper-accumulating heavy metal plant and biological systems
- use nuclear techniques to study thin films, multi-layers and interfaces for materials characterisation.

Using cosmogenic radio nuclides to understand past climate change

Activity

ANSTO's Cosmogenic Climate Archives of the Southern Hemisphere project uses naturally occurring cosmogenic radionuclides and the ultra-sensitive Accelerator Mass Spectrometry technique to determine past climatic and environmental change. The 'cosmogenic' signals – archived in corals, tree-rings, ocean sediments, ice cores and glacial deposits – allow us to date these archives and study the processes of past climate change and landscape evolution. This work is an important contribution to the NRP goal of *Responding to climate change and variability*.

Output

We continued radiocarbon measurements in Indian Ocean corals and commenced work on a stalactite which grew between 16 000 to 33 000 years ago to better understand long term environmental changes. Dating of ocean sediments from Peru showed that El Nino-type

climate changes occurred during the last glacial period. Rock samples from mountain peaks in Antarctica and New Zealand's Southern Alps were collected for exposure dating and we successfully extracted an ice-core at Law Dome, East Antarctica.

Outcomes

We published our first results in two prestigious journals. Results highlighted the major differences in patterns of surface water currents across the Indian Ocean and quantified the rate of glacial decay in New Zealand during the Last Glacial Maximum from 20 000 to 15 000 years ago. The ANSTO ice core contains air spanning the agro-industrial period, vital for a unique radiocarbon study aimed at quantifying the impact of increasing atmospheric methane, which is a potent greenhouse gas.

Future

We aim to make ANSTO an internationally recognised centre for the applications of Accelerator Mass Spectrometry and cosmogenic nuclides in the study of climate change and landscape evolution in the southern hemisphere.

→ CASE STUDY

Natural radionuclides and turbulent mixing in the lower atmosphere

NRP associated priority goal – Responding to climate change and variability

Global warming is a serious issue which makes more accurate predictions of the extent and strength of future climate change an international research imperative. Here

Isotopes in earth systems

ANSTO is playing a part through the IsoTrans (Isotopic Tracers in Atmospheric Transport) project. Also involved as research collaborators are several Australian organisations, the World Meteorological Organisation Global Atmosphere Watch, and a number of universities in Asia and Europe.

The IsoTrans project has developed new detection systems that provide quantitative measures of the strength and extent of vertical mixing and horizontal transport of important quantities away from the earth's surface into the atmosphere. These include not only heat, moisture and momentum – the basic quantities that drive and regulate the climate – but also important greenhouse gases such as carbon dioxide.

IsoTrans is able to provide these measures by recording changes that occur on day-night and seasonal timescales in the atmospheric concentration of the natural radioactive gas radon. Radon emanates from rocks and soils at an almost constant rate on all continents and is unreactive in the atmosphere. Only mixing away from the earth's surface, and radioactive decay (precisely known), changes the concentration of radon in the air.

IsoTrans utilises tower-based systems for continuous observation of radon concentrations. These are located in Australia at Lucas Heights and overseas at the Cabauw Experimental Site for Atmospheric Research, The Netherlands. The latter operations are conducted in collaboration with the Energy Research Centre of The Netherlands.

IsoTrans is also starting to employ a radon sampling system that has been developed for use on light aircraft. Measurements with the

new airborne sampler complement the tower-based observations, extending ANSTO's capability for atmospheric radon measurements to vertical profiles spanning the entire atmospheric boundary layer and above (up to 3 000m or higher).

With a better understanding of these near-surface mixing processes, we can improve the computer models used to predict long and short-term weather and climate. The IsoTrans detection systems will also enable better estimates of the amount and sources of surface emissions of greenhouse gases.

→ CASE STUDY

Isotope tracing of contaminants in Sydney estuaries

NRP associated priority goal – Water – a critical resource

Recent media reports have highlighted concerns over contaminated sediments in Sydney Harbour with the movement of contaminants up through the food chain posing a risk to people and ecosystems.

The Isotopes for Water project is currently conducting case studies at two Sydney locations – Homebush Bay in Sydney Harbour and Botany Bay – to demonstrate the value of a combination of nuclear and isotopic tracing techniques in studying the behaviour of contaminants. The research focus is on tracing the transfer of contaminants from their source through sediments and water, to organisms such as worms and crabs and finally to edible fish.

The case studies are defining the ecological significance of key species for the management of commercial fisheries, quantifying the

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transfer of, and assessing the ecosystem risk of contaminants. Although the studies concern just two sites, the results will be directly transferable to other locations in NSW and Australia.

→ CASE STUDY

Isotope tracing of water gains and losses along the Barwon and Darling rivers

NRP associated priority goal – Water – a critical resource

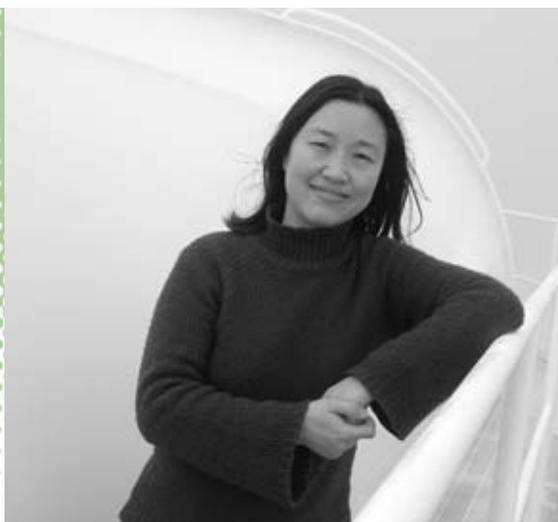
Australian water resources are especially vulnerable to climate change and degradation due to our semi-arid climate and high level of water use and diversion.

Current research on the Darling River under ANSTO's Isotopes for Water project has focused on refinement of isotope techniques including naturally-occurring oxygen-18 and deuterium (hydrogen-2) for quantifying both natural and development-related impacts on the water cycle. Research efforts include organisation of cooperative networks for monitoring these isotopes in groundwater, precipitation, evaporation pans and river discharge.

To date, research in the Darling Basin has centred on a series of nine gauging stations situated along the Barwon-Darling Rivers from Mungundi to Burtundy – a distance of over 1000 km. Flow along the main river stem below Mungundi station depends heavily on episodic rainfall in the higher headwater basins and is muted in summer. The natural flow is heavily affected by diversions and alterations including, in the main river stem, nine headwater dams, 15 main channel weirs and 267 licensed water extractors.

ANSTO researchers have applied a steady-state isotope balance method that shows considerable potential for tracing water gains and losses along river reaches during a representative drought-flood-drought cycle. The required sampling is easily incorporated within standard water quality monitoring programs and may therefore be well suited to non-invasive audits along this typical Australian dryland river.

ANSTO's research will ultimately improve the gathering of information on the Barwon-Darling Rivers and contribute to the sustainable management of the altered river ecosystem.



Xiang Liu, one of the Radiopharmaceutical Research Institute team, joined ANSTO in early 2003, two years after completing a PhD in medicinal chemistry at the University of Sydney. Her work with the Institute centres on the synthesis and evaluation of novel molecules for their potential in diagnostic imaging and therapeutic purposes. Among her current projects is the development of radiopharmaceuticals targeting certain cancers and neurodegenerative diseases such as Alzheimer's. The possible benefits will take some time to realise, however, as preliminary research and development alone can take from a few years to over a decade.

Projects and activities in this theme contribute to goals within the National Research Priority of *Promoting and Maintaining Good Health*.

Cell level microdosimetry for cancer therapy

Activity

This research is contributing to the development of emerging radiation cancer therapies such as proton therapy with new instrumentation to measure the interactions of radiation at the cell and cell nucleus level (microdosimetry).

Output

Collaborating with the University of Wollongong, inventors of the first generation solid-state microdosimeter, ANSTO is developing new technologies and techniques to better understand the true radiobiological effectiveness of heavy ion-based radiotherapy beams.

Outcome

The first generation solid-state microdosimeter device was used by the collaborative team to verify the radiobiological effectiveness of 250 MeV therapeutic proton beams in a variety of different tissue phantoms. The research will ultimately assist radiation oncologists to improve the efficacy of proton and other heavy ion-based therapies in treating cancer.

Future

The project team is currently expanding its research activities after receiving an Australian Research Council grant of \$430 000 over three years. The team, which now includes the University of New South Wales, will develop a new generation of microdosimeter devices for radiotherapy and radiation protection applications.

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→ CASE STUDY

SarAr platform technology

NRP associated priority goal – Ageing well, ageing productively

For a decade there has been a demand for PET (Positron Emission Tomography) radiopharmaceuticals in molecular imaging, to provide a screening process for cancer patients – many of them older people – to determine who is likely to respond to treatment. The wider use of PET radiopharmaceuticals has however been limited because of the short half-lives (less than 2 hours) of commercially available PET isotopes.

To label molecular targets with longer biological half-lives (hours to days), researchers require an isotope with the right half-life and a good delivery system. Copper-64 is an emerging PET radioisotope with a half-life that is suitable for shipping across a continent. The SarAr platform technology is the means to attach copper-64 to carrier molecules for imaging purposes.

SarAr has many applications and is easy to use. It readily encapsulates copper-64 and generates a product that is stable in the body. It can be used to radiolabel at a wide range of pH levels, rapidly and quantitatively. A major commercial advantage is that the process is undertaken at room temperature. Hence the SarAr technology can be applied to carriers such as peptides or antibodies, which would be degraded at temperatures above that of the body.

Collaborative research studies with Harvard Medical School demonstrate that the SarAr technology allows copper-64 to be attached to

an antibody and tracked in the body to the tumour site. This antibody can be used to diagnose and treat neuroblastoma, a cancer that affects children. There are also possibilities for treating melanomas and a number of other cancers.

SarAr technology also has the potential to enable scientists to improve the specific level and type of cancer treatment to adapt for individual patients. By labelling the drug, we can see whether it is taken up at the cancer site or, if there is no uptake, to understand where the drug is going and then how to adjust the treatment to make it more effective.

The development of SarAr technology is a joint collaboration between ANSTO and the Australian National University. Patents on this technology have been secured in Australia, US and Europe. The project is now part of the ANSTO business arm, Access ANSTO, where we are focussing development of the technology on a range of drugs in the development phase, and actively advancing licensing opportunities worldwide.

Materials science



Materials chemist **Chris Griffith** crossed the continent to join ANSTO in 2002. His focus since then has been on the pre-treatment of radioactive waste through partitioning the most active radioisotopes using tailored, inorganic materials and leaving the bulk as low-level liquid waste. For example, out of approximately 10 000 litres of liquid waste arising from molybdenum-99 production at ANSTO, removing around 20 kilograms of these inorganic materials would remove more than 99% of the original activity. With access to waste at ANSTO, Chris has been able to complete an active rather than a simulated demonstration of how the method works.

Projects and activities in this theme mainly contribute to goals within the National Research Priority of *Frontier Technologies for Building and Transforming Australian Industries* but some also fall under other priorities as indicated below.

Nanostructural engineering

Activity

This project concerns the development of a comprehensive technology platform and associated neutron/X-ray based characterisation tools to engineer nanostructured materials with potential applications in areas such as:

- optics/optoelectronics, for example, photosensitive coatings
- biotechnology, for example, production of chiral pharmaceuticals
- protective/adaptive coatings for abrasion/corrosion resistance.

Particular focus areas include nanostructured coatings on polymeric substrates and nuclear waste forms. This work is an important contribution to the NRP goals of *Frontier technologies and Advanced materials*.

Output

New capabilities in surface functionalisation of polymeric substrates and novel functionalised precursors for depositing adaptive nanohybrid coatings on nuclear waste forms (as part of technology developments for Advanced Nuclear Fuel Cycles) have been developed. We forged alliances with such key institutions as the Ecole Nationale Supérieure de Chimie de Montpellier, Université de Montpellier II, Institut de Chimie Séparative de Marcoule in France and the Cooperative Research Centre for Polymers.

Outcomes

Our work is delivering new methods for improving the durability, mechanical properties and functionality of polymers used in the

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manufacture of ophthalmic lenses, and technology for enhancing the durability of nuclear waste forms.

Future

We will extend our nanotechnology platform for depositing functional coatings on polymeric substrates to include such applications as flexible solar cells. In conjunction with our collaborators, we will further develop our platform technology for depositing adaptive nanohybrid coatings on waste forms to enhance their durability.

Advanced materials for environment and energy applications

Activity

Development of functional nanoporous semiconducting materials for the separation of radioisotopes is taking place primarily in the context of:

- the EUROPART (EUROpean research program for the PARTitioning of minor actinides and some long-lived fission products from high active wastes issuing from the reprocessing of spent nuclear fuels) project on reprocessing for Advanced Nuclear Fuel Cycle applications
- development of processes for the recovery of isotopes with applications in nuclear medicine (molybdenum-99, iodine-131)
- the minerals processing industry (lead-210, polonium-210).

This work contributes to the NRP goal of *Advanced materials*.

Outputs

One of the important outputs has been the building of new capabilities in pyroelectrochemical processing for Advanced Nuclear Fuel Cycles, a new area of activity for ANSTO. We have also developed novel granular mesoporous zirconium titanate adsorbents for applications in the separation of isotopes while forging alliances with other agencies including the Argentine Atomic Energy Commission (CNEA), The Ian Wark Research Institute and the National Hydrogen Materials Alliance within the CSIRO (Commonwealth Scientific and Industrial Research Organisation) *Energy Transformed flagship*.

Outcome

The project is contributing to the development of advanced materials and methods for separating radioisotopes most relevant to Advanced Fuel Cycles and the production of radioisotopes.

Future

We are developing a versatile platform separation technology that can be deployed across a spectrum of applications with particular emphasis on advanced fuel cycles. There are short-term prospects for deploying previously developed microporous materials for the extraction of radioactive lead-210 and polonium-210 from minerals processing solutions.

Materials science

→ CASE STUDY

Nanoscale nuclear sieves

NRP associated priority goals – Transforming existing industries (Environmentally Sustainable Australia), Frontier technologies, Advanced materials

The separation of one substance from another has held a key place in the chemical sciences since the days of the great alchemists. Chemical separations are also vital components of the nuclear fuel cycle and are set to increase in prominence as industry focuses on how to enhance efficiency and reduce the environmental footprint in the next generation of nuclear fuel cycles (the so-called Advanced Fuel Cycle Initiative).

This is the context for ANSTO's work on the development of nanoscale 'sieves' that enable the sifting out of toxic chemicals and heavy metals. So far we have been able to develop materials that can remove the major radiotoxic elements from ANSTO's own radioisotope production solutions, concentrating these elements into a small solid mass and thus minimising the volume of wastes for storage.

The materials work much like conventional kitchen sieves, only at the scale of atoms or molecules (the nanometre scale). In some cases, the engineering of such nanoporous materials requires altering or functionalising the internal surfaces of their pore networks so as to profoundly modify their affinity for particular molecules or ions.

Advanced fuel cycles will also involve the separation of radioisotopes. In particular, we need to separate long-lived isotopes from

shorter-lived isotopes so that the former can be destroyed in dedicated reactors while simultaneously generating energy for society's needs. This enables the long-lived isotopes to be rendered harmless in a relatively short period of time.

ANSTO is uniquely positioned in Australia for the design and synthesis of nanoscale sieves as well as for the study of their separations properties. The new neutron scattering tools we are assembling at OPAL will assist greatly in this work.

→ CASE STUDY

ANSTO research into the integrity of gas transmission pipelines

NRP associated priority goal – Critical infrastructure (Safeguarding Australia)

Gas transmission pipelines are integral to the national energy economy and loss of supply due to rupture or explosion can have far-reaching consequences. Through our research for the Australian Pipeline Industry Association (APIA), ANSTO is helping to ensure safe and continuous energy transportation. Several recent projects are noteworthy in this context.

At the top of the list is the PipeStrain software written at ANSTO, which APIA estimates will potentially save industry \$110 million over the next seven years. PipeStrain, which is marketed under licence through APIA, allows better management of pipeline strength testing, a process that can plastically deform some pipes. It does so by predicting the effects of high pressure testing of pipes, reducing the chances of failure in testing, and helping achieve the highest test pressure. The end

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results are increased throughput and savings on pipelines construction from the use of thinner walled pipe. During testing of PipeStrain, the software was used in the construction of a new pipeline section and delivered savings of more than \$350 000.

ANSTO also made a major breakthrough in developing methods for predicting the ability of pipeline steel to successfully accommodate strain such as that due to ground movement. Using these methods, we now know that the failure strain is much lower than was commonly assumed – a finding with important implications for the use of these steels in modern pipelines.

Other research concerns stress corrosion cracking, which is a pipeline problem worldwide, and methods to assess the safety of pipelines in areas of potential mine subsidence.

At the same time as solving specific pipeline problems for APIA, our work has enabled the association to join European and US pipeline groups in tripartite research collaboration.

National interest and capability enhancement



Mike Colella started work at ANSTO over 17 years ago as a junior technical assistant. Now a nuclear materials scientist with the Institute of Materials and Engineering Science, he leads 'forensic and nuclear security research' activities within the National and International Safeguards and Security Research project. Mike collaborates with the forensic and counter-terrorism community on strategic research in radiological and nuclear forensics, and nuclear security research initiatives. Mike and his team are currently investigating the effects of radiation exposure on critical trace evidence and evaluating post-incident radiological decontamination products and technology. Both research activities have received funding from the Prime Minister and Cabinet's National Security Division and the Australian Federal Police.

Projects and activities in this theme contribute to goals within the National Research Priority of *Safeguarding Australia*.

Regional security of radioactive sources

Activity

As part of the Australian Government's commitment to counter-terrorism, ANSTO is leading the Regional Security of Radioactive Sources project. ANSTO radiation specialists are working with our neighbours in the South East Asia and Pacific region to identify, and assist in securing, high-risk radioactive sources.

Output

RSRS has engaged organisations and personnel from Brunei, Cambodia, Indonesia, Laos, Papua New Guinea, Philippines, Thailand and Vietnam. We have provided training and advice to help these countries to recognise vulnerable or orphan sources, to improve infrastructure for regulation and the physical

protection of radioactive sources, and to respond to emergencies. A major success was relocation and secure storage at ANSTO of a vulnerable, disused cobalt-60 medical teletherapy source from a hospital in Papua New Guinea.

Outcome

Working in conjunction with the International Atomic Energy Agency and the US National Nuclear Security Administration, the project ensures international security objectives are met.

Future

The Australian Safeguards and Non-proliferation Office and Australian Radiation Protection and Nuclear Safety Agency will collaborate with ANSTO on further work to enhance the capability and resources of nuclear regulatory agencies and users in regional countries to ensure continuing security of nuclear material and radioactive sources.

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→ CASE STUDY

The impact on forensic trace evidence exposed to radiological materials

NRP Associated Priority Goal - Protecting Australia from terrorism and crime

What are the effects of radiation on trace evidence at a radiological crime scene? In answering this question, a current ANSTO project will equip forensic and counter-terrorism agencies with the knowledge to process effectively a radiological crime scene and thereby enhance Australia's forensic counter-terrorism capabilities.

Our research method is to expose trace evidence samples such as fingerprints, hair, fibre, glass fragments and paint chips to increasing doses of radiation to simulate exposure to a radioactive source. At each juncture, we characterise and evaluate the trace evidence using a range of forensic techniques to ascertain if any radiation damage has manifested and whether or not the radiation damage impacts on the interpretation and reporting of forensic evidence.

In addition to the primary benefits noted above, the research outcomes will also inform law enforcement agencies and forensic laboratories about the necessary changes in methodologies and processes to apply to forensic evidence in the event of a radiological event.

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Jason Chakovski has been busy over the last 12 months. As Replacement Research Reactor Project Electrical System Coordinator for OPAL, Jason has worked on verifying the design, inspection, operation and testing of the reactor's electrical systems and will be operating the facility as one of the Shift Managers. He has also trained members of the 24 x 7 shift that will ensure OPAL's safe and efficient operation. It's a role Jason was well prepared for, having received extensive training himself from the company that designed the new reactor. An electrical engineer, Jason found that the most interesting – and challenging – aspect of his work in 2005-06 has been taking on a large number of varying responsibilities and learning different aspects of engineering.

Introduction – Operations

In addition to ANSTO's research function, our role entails the operation of facilities for our own use and that of other researchers, provision of advice to government, representing ANSTO in international forums and ensuring that all our activities are carried out in a safe, efficient and environmentally aware manner.

In terms of our facilities, the highlight this year has been the completion of cold commissioning of the OPAL reactor, a process that was completed within schedule, and the submission of the application for an operating licence to the Australian Radiation Protection and Nuclear Safety Agency. This latter activity involved staff from across the organisation and extensive documentation creation and review. These documents confirm that the reactor was built according to the approved design, that its systems will operate as intended and that ANSTO has sufficient numbers of qualified

operating staff. Despite this significant demand on the organisation, the existing reactor, HIFAR, has continued to operate well. Following completion of final commissioning of OPAL, HIFAR will be permanently shut down and eventually decommissioned.

Advising government entails both contributing to government priorities and acting as the premier source of advice on nuclear technology and nuclear developments worldwide. Our specific focus this year has been on response to terrorist threats. ANSTO has provided a range of advice on radiological and nuclear issues, as well as developing a capability to support first response agencies in detection, analysis and response to radiological and nuclear issues. ANSTO is also a significant contributor to the Publicly Funded Agencies Committee on Counter Terrorism (PACCT) and to the CBRN (chemical biological radiological and nuclear) Strategy Group within the Department of Prime Minister and Cabinet.

In international interactions, ANSTO has continued to represent Australia regionally through the International Atomic Energy Agency (IAEA) Regional Cooperative Agreement that binds 17 countries in our region and the Forum for Nuclear Cooperation in Asia. The major activity under the agreement has been enhancing regional capacity to assess, plan and respond to aquatic environmental emergencies, a project funded by AusAID (Australian Agency for International Development). Specific activities within the IAEA have included providing experts for missions required by the IAEA, hosting training courses and fellowships and supporting Australia's contributions as a member of the IAEA Board.

Underpinning all our activities is the maintenance of high safety standards. This requires the active commitment of all our staff and the specific support from the operational divisions. In this context, we were proud to see the opening of our new, state-of-the-art main gate facility, which will ensure security of the site.

ANSTO values interaction with our community and again this year has sought to inform people of our activities and the beneficial uses of nuclear science and technology.

Project outlines

OPAL

Activity

Development of ANSTO's new OPAL reactor advanced according to plan. We submitted final documentation to support the application for an operating licence to ARPANSA and, in parallel, carried out final training and accreditation of operations staff.

Output

Civil construction of the reactor was effectively completed. Cold commissioning commenced in February 2006 with completion in May and involved the testing of all reactor systems and equipment without fuel. During cold commissioning the reactor's designer and ANSTO checked that all systems performed as expected. Cold commissioning was completed earlier than planned. ANSTO then provided the detailed results to ARPANSA for consideration in its licence deliberations.

ARPANSA arranged for an IAEA independent review of the reactor operating procedures in November 2005 and a separate independent review of hot commissioning procedures in early 2006. Both reviews acknowledged ANSTO's preparedness for commissioning and operation of the reactor.

Outcomes

The OPAL reactor is a multi-purpose facility for radioisotope production, irradiation services and neutron beam research. It will allow us to expand our work in the development and application of new knowledge in areas vital to Australia's future, such as agriculture, industry and manufacturing, minerals and energy, construction, human health and environment.

OPAL will provide Australians with over 70 per cent of the nuclear medicines needed for diagnosis and treatment of diseases such as cancer. A major improvement over the present HIFAR reactor is the range of neutron energies that OPAL will be able to provide for advanced materials research. This capability will put ANSTO in the top ranks of international nuclear science.

Future

ANSTO is planning for OPAL to be fully operational by early 2007. Hot commissioning and performance testing of the reactor are scheduled to run from July 2006 to January 2007.

Constructing the new silicon irradiation rigs at OPAL

Activity

ANSTO is providing a suite of six new high-performance rigs for silicon irradiation or neutron transmutation doping at OPAL with a view to continuing production of high-quality, high-conductivity silicon semiconductor for the electronics industry as HIFAR has done for many years. This project is now well advanced and the rigs are being cold commissioned.

Output

Following completion of bench-testing to validate their design, performance, reliability and fitness-for-purpose, the rigs were installed into the reactor pool at OPAL in early 2006. The new design is a significant improvement on the existing rigs at HIFAR as it uses the reactor pool water to levitate and rotate the rigs rather than conventional moving parts such as mechanical bearings and electrical motors.

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Outcomes

The OPAL reactor will allow ANSTO to continue to produce high quality silicon semiconductor for the world market. The new rigs will increase productivity and support ANSTO's business plans.

Future

After the scheduled completion of cold commissioning of the silicon rigs mid-2006, hot commissioning will commence in parallel with other OPAL system commissioning.

HIFAR – operation, maintenance and utilisation

Activity

The 10MW HIFAR research reactor, Australia's only operating nuclear reactor, operated safely and reliably throughout the year and exceeded performance indicators for operation and production. The engineering, maintenance and utilisation programs supporting HIFAR operations ensured delivery of irradiated materials for radiopharmaceuticals and industry, silicon semiconductor, and neutron beams for research.

Output

The HIFAR reactor was fully converted to low enriched uranium fuel, the conversion process complying with the Reduced Enrichment for Research and Test Reactors Program – part of the international nuclear non-proliferation effort. Monitoring during conversion found that the reactor's performance and safety were close to all predictions in the comprehensive safety case that we developed before the process commenced.

Outcomes

HIFAR operated at high levels of availability and safety throughout the year to the continued satisfaction of internal and external customers. Our experience with HIFAR also benefited the OPAL project, with suitably trained staff available to support operational planning for the new reactor.

Future

We intend to operate HIFAR until early 2007 when it is planned that the OPAL reactor will be fully operational. After that, HIFAR will be shut down and subsequently decommissioned.

Managing ANSTO's waste

Activity

The safe handling, storage and ultimate disposal of ANSTO's radioactive wastes is a key focus of the organisation. Tasks include the collection, processing, treatment and conditioning of low and intermediate level wastes into solid-form packages suitable for storage and transportation.

Output

As well as managing waste, we undertook several new activities. These included:

- completion of a mock-up facility for testing the integration of the ceramic titanate immobilisation technology (synroc) for intermediate level liquid waste within hot cells
- testing of a new drying process for water treatment sludges
- improvements in methods to segregate non-active waste from active waste

Project outlines

- improvements in the effluent treatment facilities to allow the OPAL reactor to be integrated into the ANSTO system.

Outcome

ANSTO continued to safely manage its radioactive waste to meet Australian regulatory requirements, international standards and community expectations for radioactive and non-radioactive compliance. We also maintained our international reputation as a provider of innovative waste management solutions.

Future

To remain world-class, new waste management processes will focus on volume reduction, long-term immobilisation and integration of processing for packaging of wastes for long-term storage and ultimate disposal.

Leading the way in security and international safeguards

Activity

Rigorous standards and practices continued to be applied to handling all nuclear material at ANSTO. We complied with international safeguards agreements for all nuclear material in accordance with permits issued by the Australian Safeguards and Non-Proliferation Office (ASNO). ANSTO also implements physical protection and site security measures to comply with international agreements.

Output

- IAEA and ASNO inspections confirmed ANSTO's compliance with accounting and reporting requirements.

- We used our facilities and expertise to train security personnel from other countries.
- The opening of ANSTO's new main entrance further strengthened ANSTO's world-leading security systems.
- Security plans were developed and approved for OPAL.

Outcomes

ANSTO's management of nuclear materials and facilities enabled Australia to comply with the Nuclear Non-Proliferation Treaty and implement integrated safeguards. We also promoted adherence to non-proliferation and physical protection principles in neighbouring countries.

Future

The security systems at the OPAL reactor will combine high levels of security for the reactor building with ease of access for national and international researchers using the neutron beam facilities.

Construction and commissioning ANSTO's new main entrance facility

Activity

ANSTO completed the construction and commissioning of a new main entrance facility to meet current national and international security standards. As well as providing high levels of physical protection, the facility is aesthetically pleasing, functional and efficient. It gives ANSTO a modern shopfront interface with the general public and allows efficient processing of visitors and contractors at their initial physical point of contact with the organisation.

Report of Research and Operations

Output

Construction and commissioning of the main entrance facility was completed on budget and within the approved timeframe. Project staff, including ANSTO personnel, consultants and construction contractors, worked well together to achieve the successful result.

Outcomes

The facility enhances the coordination of security functions and provision of site security with minimum impact on ANSTO's day-to-day operations.

Future

The new facility will allow ANSTO to maintain scaleable levels of security at the ANSTO site for the foreseeable future.

Advising government

Activity

ANSTO advises ministers, Federal Parliament and government agencies on a range of national and international nuclear issues including the nuclear fuel cycle, counter terrorism initiatives, regional activities and developments at the International Atomic Energy Agency. We also contribute to government policy on science and technology, health, environment, industry, foreign affairs and trade.

Output

ANSTO gave regular advice on radioactive waste management, the nuclear fuel cycle and other overseas developments of importance to Australia. We participated in interagency discussions on nuclear issues and commissioned an economic comparison of the

costs of introducing nuclear power to Australia. We also provided analytical services to help detect clandestine nuclear activities as a service to the IAEA and supported government programs directed at assisting regional countries to strengthen nuclear safety, security and non-proliferation.

Outcomes

The sound advice we provided over the course of the year enabled the Australian Government and government departments to make informed decisions on a range of issues of national importance.

Future

We will continue to play an advisory role to government, in particular in the discussions about nuclear energy as an alternative source of power in Australia, and the ramifications of overseas proposals such as the US Global Nuclear Energy Partnership.

Scientific support to counter terrorism

Activity

ANSTO is collaborating with Australian Government agencies responsible for counter-terrorism intelligence and operations to prevent the proliferation of chemical, biological, radiological and nuclear weapons and reduce the risk that terrorists can acquire such materials.

Output

Drawing on their operational experience with radiological and nuclear materials and processes, ANSTO personnel have contributed to the development of improved protocols for

Project outlines

assessing risks and enhanced strategies for dealing with these risks.

Outcome

Through collaboration, ANSTO has been able to use its unique skills in the national interest and ensure an effective whole-of-government approach to counter terrorism and avoid costly duplication.

Future

The establishment of strong relationships nationally is expected to lead to an improved ability to share information with allies and hence better prevention of CBRN proliferation and terrorism internationally.

→ CASE STUDY

Radiological crime scene investigation training

With forensics now an established part of counter-terrorism training, ANSTO has a unique role to play as an educator in radiological crime scene investigation. This is because, in addition to our technical competence, we can provide an extra dimension to radiological training through the practical use of radioactive material.

In 2005-06, ANSTO hosted two radiological crime scene investigation workshops in preparation for the 2006 Melbourne Commonwealth Games. Participants from across Australia included forensic counter-terrorism, bomb squad, fire/HAZMAT and defence force personnel. The aim of the workshop was to equip participants with the prerequisite skills and knowledge to competently assess the extent of the radiological hazard following a terrorist attack (for example, a radiological ‘dirty-

bomb’) and, if safe to do so, enter the scene to collect evidence.

Participants were presented with both academic and physical challenges. On the physical side, they responded to two realistic mock scenarios requiring all agencies to work together and safely examine the crime scenes. Academically, participants received formal instruction on all aspects of crime scene operations, radiation protection and measurement, decontamination and radiological sampling. Overall, the exercises demonstrated the importance of a national approach to such specialist training programs.

The outcomes from the workshops assisted ANSTO staff in drafting guidelines for assessing suspicious packages/substances for the national chemical, biological, radiological and nuclear working group.

Representing Australia internationally

Activity

ANSTO maintained a strong presence on established regional and international forums, including the IAEA Board of Governors. We also took a leading role in the two major regional nuclear cooperation mechanisms – the treaty-level Regional Cooperative Agreement (RCA) and the Forum for Nuclear Cooperation in Asia.

Output

ANSTO staff provided their expertise across a wide spectrum of assignments to support the IAEA’s nuclear-related programs. Assignments included chairing or participating in technical meetings, providing specialist advice to

Report of Research and Operations

developing countries, and delivering lectures at IAEA conferences and training events.

Australia, through ANSTO, acted as lead country within the region for radiation protection, chaired the RCA Regional Office Advisory Committee and with the support of AusAID funded a range of activities relating to environmental pollution and possible future radiological emergencies.

ANSTO Counsellors in Vienna and Washington represented Australia on nuclear issues, and maintained strong links with the IAEA and the OECD (Organisation for Economic Cooperation and Development) Nuclear Energy Agency.

Outcomes

Along with fulfilling Australia's obligations under the Nuclear Non-Proliferation Treaty and demonstrating our country's commitment to the peaceful application of nuclear technology, we advanced ANSTO's own scientific and nuclear policy standing.

Future

ANSTO will continue to represent Australia in regional and international nuclear cooperation arrangements and in the implementation of ongoing technical and management initiatives. A major aim of this involvement is to encourage countries in the Asia-Pacific region to achieve increased self-reliance in the safe, sustainable and peaceful use of nuclear technology.

→ CASE STUDY

Improved regional management of aquatic pollution

Industrial development in Asia has been important to the economic growth of the region but has led to increased aquatic pollution. As a direct result, flora and fauna numbers have decreased, and consequentially, the health and viability of local communities could suffer.

To address the problem, an ANSTO-led team has coordinated a three-year project to improve regional capacity to assess and manage radiological and environmental risks in coastal waters. Up to sixteen countries will benefit from the project, which is largely funded through the Australian Government's AusAID program to reduce poverty in developing countries.

Demonstration studies have been one of the strands of the project, including studies of heavy metal contamination in Jakarta Bay and seafood safety in Thailand. Training has been the other principal focus. During 2005 in Thailand, ANSTO staff trained scientists from the region on the use of nuclear techniques to analyse contaminants and determine the rate of biological uptake and passage through the food web. In 2006, they demonstrated to Indonesian scientists the use of a computer model to accurately simulate the movements of contaminants in coastal areas.

The project will culminate in a workshop and regional conference to be held in December 2006 in China. This is planned as a wrap-up event at which the project team will demonstrate ecological risk assessment modelling technology that employs software developed at ANSTO.

Project outlines

**Table 1. Overview of courses managed by Learning and Development
July 2005 - June 2006**

Courses & duration	Number of courses delivered 2004-05	Total number of days	Number of attendees
Site-Wide Training Programs			
Frontline Management Workshop (Swinburne University) x 3 days	1	3	19
Frontline Management (Australian Institute of Management) x 1 day	2	2	22
Welcome to ANSTO Orientation x 1 day	5	5	74
Science Communication Workshop x 3 days	1	3	19
Introduction to Supervision x 2 days	2	4	18
Advanced Supervisory Skills x 1 day	2	2	16
Coaching and Development Program (4 x 1/2 days and 1 full day)	2	6	16
Australian Graduate School of Management New Manager Program x 5 days	1	5	3
Crucial Conversations x 2 days	1	2	11
Certificate IV – Workplace Training and Assessment (specific modules) x 15 days	1	15	11
Dream Weaver x 1 day	1	1	6
Strategies to a Work and Life Balance x 1 day	1	1	10
Working Successfully at ANSTO x 2 days	1	2	8
Harassment Contact Officer Training x 2 days	1	2	1
Computer Forensic Course X 5 days	1	5	1
Excel Training x 1 day	1	1	2
Recruitment Training (3 x 1/2 days)	1	1 1/2	16
Division/Institute Development Workshops			
Management Team Development Day x 1 day	2	2	19
Coaching Skills Workshop x 2 days	1	2	6
TOTAL	28	64 1/2	278

Report of Research and Operations

**Table 2. Supervision of students by Learning and Development
July 2005 – June 2006**

Program	Numbers
Postdoctoral Fellowships	8
Year-in-Industry (undergraduate)	18
Vacationers (undergraduate)	20
Work Experience (high school)	23
TOTAL	69

While at the time of writing the project has still six months to run, it is on target to achieve objectives and provide well-founded scientific bases for sustainable coastal development.

Delivering Learning and Development

Activity

Learning and Development is responsible for identifying and delivering a variety of individual and organisational development activities for ANSTO staff.

Outputs

This year we ran 19 different courses as shown in Table 1 and facilitated 69 postdoctoral, year-in-industry, vacation and work experience placements as shown in Table 2. We introduced several new programs, including the Coaching and Development Program and the Crucial Conversations Workshop, launched the redesigned Frontline Management Program and rolled out the Building a Better Workplace Online Training Program to help support a better work culture at ANSTO.

Outcomes

Training helped staff develop their skills across a broad spectrum of professional competencies. With supervisory skills a key requirement at ANSTO, the redesigned Frontline Management program gave current and aspiring managers a more flexible and practical way to enhance their skills and obtain formal accreditation.

Future

We will introduce additional content to our online Building a Better Workplace Program including modules on 'Behaviour' and 'Ethics'. In addition, we will roll out an online, interactive induction program to assist new starters make a smooth transition to ANSTO.

Project outlines

→ CASE STUDY

Reaching schools all over Australia

Our commitment: that teachers across Australia have access to ANSTO and our educational resources. How we delivered: we used a variety of avenues to promote ANSTO and our free education resources to teachers and to support them in fostering student interest in science.

By partnering with the television program, *School Torque*, shown weekly on SBS television, we were able to showcase ANSTO scientists and their work. This entertaining program, which is hosted by students, featured interviews with ANSTO scientists who explained complex projects simply and creatively. We will be compiling all *School Torque* segments for uploading to our website and making a free compilation DVD available to all schools.

We also established strong relationships with all state science teachers' associations. Under our partnership with each association, we supplied regular ANSTO stories and teacher resources for their various publications, websites and conferences. In working with the associations, we heavily promoted the availability of free teacher resources and have since been responding to a steady stream of requests from teachers across Australia.

Another initiative was the development of the *Careers in Science* lesson plans. Our aim was to further support teachers in using the successful *Careers in Science* brochures, fact sheets and website which encourage students to choose a science subject for senior study. The lesson plans give teachers strategies

through which to 'sell' science both as a field of study and as a career.

We plan to undertake a comprehensive evaluation of education initiatives in 2006-07.

KEY PERFORMANCE INDICATORS



Key Performance Indicators

The Australian Government funds ANSTO in three separate tranches, or outcomes, to:

1. acquire new nuclear based infrastructure, that is, the construction of OPAL
2. dispose of spent HIFAR fuel
3. deliver valued, nuclear-related scientific services and products.

The first two outcomes are funded in accordance with specific Government decisions. The third outcome is subject to a Triennium Funding Agreement (TFA) between the Minister for Finance and Administration, the Minister for Education, Science and Training, and ANSTO. Funding on a triennial basis provides a more stable financial environment and a realistic timeframe in which to plan for and deliver outputs and outcomes.

The following performance report covers all three outcomes and reports against outputs identified in ANSTO's section of the 2005-06 Department of Education, Science and Training Portfolio Budget Statement.

Outcome 1 – Nuclear based infrastructure

Objective

The replacement research reactor is operational and providing improved core nuclear facilities for medical, industrial and R&D (Research and Development) applications during 2006.

Indicators

Performance

Level of compliance with project plan and achievement of specific milestones:

- On time

Delays totalling 3 months occurred this year due to manufacturing issues and approvals

- On budget

The construction and commissioning project is within budget. However, ANSTO has agreed to provide extra funds to settle commercial claims from the contractor

Contributions of Outputs to Outcome

ANSTO's specific output relates directly to client supervision of the design, construction and performance testing of the outcome in the form of an operational replacement research reactor together with neutron beam instrumentation.

Indicators	Performance
• Complete installation of reflector vessel (July 2005)	• Completed in August 2005, ready for pool filling with water in October 2005
• Cold neutron source vacuum containment arrived (Aug 2005)	• Achieved
• Complete installation of cold neutron source (Nov 2005)	• Completed to schedule
• OPAL Construction • Final activities (April 2006)	• Completed June 2006 except for minor activities not required for fuel loading
• Pre-commissioning activities (Feb 2006)	• Completed to schedule except for some minor activities
• Cold Commissioning and completion of reactor pool activities (May 2006)	• Completed to schedule except for some minor activities
• Complete outstanding required documentation (May 2006)	• Achieved July 2006
• Operating Licence achievement (June 2006)	• Achieved 14 July 2006
• Operator training and accreditation (June 2006)	• Achieved to schedule

Outcome 2 – Disposition of Spent Fuel

Objective

Removal of spent fuel from the ANSTO site in line with stringent safety arrangements and community expectations.

Indicators	Performance
Safety procedures adhered to fully and shipment is: <ul style="list-style-type: none"> • On time • On budget 	<ul style="list-style-type: none"> • No shipments were conducted for this reporting year. However, planning for the eighth fuel shipment has met the required time and budget parameters

Key Performance Indicators

Output 2.1

Indicators

- Schedule for eighth shipment is completed

Performance

- Planning for the eighth shipment (scheduled for late 2006) has been successfully completed

Outcome 3 – Science and Technology Solutions

Output 3.1

Management of core nuclear facilities providing Australia with nuclear capability and credibility from which socio-economic benefits flow to Australia, the R&D community and industry.

Indicators

Performance

	2004-05	2005-06
• Research beamline usage – percentage of all available days, across all seven HIFAR instruments	83%	71% ⁱ
• Research reactor availability – percentage of actual hours at power as a proportion of total hours planned to be at power	93%	99%
• Accelerator usage – percentage of all available days, excluding maintenance, for tandem accelerators ⁱⁱ	86%	91%

Output 3.2

Expert scientific and technical services for and on behalf of Government, in support of Australia's national and international strategic and nuclear policy objectives.

Indicators

Performance

	2004-05	2005-06
• Leadership role in national and international forums and networked organisations – number of such roles	21	35 ⁱⁱⁱ
• Person years by staff on projects that have as a primary objective providing advice to Government	14	11

Output 3.3

The acquisition of knowledge, through research and its utilisation, through innovation, to advance the beneficial applications of nuclear science and technology to problems of environmental, medical, social and industrial importance.

Indicators	Performance	
	2004-05	2005-06
• Publication and conference papers		
- Books, chapters & monographs	4	2
- Journal articles	156	172
- Conference papers/abstracts	246	269
Total	416	443
• Number of research collaborations	260	251
• New inventions per year		
- Invention disclosures	15	16
- Provisional patent filing	6	4

Output 3.4

Science and technology services to industry and the Australian research and development community, including training of students in nuclear science and technology and its applications.

Indicators	Performance	
	2004-05	2005-06
• Number of postgraduates and undergraduates supervised	194	195
• External earnings from services and contract research	\$5 380 000	\$5 829 000
• External earnings from training courses	\$100 000	\$251 000

Key Performance Indicators

Output 3.5

Regular production and sale of radiopharmaceuticals and radioisotopes for medical and industrial applications and other services through designated business units.

Indicators	Performance	
	2004-05	2005-06
• Radioisotope sales (total)	\$20 730 278	\$20 951 576
• Export sales	\$4 394 653	\$5 042 638
• Radiopharmaceutical doses to patients – potential doses ^{iv}	2 132 833 ^v	2 201 145

Output 3.6

The exploitation of ANSTO's intellectual property and physical assets.

Indicators	Performance	
	2004-05	2005-06
• Intellectual property being commercialised – inventions and designs with active commercialisation plans ^{vi}	21	36
• External earnings from land management and CSIRO site support	\$3 488 339	\$3 809 136

i Reduction in beamline usage is due to a gradual decrease in development using the HIFAR Instruments which are due to be shut down at the end of 2006. Staff effort has transferred to the installation of the new instruments for the OPAL reactor.

ii The indicator is for usage of STAR (Small Tandem for Applied Research) and ANTARES (Australian National Tandem Accelerator for Applied Research), with 13 per cent allowance for maintenance.

iii The results reflect the increased profile of ANSTO staff as leaders in the Nuclear Science and Technology arena, nationally and internationally.

iv For 2004-05 ARI reported potential doses to patients at 1.45 million. Following a modification to the calculation method, this figure has been revised to the figure shown in the table i.e. 2.13 million.

v Potential doses to patients based on radioactivity of the five main ARI products, as measured at the point of despatch to nuclear medicine centres in Australia. These five main products are a technetium-99m generator, thallium-201, gallium-67 and the medical iodine products iodine-131 and iodine-123. The estimate takes account of transport times, rates of radioactive decay and average dose quantities per patient but not the centres' hours of operation and usages, patient characteristics or the organs imaged. The indicator only covers distribution in Australia, not exports.

vi Results reflect a focussed strategy for commercialisation and intellectual property management, particularly in relation to new inventions with multiple target markets such as ANSTO CeramiSphere.

BUSINESS AT ANSTO



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Business at ANSTO



Sam Hajjar made a bold career move in 2005 when he left a top-shelf law firm to join ANSTO. He now employs his commercial and intellectual property expertise to facilitate interaction with industry in the Access ANSTO business unit. 'All the deals I've worked on have been very different', says Sam. Deals range from joint technology development to the transfer of ANSTO intellectual property and involve both Australian and overseas companies and research organisations. As well as sorting out legal complexities, Sam gets involved in the commercial and technological considerations behind each deal. This is a positive for him as is the opportunity to engage with colleagues he describes as 'passionate about their work'.

Access ANSTO

Background

This year has seen ANSTO, through Access ANSTO, establish a new strategic framework to link the commercial capabilities and activities of ANSTO with key industry partners. The building blocks established place Access ANSTO as the single point of interface between the exciting new research being undertaken at ANSTO and industry partners (national and international) who wish to collaborate with us and advance their business capabilities.

The key objectives of Access ANSTO are:

- to promote ANSTO's technology, research and services to industry
- to assist ANSTO's staff identify commercial opportunities and nurture new innovations
- to provide marketing, business and legal support for ANSTO's commercial activities

- to develop the skills needed for ANSTO's staff to engage with commercial clients.

The approach adopted for our commercialisation model is the creation of strategic partnerships with a variety of large and small to medium enterprises. This holistic approach to commercialisation means we are able to add value to industry partners by:

- Identifying and exploiting research capabilities through
 - Collaborative partnerships
 - Analytical skills
 - Expertise of researchers
- Utilising unique scientific instruments and equipment maintained at ANSTO
- Engaging with industry in strategic partnerships through the provision of
 - Research
 - Joint ventures
 - IP Transfer

Encouraging innovation

The Access ANSTO team works closely with the research groups and the operational areas to identify their specific unique skills and ways in which potential industry partners can take up developments at an early stage. The team proactively seeks to identify industry partners who are interested to collaborate with our leading researchers and utilise the specialist analytical services available at ANSTO.

Where innovative ideas arise outside the normal project-based approach, Access ANSTO sponsors a new concept called the Innovation Forum under which we fund innovative ideas through the 'proof of concept' phase and support the transition through to industry adoption.

New project developments

During the past year Access ANSTO has been instrumental in providing expertise for a number of new opportunities which support the strategic directions of ANSTO and will lead to increasing new relationships with industry. We have seen a continued strong interaction with industry, with 2 149 new projects being commenced with industry during the year, an increase of 23% over the previous year. Projects include:

Aquarisk – environmental assessment software that ANSTO has developed and licensed to scientific distributor Hearne Scientific Pty Ltd. A range of businesses acquired licences in the first three months since release of the product.

PipeStrain – another software based technology has been developed to provide commercial assessment of the strain that pipes laid across the country can withstand given the terrain and type of welding joins used. A case study on the technology appears earlier in this report.

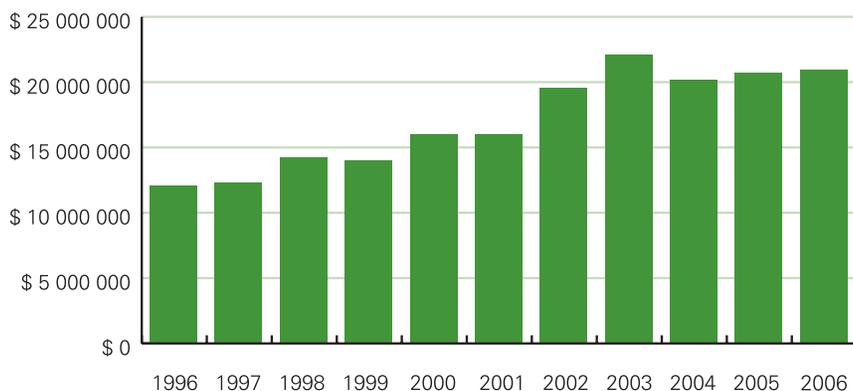
residual life and stress analysis – ongoing work, focused mostly in the power generation area, on extending the life of large engineering structures. Yearly revenue now exceeds \$500 000. Recent work has included assessment of remaining life extension on all the boiler stop valves at a major Victorian power station, and high temperature combined creep-fatigue defect assessments in NSW, Victorian and South Australian generation plants, providing savings to customers of several million dollars each.

CeramiSphere – technology that, using ceramics at room temperature, can encapsulate and control the release rate of active ingredients. Originally used at ANSTO in waste form management, the technology has broader applications for industry in drug delivery, cosmetics, biocides and food and flavours. ANSTO is supporting further technology development at the same time as demonstrating its economic viability through projects with local and overseas industry partners.

nanoparticulate membrane bioreactor – technology which eliminates a number of costly elements in the treatment of household wastewater and could enable individual households and small communities (including apartment blocks) to make water savings of 60% through the use of recycled water. ANSTO is supporting the project through the proof of concept and scale up stages to demonstrate its economic viability. A number of industry partners have expressed interest in combining this technology with later stage water treatment processes as part of an improved total waste water treatment system.

Business at ANSTO

ARI revenue growth



ANSTO Radiopharmaceuticals and Industrials

ANSTO Radiopharmaceuticals and Industrials (ARI) produces radiopharmaceuticals and radiochemicals to help in the diagnosis and treatment of a range of serious illnesses. We supply approximately 200 public and private nuclear medicine centres in Australia and provide radiopharmaceuticals to Asian, New Zealand, US and UK markets.

ARI produces radiopharmaceuticals at HIFAR and at the National Medical Cyclotron. The isotopes produced in our reactor are used in more than 80% of diagnostic nuclear medicine procedures (about 470 000 procedures) in Australia every year. Cyclotron-produced radioisotopes account for about 96 000 procedures. All in all, over 500 000 Australian patients benefit from our radiopharmaceuticals annually.

A principal application of radiopharmaceuticals is to enable us to 'see' diseased or inflamed

cells inside the body. This is called 'imaging'. The appropriate radiopharmaceutical has to be selected to suit the bodily organ or physiological process to be imaged, for example, thallium-201 is used for cardiac imaging and gallium-67 for tumour and infection imaging. The results provide valuable functional information, and this can be correlated with structural changes evident through other imaging techniques such as Computerised Tomography (CT). Nuclear imaging is integral to cancer diagnosis and is contributing to the recent decline in mortality from cancer.

The other important applications of radiopharmaceuticals are in therapy and palliative care. ARI supplies the Australian company Sirtex Medical with yttrium-90 microspheres, which are used to treat liver cancer. 'Sir-spheres', an Australian innovation, are used in both Australia and the United States. ARI also produces Quadramet (samarium-153) for alleviating pain from breast

and prostate cancers that have spread to the bones. Iodine-123 is used to treat thyroid cancers. Iridium-192 is used in internal radiotherapy, while phosphorus-32 is used by physicians to treat polycythaemia vera (a chronic disease characterised by an increase in the number of red blood cells and blood volume).

ARI also produces radioisotopes to help solve a wide range of industrial and environmental problems. Industrial gamma radiation based products are used in non-destructive testing and non-destructive evaluation to locate and quantify defects and degradations in material properties that could lead to failure. These techniques are critical in assuring the safety and reliability of aircraft, motor vehicles, pipelines, bridges, trains, power stations, refineries and oil platforms.

Isotopes produced for industry include iridium-192, which is the most commonly used industrial radioisotope in Australia.

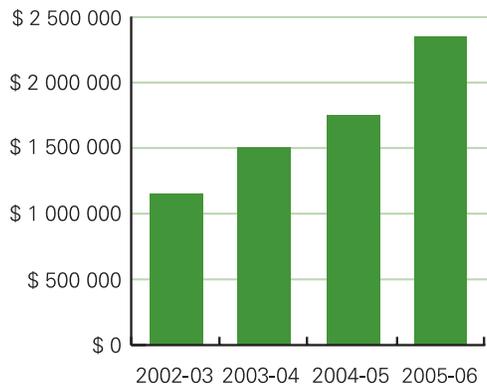
ANSTO Minerals

Role and capabilities

ANSTO Minerals is a mining industry consultancy that specialises in knowledge of uranium ore processing and radioactivity in mineral processing. The core group has a 25-year track record of providing practical solutions and innovative technology in ways that deliver financial and environmental benefits to the mining industry.

In addition to consulting, we undertake sponsored, collaborative and contract research and offer services in:

ANSTO Minerals revenue from the sale of consultancy services



- uranium ore processing and extraction
- control of naturally occurring radioactive materials (NORM) in the minerals industry
- process development for extractive hydrometallurgy.

The uranium/radioactivity market

Australia has the largest reserves of uranium in the world and is the world's second largest uranium (yellow cake) producer. ANSTO has been very active in the development and application of technology for the uranium industry since the late 1970s and has built strong relationships with all uranium producers in Australia. For the past two decades, the price of uranium has been at historically low levels due to large stockpiles of the ore and the oversupply of enriched uranium from the cold war era. Recently the inventory of stockpiled uranium has been depleted. Perhaps more importantly, there has also been a realisation that over-use of fossil fuels is having negative climatic consequences and that

Business at ANSTO

nuclear power may be a complementary source of energy. These two factors have led to a uranium supply shortage, a rapid rise in its price and a flurry of exploration and feasibility studies.

Apart from the uranium industry, many ores processed for the extraction of other metals also contain NORM. There is a growing awareness of the implications of the presence of this radioactivity for workforces exposed to process streams and tailings and for the community exposed to the products. In addition, there is a growing interest in the issue of radioactivity in mineral products, driven by stricter regulations and the threat of legal liability over exposure to NORM and the related environmental impact.

Commercial work

Revenue from the provision of consultancy services and expertise has increased from around \$1 million in 2002-03 to over \$2 million in 2005-06. The increase is due to ANSTO Minerals' closer interaction with industry and the growing interest in uranium production. BHP Billiton has recognised this expertise by signing a five-year agreement with us for commercial work.

In the reporting period, ANSTO Minerals carried out a wide spectrum of projects for more than 30 clients. The projects ranged from site radiological surveys and sample analysis, to research and development projects at bench and pilot plant scales, including on-site pilot plants. These projects included laboratory and mini-plant leaching of uranium ores, improving the performance of uranium ion exchange operations; the recovery of uranium from tailings water by ion exchange; resin-in-pulp

(RIP) development; uranium recovery flowsheet development; surveying and predicting radioactivity deportment at mine sites; rare earth recovery; and improving the neutralisation and thickening of process sludges and precipitates.

Research work

The primary objective of ANSTO Minerals' research is to develop technologies that will increase the competitiveness and environmental sustainability of operations in the uranium mining sectors and industries affected by NORM.

The research focus in uranium processing was in two main areas:

- the application of resin-in-pulp technology to uranium extraction. RIP can produce considerable savings by eliminating a solid/liquid separation step
- the development of uranium separation technologies, such as solvent extraction and ion exchange, which will tolerate the presence of chloride. This is of particular interest to Australian uranium operations in arid areas where high quality water is in short supply.

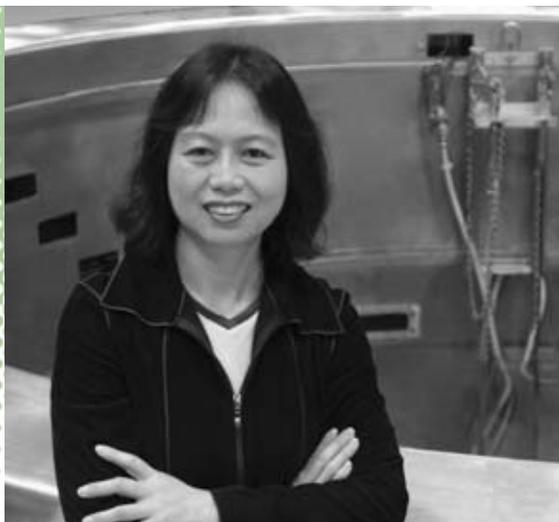
ANSTO Minerals keeps abreast of the regulatory requirements for the handling and processing of radioactive minerals through participating in ARPANSA forums and IAEA committees.

We are also a core member of the Cooperative Research Centre (CRC) for Sustainable Resource Processing.



SAFETY ARRANGEMENTS AT ANSTO

Safety Arrangements



For **Li Mo**, who has been with ANSTO for over a decade, this past year has been especially challenging. The reason for this is that Li and her Ionizing Radiation Physics team have played an important role in the commissioning process for the new OPAL reactor. Their job was to develop new methodologies for determining thermal, epithermal and fast neutron flux for the reactor. Working to a tight timetable, the team developed techniques for accurate activity measurements of aluminium-diluted gold wire and pure gold foil, which were then used to calculate neutron flux in the OPAL reactor core, irradiation facilities and neutron beam lines.

Safety Arrangements

ANSTO is committed to ensuring a safe and healthy environment for employees, visitors, contractors and the external community.

Our objectives

To ensure that our activities do not have an adverse impact on the community, ANSTO's objectives are to:

- protect human health and safety – this is the organisation's highest priority
- develop and maintain safety systems and assessment procedures that comply with national and international standards
- create and promote a positive safety culture
- strive for continual improvement in safe work practices so that any risk to staff and the public from ANSTO's operations is as low as reasonably achievable.

Outcomes

Safety initiatives implemented during the year resulted in:

- a reduction of 50 per cent in ANSTO's lost time injury frequency rate
- housekeeping improvements due to the implementation of a monthly clean up schedule across site
- enhanced managerial accountability for safety through the inclusion of safety objectives in performance appraisals
- improved safety documentation following a review of safety management system to ensure easy access by all staff to comprehensive safety information. All staff received the ANSTO *Pocket Guide to Safety*
- improved pedestrian safety after extensive changes to road layout and traffic flow across site.

Activities and outputs

Safety management

Our safety and environmental principles, values and commitments are set out in the ANSTO Health, Safety and Environment Policy. Under this policy is a framework of documents, including safety directives, that constitutes our safety management system.

ANSTO's safety goals are to:

- maintain the safety of ANSTO employees and the public
- improve the efficiency and effectiveness of our safety systems
- promote safety initiatives and safety awareness programs
- continually improve employee and public protection from radiation
- ensure that staff are trained to deal with all potentially hazardous activities
- comply with good practice, including the requirements of the safety regulators – Comcare and ARPANSA.

A key element of ANSTO's safety management system is the monitoring of safety performance. An independent committee – the ANSTO Health, Safety and Environment Committee (AHSEC) – oversees the implementation of safety systems and the outcomes achieved. The committee comprises external members as well as ANSTO general managers and senior staff.

At the operational level our Safety Assessment Committee, which also has external members, reviews all potentially hazardous activities

undertaken at ANSTO. From July 2005 to June 2006 the committee assessed and endorsed 53 submissions.

Occupational health and safety

Measuring radiation by the dose

Everyone is exposed to ionising radiation from natural sources. We may also be exposed to radiation from non-natural sources, including medical procedures such as X-rays. The effect of radiation on our body is called dose and is measured in sieverts (Sv). Typical doses of radiation 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 other than 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.

ANSTO's workers are routinely monitored for exposure to radiation. Monitoring results for 2005-06 show that, with one exception, the radiation doses received by ANSTO workers were significantly below regulatory limits.

One measured dose (65.9 mSv) exceeded the annual dose limit of 50 mSv and was reported to ARPANSA and fully investigated. Although the cause of the high reading on the detector worn by the individual was not specifically identified, despite extensive investigations and

Safety Arrangements

Table 1: Effective dose

	2001-02	2002-03	2003-04	2004-05	2005-06*
Maximum effective dose mSv	8.7	9.7	9.8	10.2	10.2
Average effective dose mSv	0.9	0.8	0.8	0.8	0.8
Collective effective dose man-mSv	749	684	692	697	690

*The 2005-06 values do not include an outlier dose value of 65.9 mSv

Table 2: Distribution of individual effective dose

dose ranges (mSv)	2001-02	2002-03	2003-04	2004-05	2005-06
0 to 2	726	756	824	807	751
2 to 5	77	80	82	66	61
5 to 10	25	23	18	20	28
10 to 15	0	0	0	1	1
> 15	0	0	0	0	1

reviews of the working environment, the dose was allocated to the individual's dose record and the individual was removed from radiation work for the remainder of the year. The dose level was not significant for the individual's health. The investigation identified a number of improvements in work practices that have since been implemented.

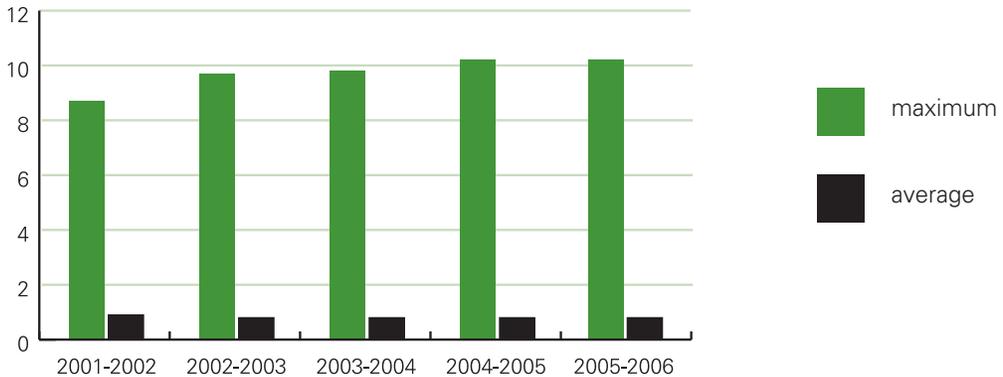
Table 1 shows the maximum, average and collective effective doses for the past five years. Table 2 shows the distribution of individual effective doses over the same period. The graph in Figure 1 compares maximum and average effective doses. Regulations give annual dose limits for radiation workers for the whole body (effective dose), for the skin (shallow dose) and for extremities such as hands or feet. The dose limits are:

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

Accidents and incidents

An important part of ANSTO's safety management system is the capturing of information on all safety-related events including accidents and 'near misses'. This ensures the proper investigation of all such events and the implementation of safety improvements. It also gives us data for monitoring ANSTO's safety performance. We are required to notify Comcare of incidents that result in, or could result in, serious personal injury or incapacity.

Figure 1: Comparison of the maximum and average annual effective doses



In 2005-06 ANSTO informed Comcare of five notifiable incidents. Four of these were serious personal injury (or possible serious injury), two relating to contractors, and one dangerous occurrence. Comcare was also provided two precautionary notifications of dangerous occurrences that did not meet the criteria of notifiable incidents but were advised for information purposes. We investigated all incidents and made improvements to work practices as a result.

Safety training

ANSTO conducted comprehensive safety training. Some of the areas covered were:

- safety induction for new employees and contractors
- hazard specific training relating to working in confined spaces, at heights and with chemical hazards
- occupational health and safety training for managers, building wardens and area supervisors

- accredited training in first aid and contained air breathing apparatus.

Emergency preparedness and responses

ANSTO and emergency services organisations jointly maintain a 24-hour emergency response capability to deal with incidents at Lucas Heights.

The Response Plan for Accidents and Incidents describes how an emergency response will be coordinated and identifies who is responsible for which actions. Each organisation has standing procedures detailing each individual response.

NSW emergency services manage responses to emergencies with potential significant off-site radiological consequences at state-level according to the Lucas Heights Emergency Sub Plan. There is also a district-level Lucas Heights Emergency Evacuation Sub Plan supporting these arrangements. In the event of an emergency, ANSTO staff would give technical assistance and practical support to emergency service organisations.

Safety Arrangements

ANSTO maintains a close working relationship with emergency service organisations through the Local Liaison Working Party. The working party includes ANSTO specialists and representatives of emergency service organisations, local government, and support organisations, including NSW Health. ARPANSA is an observer.

A major site emergency exercise involving the joint participation of ANSTO and emergency services personnel was successfully carried out in September 2005.

As part of the ARPANSA Stage A commissioning licence for OPAL, an emergency exercise to test the ANSTO OPAL emergency procedures was carried out. The exercise scenario, based on a Beyond Design Basis accident, aimed to assess:

- operators identification of and response to alarms
- evacuation from the facility
- coordination and communication between the
 - Main Control Room
 - Emergency Control Centre
 - Shift Manager
 - Duty Safety Coordinator
 - Site Operations Safety Supervisor
- identification, location and retrieval of missing and injured people.

OPAL reactor staff actions and the response by ANSTO emergency personnel were assessed as appropriate during the exercise, with some minor improvement identified.

An ongoing program of emergency training and evacuation drills is in place for all of site. Each division undergoes training in the emergency response protocols for their area and is familiarised with the appropriate muster points. This training is supplemented with evacuation drills that are run with the respective Building Wardens.

ANSTO staff continued to provide technical support to the radiation monitoring program for nuclear powered warships visiting Australia. There were nine such visits in 2005-06.

We continued to run the Radiological Awareness Program for local emergency service organisations and functional groups in cooperation with ARPANSA. We also provided specific radiological training to the NSW Fire Brigade members as part of their HAZMAT training.

ENVIRONMENTAL PERFORMANCE



Environmental Performance



In leading the group responsible for environmental monitoring, **John Ferris** is part of a long history at ANSTO where reports on environmental radioactivity go back to 1959. There is, says John, a proud tradition of good measurement and reporting to uphold. A major part of the group's role is to ensure that ANSTO, its regulator and the public have reliable information about the environmental releases from the organisation's operations. John is also involved in research that aims to provide insights into biologically produced inorganic materials such as silica.

Environmental Protection

ANSTO is committed to operating in a manner that protects the environment and is consistent with Australian and international standards. We promote environmental awareness throughout the organisation and strive for continual improvement in environmental performance.

Environmental management system

In line with the high priority ANSTO places on the environment, we maintain an environmental management system (EMS) that was first certified to the International Standard ISO 14001 in 2004. This standard requires that environmental risks and legal requirements are understood and managed, an appropriate measurement system is in operation, and that there is an organisational commitment to continual improvement. Improved EMS performance has been achieved in 2005-06 through independent ISO 14001 auditing and the appointment of a custodian from within the senior management team.

Accurate measurements with independent verification

We systematically measure our air and liquid emissions and maintain a long-term monitoring program that includes measuring local gamma radiation and weather patterns as well as sampling water, air and biota in the local environment. We conduct specialised measurements of radionuclides in these environmental samples using calibrated equipment sensitive enough to detect radioactivity at the trace levels normally present.

The ANSTO environmental and effluent monitoring program operates within a quality system certified to the ISO 9001:2000 standard for Quality Management Systems. To verify our results, we send a range of environmental samples to an external laboratory for parallel measurements.

Airborne doses low

In the course of normal operations, some ANSTO facilities produce gaseous radioactive

emissions. We minimise these emissions by treatment and filtration before discharge and follow with constant monitoring. The effect on the local public is too small to be detected directly, so we estimate the doses by using an independently evaluated computer model to assess atmospheric dispersion of airborne releases. The outcome of this modelling estimated that the maximum potential public dose derived from ANSTO in 2005-06 was 0.0046 mSv. This corresponds to less than 0.5 per cent of the 1.0 mSv annual limit for members of the public recommended by ARPANSA and the National Health and Medical Research Council (NH&MRC). For our closest neighbours, ANSTO's activities add less than 0.4 per cent to the approximately 1.5 mSv dose that every Australian receives from natural background radiation.

Liquid effluent discharges within limits

Effluent discharged from ANSTO into the sewer complied with all limits for radioactive discharges, in accordance with the Trade Waste Agreement with Sydney Water. Compliance with these limits ensures that water at the Cronulla sewage treatment plant meets World Health Organisation drinking water standards for radioactivity. All discharges also complied with the Trade Waste Agreement limiting concentrations for non-radioactive materials, such as ammonia, zinc and suspended solids.

Good water quality

ANSTO regularly monitors stormwater leaving the site, as well as sampling the nearby Woronora River. Results show that tritium concentrations remained below a level considered acceptable in Australian drinking

water. Gross alpha and beta measurements were also below the levels required for stormwater/surface waters, following the NSW *Protection of the Environment Operations Act 1997*. In fact, more than 95 per cent of measurements were below the stricter screening levels from the Australian Drinking Water Guidelines (ADWG). ANSTO's stormwater does not contribute to public water supply, but referring to the ADWG provides a useful context for understanding our data. Monitoring of groundwater at the Lucas Heights site showed no detectable ANSTO-produced radionuclides apart from very low levels of tritium.

Detailed reporting

The results and findings from our monitoring programs are available to the public in the annual report series *Environmental and Effluent Monitoring at ANSTO Sites*, available at local libraries. We also submit regular reports to government departments and regulatory organisations, including ARPANSA and Sydney Water.

CORPORATE GOVERNANCE



Corporate Governance



Dorothy Wailes is a long-term ANSTO staff member but describes her 33 years at the organisation as feeling 'more like five minutes'. She has been in the accounts area for almost the whole period and currently supervises a team responsible for accounts payable and receivable, payroll and travel. Dorothy has seen major changes over three decades, notably the shift from paper-based to electronic systems, and played a part in implementing the SAP accounting package now in use. There has however been one constant over the years – the 'fabulous' people at ANSTO, many of whom have worked together for a long time.

Compliance

ANSTO is subject to the provisions of various Commonwealth Acts, Regulations made under these various Acts and Commonwealth Awards.

The principal Acts are:

- *Australian Nuclear Science and Technology Organisation Act 1987*
- *Australian Nuclear Science and Technology Organisation (General) Award 1990*
- *Australian Radiation Protection and Nuclear Safety Act 1998*
- *Commonwealth Authorities and Companies Act 1997*
- *Nuclear Non-proliferation (Safeguards) Act 1987*
- *Occupational Health and Safety (Commonwealth Employment) Act 1991*

Other relevant Acts are:

- *A New Tax System (Goods and Services Tax) Act 1999*
- *Archives Act 1983*
- *Auditor-General Act 1997*
- *Australian Radiation Protection and Nuclear Safety (Licence Charges) Act 1998*
- *Environment Protection and Biodiversity Conservation Act 1999*
- *Equal Employment Opportunity (Commonwealth Authorities) Act 1987*
- *Freedom of Information Act 1982 (FOI Act)*
- *Legislative Instruments Act 2003*
- *Long Service Leave (Commonwealth Employees) Act 1976*
- *Maternity Leave (Commonwealth Employees) Act 1987*
- *Privacy Act 1988*

- *Racial Discrimination Act 1975*
- *Safety, Rehabilitation and Compensation Act 1988*
- *Sex Discrimination Act 1984*
- *Superannuation Act 1976*
- *Superannuation Act 1990*
- *Superannuation Guarantee (Administration) Act 1992*
- *Superannuation (Productivity Benefit) Act 1988*
- *Therapeutic Goods Act 1989*
- *Workplace Relations Act 1996*

ANSTO has put in place policies and procedures to deliver compliance with the above Acts, Regulations and Awards.

The functions of the Board

A Board established under Section 8 of the *Australian Nuclear Science and Technology Organisation Act 1987* governs ANSTO.

The general functions of the Board, as set out in Section 10 of 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.

In particular, it has responsibility for:

- approval of organisational strategy and the annual business plan and budget
- monitoring financial performance
- monitoring managerial performance

- ensuring that the significant risks facing the organisation have been identified, and that appropriate control, monitoring and reporting mechanisms are in place.

The *Commonwealth Authorities and Companies Act* requires the Board to comply with certain accountability and corporate governance principles, including:

- the maintenance of an Audit Committee
- specific financial and reporting provisions
- disclosure of all Board members' personal interests
- provision of indemnities and indemnity insurance in certain circumstances.

All *CAC Act* requirements are currently being met.

Processes are in place for performance assessment of both the Board and its Audit Committee and individual members thereof.

The Board has established an Audit Committee and a Remuneration Committee. All matters considered by those Committees are submitted to the Board for information and, where appropriate, ratification. Details of the Audit Committee and the Remuneration Committee are provided below. The Board is also supported in its role by other committees or mechanisms relating to safety and environmental management and to management of the research portfolio. These are also described below.

Corporate Governance

Board Charter

ANSTO has an established Board Charter, setting out the respective rights and responsibilities, functions and powers of Board members and ANSTO executives. It is made available internally on the ANSTO internet site.

Board membership

During the 2005-06 financial year, the Board comprised six non-executive members, drawn from the broader community, who are not involved in the day-to-day running of the organisation, and an Executive Director. The Executive Director, who is appointed by the Board, cannot be the Chair. The non-executive members are appointed by the Governor-General for specified periods. The dates of appointment and tenure of Board members is set out in the financial statements. Other positions held, including other directorships, are disclosed in the Board information section of this Annual Report.

Section 19 of the *ANSTO Act* provides that the Executive Director shall manage the affairs of the organisation, subject to the directions of, and in accordance with, policies determined by the Board. Senior management attend Board meetings as required to report on matters relevant to their individual areas of responsibility.

Each member brings complementary skills and experience to the Board. Its members during the 2005-06 financial year had experience in areas that included academia, information and communication technology, public service, industry, mining, scientific research, medicine and the commercialisation of research.

The Board meets regularly in accordance with a formally approved timetable and agenda. Board members receive regular papers from management on financial and business performance and specific papers on a range of issues relevant to the organisation.

Meetings – Board

Member	Eligible to attend	Attended
Dr Ian D Blackburne (Chair)	7	7
Mr Michael A Eager (Deputy Chair)	7	7
Dr Ian O Smith (Executive Director)	7	7
Dr Carmel J Hillyard	7	7
Mr Grahame Cook	3	2
Dr Agatha A van der Schaaf	7	7
Dr Klaus H Schindhelm	7	7
Dr Zygmunt Switkowski	2	2

Seven Board meetings were held during the 2005-06 financial year. Details of the number of Board meetings attended by each member during the period in which each member held office during the financial year are shown on the previous page.

Board remuneration and allowances

The remuneration and allowances of members of the Board, including the Executive Director, are determined by the Remuneration Tribunal. Remuneration of Board members is disclosed in the Financial Statements.

Disclosure of interests of Board members

Section 21 of the *CAC Act* provides for the disclosure of material personal interests in a matter that is being considered by the Board, and prohibits participation, deliberation and decision making by any member on such matters. All these requirements were met during the year.

Board member access to independent professional advice

The Board has established procedures by which members, in the interests of their duties, may seek independent professional advice at ANSTO's expense. In brief, members must first seek permission from the ANSTO Chairman.

Report of operations

Section 9, Schedule 1 of the *CAC Act* requires that the Organisation's Annual Report include a report of operations. *The Commonwealth Authorities and Companies (Report of Operations) Orders 2005* set out the

requirements for such a report. In this Annual Report this is called a Report of Research and Operations. The format and content of the 2005-06 Annual Report, including the financial statements, addresses these requirements in general, and Appendix 8 sets out details of compliance with the particular requirements of these Orders.

The Board reports that:

- ANSTO's mission and strategic directions are being actioned
- actual performance is reported against approved performance indicators
- there were no significant events requiring disclosure in terms of Section 15 of the *CAC Act*, other than ANSTO's decision to participate in the Australian Synchrotron Project
- there have been no significant changes in ANSTO's state of affairs or principal activities during the year
- ANSTO has continued to manage both the risks and opportunities it faces.

The Board reports that, in the opinion of senior management and the Board, at the time of making this report, adequate cash resources are, and will continue to be, available to cover the ANSTO's requirement for working capital, to pay existing debts, and meet obligations during the next financial year.

The Board states that a risk oversight and management policy and supporting processes are in place and that adequate systems are in place to ensure compliance with this policy.

Corporate Governance

Safety

The Board places primary importance on the safe performance of all ANSTO activities. The monitoring of safety in general, and compliance with relevant legislation in particular, is designated as a responsibility of the whole Board. ANSTO's Health, Safety and Environment Policy clearly sets out the Organisation's commitment to verifiable implementation of best practices in safety and environmental protection.

The Board attaches priority to the directions and recommendations on safety made by the Australian Radiation Protection and Nuclear Safety Agency. Under the *ARPANS Act 1998*, ANSTO has received licences for all ANSTO facilities and radioactive sources, as well as a construction licence for the OPAL reactor. On 14 July 2006, ANSTO received an operating licence for the OPAL reactor. Procedures are in place to ensure compliance with all licence conditions relating to all licences.

ANSTO has the ANSTO Health, Safety and Environment Committee to oversee health, safety and environmental management and advise the Executive Director on the effectiveness and compliance of ANSTO's performance in these areas.

The Board receives regular reports on health and safety issues. ANSTO was granted occupational health and safety self-audit status for two years by Comcare in 1999. Comcare renewed this self-audit status for further two years periods to 2005 and then to 2006. The audit program for 2005-06 was successfully completed. Due to policy changes, the whole of government self audit programme was discontinued by Comcare effective 30 June 2006 and has now been replaced by internal ANSTO processes.

Recently there have been some incidents, such as spills, occurring during the production of radiopharmaceuticals. While these have been minor and none had any potential for off-site consequences, all incidents are taken extremely seriously and fully investigated. ANSTO continues to strive to improve processes in our business unit ANSTO Radiopharmaceuticals and Industrials (ARI) to minimise such occurrences. In addition, there have been some issues to do with regulatory compliance, in particular non-compliance findings for ARI in respect of some exports. The Board has addressed this by implementing a comprehensive range of internal and external audits and frequent monitoring.

Audit Committee

The Audit Committee, a formal sub-committee of the Board, comprised during the year Mr M A Eager (Chair), Dr K Schindhelm and a member external to ANSTO, Mr W Wilton. Mr Wilton is a Chartered Accountant. The ANSTO Chairman is an ex officio member of the Committee. The Executive Director, the Board Secretary, the Chief Financial Officer, representatives of the Australian National Audit Office and the Chief Internal Auditor attend all meetings or relevant parts of all meetings by invitation. Others attend meetings, as appropriate, at the invitation of the Committee. In accordance with good practice, all Board members receive copies of Audit Committee papers and meeting minutes, and can attend Committee meetings as a right.

This Committee was established by the Board under a formal written charter to oversee the Organisation's risk management policies, practices and controls in relation to financial

Meetings – Audit Committee

Member	Eligible to attend	Attended
Mr Michael A Eager (Chair)	5	5
Dr Klaus Schindhelm (Member)	5	5
Mr Warren Wilton (External Member)	5	5

and commercial activities, including the financial reporting process, legislative and regulatory conformance, corporate governance and asset protection. Its charter extends to the review of safety and environmental systems and performance. The charter is made available internally on the ANSTO internet site.

The Committee also reviews summaries of the internal and external audit work schedules and reports. Additionally, in accordance with the provisions of the *CAC Act*, the Committee is responsible for assisting Board members to fulfil their specific responsibilities under that Act. The *CAC Act* regulates the size and composition of the Committee.

The Committee has unlimited access to both the internal and external auditors and to senior management.

The Committee scrutinises the annual financial statements of ANSTO and considers the appropriateness of accounting practices reflected therein. It receives a signed recommendation from the Chief Financial Officer, and the Executive Director, as to the veracity of the financial statements signed by the Board.

Five Audit Committee meetings were held during the financial year. Details of the number of Committee meetings held and attended during the period in which each member held

office during the financial year are provided in the table above.

The Committee generally meets quarterly. It is the first of two formal sub-committees of the Board.

Remuneration Committee

The Remuneration Committee, a formal sub-committee of the Board, comprised during the year Dr ID Blackburne (Chair), Mr MA Eager and Dr Z Switkowski. The Executive Director, the Board Secretary and the Chief Financial Officer, attend all meetings or relevant parts of all meetings by invitation. Others attend meetings, as appropriate, at the invitation of the Committee. In accordance with better practice, all Board members receive meeting minutes, and can attend Committee meetings as a right.

This Committee was established by the Board under a formal written charter to oversee:

- The overall remuneration policy and strategy for the Organisation
- The remuneration policies for the Chief Executive
- The compliance of remuneration policies and practices with statutory and regulatory requirements.

Corporate Governance

Meetings – Remuneration Committee

Member	Eligible to attend	Attended
Dr Ian D Blackburne (Chair)	3	3
Mr Michael A Eager (Member)	3	3
Dr Zygmunt Switkowski (Member)	2	2

The charter is made available internally on the ANSTO internet site.

Three Remuneration Committee meetings were held during the financial year. Details of the number of Committee meetings held and attended during the period in which each member held office during the financial year are provided in the table above.

The Committee generally meets quarterly. It is the second of two formal sub-committees of the Board.

Technical Advisory Committee

The Technical Advisory Committee, formally established in accordance with a Board decision, comprises four members, all of whom are external to ANSTO. Members are chosen on the basis of internationally recognised scientific expertise and experience. The current members (as at 30 June 2006) of the Committee are Dr Roy Green, Emeritus Professor Peter Robinson and Dr Dan Shochat. Professor Alan Leadbetter's term concluded at 30 June 2006.

This Committee operates under written terms of reference and was established by the ANSTO Board to advise it on the quality and relevance of the portfolio of research projects being undertaken at ANSTO. The terms of

reference are made available internally on the ANSTO internet site.

Specifically the TAC provides an expert overview of research and addresses the following matters:

- To provide strategic advice to the Board to guide the research project portfolio shaping decisions
- To provide the Board with an overview of the quality of the research within the portfolio through the expert committee reviews
- To advise on any matters affecting the quality of research outputs as observed by the Committee.

The Committee was formally constituted in October 1996 and is required to meet at least once per year. It met once during the 2005-06 financial year and presented a formal report to the Board. Committee members also participate in the advisory and review panels for each research institute.

Induction and continuing professional development of ANSTO executives

Processes are in place for induction and ongoing education to inform executives of their responsibilities and rights. New executives

have access to appropriate induction documents and processes (including those relating to safety and security) and to ANSTO officers. Executives may be provided with access to appropriate professional development activities on request.

Performance review for ANSTO executives

During the 2005-06 financial year performance reviews were conducted of the Executive Director, the Chief of Operations, the Chief of Research and the Chief Financial Officer and those reporting directly to them. Information on the performance review system is made available internally on the ANSTO internet site.

Risk management

The Board recognises that developing and implementing ANSTO's strategies requires careful assessment and balancing of both risk and opportunity.

The Board is charged with the responsibility of ensuring that appropriate policies are in place to cover identified risks, and management is required to develop appropriate procedures to manage these risks.

The Board has endorsed a risk management framework introduced by management in 1997 and continually refined. As part of this framework, ANSTO's Internal Audit function undertakes a systematic program of risk assessments designed to identify, evaluate and prioritise high and significant risks, utilising a methodology consistent with the Australian Risk Management Standard AS/NZS - 4360/2004. The Audit Committee and the

Australian National Audit Office (ANAO) receive summaries of all risk assessment reports.

ANSTO's risk management policy provides that it is the responsibility of the operational management of ANSTO to develop and implement risk mitigation strategies. The overall risk framework is actively applied in ANSTO's operations and to new initiatives in particular. Project risk management remains a significant area of focus in the OPAL project and particular capital works projects.

In appropriate circumstances, insurance is used as a method to transfer the financial impact of risk.

The Board, supported by the Audit Committee, oversees the development and operation of business continuity planning and other emerging risk issues.

The ANSTO risk management policy is made available internally on the ANSTO internet site.

Ethical standards

ANSTO's ethics policy is set out in a document entitled *Code of Ethics – A Code for ANSTO Staff*. The Code provides a reference point for ethical behaviour and applies to members of the Board, management and all staff. The Code sets out the standards for ethical behaviour and conduct and provides guidance by defining the expected values and standards of workplace behaviour and performance.

Fraud control

The organisation has an established fraud control policy and plan, in line with the *Fraud Control Policy of the Commonwealth* and guidelines set out by the Attorney General's Department, Criminal Justice Division.

Corporate Governance

External audit

Under the *CAC Act* the Commonwealth Auditor-General, through the ANAO, is the external auditor for ANSTO.

The ANAO, as a matter of policy, provides only audit services to ANSTO.

The Audit Committee reviews the ANAO audit plan and reports and meets with ANAO representatives prior to recommending to the Board that the annual financial statements be accepted and the Statement by Directors signed.

Internal audit

The ANSTO Internal Audit function has a dual reporting line to the Audit Committee and the Executive Director. Its responsibility is to provide an independent, risk-based review function, as set out in a formal charter endorsed and periodically reviewed by the Audit Committee. The Audit Committee approves the annual Internal Audit plan and receives regular reports on progress against that plan.

Internal control

The Board is responsible for ensuring that appropriate policies and internal controls are in place and operating.

Compliance and review are monitored through the Audit Committee and the Internal Audit function.

Service Charter

ANSTO's Service Charter sets out a statement of what ANSTO does and the standards of product and service that customers, stakeholders and the community can expect from the organisation.

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 that issued in relation to the 2005-06 financial statements.

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

Ministerial directions

There were no ministerial directions to ANSTO made under either the *ANSTO Act* or the *CAC Act* during the reporting year.

Indemnities and insurance premiums for officers

ANSTO's insurance coverage 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 that required a claim on ANSTO's insurer, Comcover.

Nuclear safeguards

ANSTO undertakes continuing observation of and compliance with strict national and international safeguards guidelines and requirements established by the International

Atomic Energy Agency and the national safeguards regulator, the Australian Safeguards and Non-Proliferation Office.

IAEA inspectors carried out inspections of ANSTO's nuclear material during a short notice inspection and a full Physical Inventory Verification in June 2006. During each of the inspections the IAEA inspectors requested and were granted complementary access. The results of inspections were satisfactory. The IAEA inspections were supplemented by ASNO's regular audits of ANSTO's nuclear material accounting system.

ANSTO is strengthening further its nuclear safeguards by putting greater emphasis on each individual manager's accountability for the nuclear material in the division or institute's custody.

During 2005-06 ANSTO demonstrated, through ongoing implementation of all safeguards provisions, our commitment to the fulfilment of both the national *Nuclear Non-Proliferation (Safeguards) Act* and the Agreement with IAEA.

Business continuity planning

Continuity of ANSTO business is a critical issue that has been considered and planned for by the Board, the Executive Director and senior management. Many services delivered by ANSTO are critical to the economic and social well-being of our society. A failure to deliver these could have significant consequences for those concerned. As a consequence, ANSTO regularly reviews all aspects of its business continuity management to ensure a constant state of readiness. In 2005-06 ANSTO's crisis management plan was updated.

Corporate social responsibility

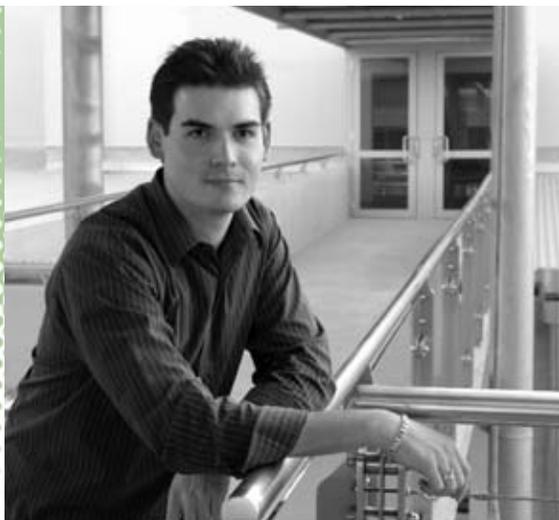
A fundamental shift has occurred in recent years in community expectations that is making responsible corporate behaviour an integral component of every organisation's day-to-day operation, rather than it being seen as an additional, unwanted business burden.

ANSTO supports this development and took pride in releasing its second corporate social responsibility report in 2005-06, focusing not on its financial performance, but on the ways ANSTO responds to environmental, safety and social issues that affect staff, customers, the Australian community and key stakeholders.

ASSOCIATED ORGANISATIONS AND PROGRAMS



Associated Organisations and Programs



Mark Callaghan, a former ANSTO year in industry student, is back with the organisation but in a different capacity this time as the holder of an AINSE post-graduate scholarship. Mark is completing a PhD with the University of Technology Sydney on the subject of high temperature fatigue testing of steel used in power generation plants. Remaining life assessment, as the area is known, has been studied for some time and is crucially important to heavy industry, particularly with the development of new materials for industrial components that need to be tested before use. Mark aims to complete his doctorate in mid 2007.

Australian Institute of Nuclear Science and Engineering

Located on ANSTO's Lucas Heights site, the Australian Institute of Nuclear Science and Engineering Incorporated is a not-for-profit association of 39 universities and the Institute of Geological and Nuclear Science (New Zealand) in partnership with ANSTO. Thirty-five of the universities are Australian and three are in New Zealand. AINSE was established by the Commonwealth Government in 1958 and has three full-time staff.

AINSE's mission is to advance research, education and training in nuclear science and engineering and related fields within Australasia by being, in particular, the key link between universities, ANSTO and other member organisations and major nuclear science and associated facilities.

The mission is supported by four strategic goals, to be achieved by the end of 2008, as follows.

1. Members will have access to major nuclear and related research facilities in Australia and some overseas facilities through AINSE.
2. Research performance of our scientific outcomes will have increased substantially.
3. All universities in Australasia, some sections of the CSIRO, many major museums, many non-teaching hospitals and a significant proportion of the scientific institutes in Australasia will be members of AINSE.
4. AINSE will have expanded its existing set of excellent scientific networks.

Since AINSE operates on a calendar year basis, this report covers the period 1 January to 31 December 2005. AINSE's income of \$ 3 015 662 comprised:

- \$1 562 014 from ANSTO
- \$804 979 from university subscriptions
- \$391 250 from external grants

- \$169 843 from interest on investments
- \$87 576 from other sources.

Core business

AINSE uses its funds primarily to provide access to nuclear and other facilities at ANSTO and to AINSE-supported facilities. In 2005, it supported 223 university projects (189 new projects and 34 carried over from 2004) and provided supplements to 60 postgraduate research students, with a total value of \$1 979 957.

The projects have applications in many fields where nuclear science and technology can provide unique insights, including cultural heritage, advanced technology, manufacturing, mining, agriculture, medicine and environmental protection.

Over the course of the year 404 papers, 216 of which appeared in refereed journals, and 36 theses dated 2005 were published as a result of AINSE-supported research.

AINSE underwrote the *International Conference on Neutron Scattering* held in Sydney in November-December; and conducted the *Nuclear and Complementary Techniques of Analysis Conference* in November in Wellington, New Zealand.

AINSE awarded International Travel Scholarships to nine post-graduate students to assist them in presenting their AINSE-supported research at international conferences.

The eighth AINSE Winter School took place in July 2005. AINSE offered a scholarship to each of the 39 member universities to enable a nominated third-year student to participate. The program was judged an outstanding success.

Additional projects

AINSE acts as a peak body on behalf of its member organisations in applying for and administering major research infrastructure grants.

An application in 2005 to the Australian Research Council Linkage Infrastructure and Equipment Fund was successful. The grant of \$240 000 for access to the UK facility ISIS, the world's most powerful pulsed-neutron source, was supplemented by \$126 250 from universities, \$25 000 from ANSTO and \$8 750 from AINSE. Seventeen experiments were accepted for a total of 56 days on the facility and, based on that research, 24 papers were published.

Australian Synchrotron Research Program

The Australian Synchrotron Research Program (ASRP) gives Australian researchers access to state-of-the-art synchrotron radiation research capabilities at three overseas synchrotron light source facilities:

- the Australian National Beamline Facility at the Photon Factory, Tsukuba Science City, Japan
- the Advanced Photon Source at the Argonne National Laboratory in Chicago, USA
- the National Synchrotron Radiation Research Centre in Hsinchu, Taiwan.

Synchrotron radiation based techniques are vital to a wide range of research fields: physics, chemistry, materials science, structural biology, polymer research, environmental science and geophysics. The ASRP's facilities are open to

Associated Organisations and Programs

any scientist working at an Australian research institution, including government and industry research laboratories. Access is on the basis of scientific merit via a peer-reviewed proposal system, and includes travel and subsistence funding for successful applicants. The ASRP stations scientific staff at each overseas facility to assist visiting Australian research teams.

The ASRP is funded by the Australian Federal Government's Major National Research Facilities program. Current funding will see the program run to mid-2007. ANSTO has managed the program since its inception in 1996. The success of the program can be seen in the broad range of Australian research organisations, universities and state governments that have partnered with the Victorian and New Zealand Governments as foundation investors in the Australian Synchrotron.

The Australian synchrotron user community has grown steadily since the ASRP was established. The ASRP currently supports visits to these overseas synchrotron facilities by about 150 Australian research teams a year, and serves a total user community of more than 400. Scientists from 24 universities, four government laboratories including ANSTO and five CRCs regularly use ASRP beamlines.

The ASRP achieved an important milestone in 2006 with the successful commissioning of its new soft X-ray end-station at the National Synchrotron Radiation Research Centre of Taiwan. This instrument, dubbed SXSI (Soft X-ray Synchrotron Instrument) and costing approximately \$1 million, is the largest single piece of infrastructure funded under the current Major National Research Facilities grant to the ASRP. The end-station represents a

major investment by the Australian Government to assist Australian soft X-ray synchrotron research. It is expected that the system will be transferred to Melbourne in late 2007 where it will be stationed on the soft X-ray beamline at the Australian Synchrotron.

The ability of SXSI to handle volatile samples throughout the entire system by cooling to liquid nitrogen temperatures is a key feature of the system.

In addition to acting as the ASRP's managing agent, ANSTO is a significant user of its facilities. In the last year ANSTO scientists from the Environment, Materials and Engineering Science and Bragg Institutes were awarded beamtime on the ASRP's overseas beamlines. Projects included the study of metal uptake by hyper-accumulating plants, structure studies of thin films and novel oxide materials, the chemistry of radioactive trace elements in minerals and fundamental investigations of spin glass systems.

The ASRP administers a postdoctoral fellowship program funded by subscriptions from its member organisations. Dr Naveen Bhatia, who is studying hyper-accumulation of metals in certain plants, is an ASRP fellow based in the Environment Institute.

ASRP member organisations

Australian National University, Curtin University of Technology, Monash University, University of Canberra, University of Melbourne, University of Newcastle, University of NSW, University of Queensland, University of South Australia, University of Sydney, University of Western Australia, CSIRO, and the state governments of NSW and Victoria.

Associated Organisations and Programs



James Hester's employment history with ANSTO is unusual. On staff since 1998, he has spent a total of just three weeks at Lucas Heights. For most of the past eight years he has been based at the ASRP's Australian National Beamline Facility at the Photon Factory in Tsukuba, Japan. James's main role is to assist Australian scientists set up experiments using the facility's synchrotron, although he undertakes his own scientific research as well. A typical week would see around five or so scientists visit, each allocated a limited amount of synchrotron time in which to get their results. While this situation creates some pressures, James says he enjoys helping people to get results. He is also at home in Tsukuba Science City, which he deems well planned and good for kids.

Access to Major Research Facilities Program

ANSTO has operated the Access to Major Research Facilities Program since 1990, when it was established by the Australian Government. The term 'major research facilities' refers to large facilities not available in Australia, such as synchrotron radiation sources, high flux neutron beam sources, high energy physics facilities and astronomical facilities. For Australian science to remain at the cutting-edge, and for Australia to benefit from developments in technology, our scientists must have access to these facilities.

The International Science Linkages (ISL) program, which is a part of Government's Innovation Statement: *Backing Australia's Ability - Building Our Future through Science and Innovation*, provided funding of \$731 500 for the 2005-06 financial year.

The program objectives are to provide financial support to Australian researchers from industry, private and public research organisations and universities so that they can:

- travel to major international research facilities not available in Australia
- attend strategic planning meetings essential to Australia's participation in projects that require the use of major international research facilities not available in Australia.

There are two unique demands that must be met for access to major facilities and which underlie the current program:

- Access to the facilities is highly competitive and scientists often receive very short notice that their application has been successful. It is therefore vital that the program has a fast turnaround time.

- In many cases, use of these facilities is complex. Consequently, postgraduate students and technicians are often involved in running experiments. Our program provides for multiple personnel to visit the facilities.

During the 2005-06 financial year the program funded 105 teams to perform experiments using facilities in the USA, Europe and Asia. Although no preference is given to our own research, 16 ANSTO teams received funding to visit overseas neutron scattering, synchrotron and accelerator facilities.

The program is highly appreciated by Australian researchers and has recently been extended for three years.

FINANCIAL STATEMENTS



Independent Audit Report



To the Minister for Education, Science and Training

Scope

The financial statements and Directors' responsibility

The financial statements comprise:

- Statement by Directors and Chief Financial Officer;
- Income Statement, Balance Sheet and Statement of Cash Flows;
- Statement of Changes in Equity;
- Schedules of Commitments and Contingencies; and
- Notes to and forming part of the Financial Statements

of the Australian Nuclear Science and Technology Organisation (ANSTO) for the year ended 30 June 2006.

The Members of the Board are responsible for preparing the financial statements that give a true and fair view of the financial position and performance of ANSTO, and that comply with Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, Accounting Standards and mandatory financial reporting requirements in Australia. The Members of the Board are also responsible for the maintenance of adequate accounting records and internal controls that are designed to prevent and detect fraud and error, and for the accounting policies and accounting estimates inherent in the financial statements.

Audit Approach

We have conducted an independent audit of the financial statements to express an opinion on them to you. Our audit has been conducted in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing and Assurance Standards, to provide reasonable assurance as to whether the financial statements are free of material misstatement. The nature of an audit is influenced by factors such as the use of professional judgement, selective testing, the inherent limitations of internal control, and the availability of persuasive, rather than conclusive, evidence. Therefore, an audit cannot guarantee that all material misstatements have been detected.

While the effectiveness of management's internal controls over financial reporting was considered when determining the nature and extent of audit procedures, the audit was not designed to provide assurance on internal controls.

We have performed procedures to assess whether, in all material respects, the financial statements present fairly, in accordance with Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, Accounting Standards and other mandatory financial reporting requirements in Australia, a view which is consistent with our understanding of ANSTO's financial position, and of its financial performance and cash flows.

The audit opinion is based on these procedures, which included:

- examining, on a test basis, information to provide evidence supporting the amounts and disclosures in the financial statements; and
- assessing the appropriateness of the accounting policies and disclosures used, and the reasonableness of significant accounting estimates made by the Members of the Board.

Independence

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

Audit Opinion

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

- (a) have been prepared in accordance with Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*; and
- (b) give a true and fair view of ANSTO's financial position as at 30 June 2006 and of its performance and cash flows for the year then ended, in accordance with:
 - (i) the matters required by the Finance Minister's Orders; and
 - (ii) applicable Accounting Standards and other mandatory financial reporting requirements in Australia.

Australian National Audit Office



P Hinchey
Senior Director
Delegate of the Auditor-General
Sydney
17 August 2006

PO Box A456 Sydney South NSW 1235
130 Elizabeth Street
SYDNEY NSW
Phone (02) 9367 7100 Fax (02) 9367 7102

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 2006 have been prepared 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*.

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

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

Handwritten signature of Michael Eager in black ink.

Michael Eager
Acting Chairman

17th August 2006
Sydney

Handwritten signature of Ian O Smith in black ink.

Ian O Smith
Executive Director

17th August 2006
Sydney

Handwritten signature of Douglas Cubbin in black ink.

Douglas Cubbin
Chief Financial Officer

17th August 2006
Sydney

FINANCIAL STATEMENTS 2005-06

Income Statement for the year ended 30 June 2006

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 (a) \$'000
INCOME			
Revenue			
Revenue from Government	5A	117 568	124 683
Goods and services	5B	38 427	36 449
Grants	5C	272	329
Interest	5D	5 384	3 792
Total Revenue		161 651	165 253
Gains			
Net gains from sale of assets	5E	109	246
Net foreign exchange gains - non speculative	5F	6	22
Total Gains		115	268
TOTAL INCOME		161 766	165 521
EXPENSES			
Employees	6A	61 704	58 396
Suppliers	6B	49 332	66 881
Depreciation and amortisation	6C	52 107	42 783
Write down and impairment of assets	6D	2 176	339
Grants	6E	2 549	2 253
Finance costs	6F	8 897	8 474
TOTAL EXPENSES		176 765	179 126
OPERATING LOSS		(14 999)	(13 605)

Note:

(a) As restated in accordance with AEIFRS, refer note 3.

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

FINANCIAL STATEMENTS

2005-06

Balance Sheet as at 30 June 2006

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 (a) \$'000
ASSETS			
Financial assets			
Cash	7A, 22	11 338	4 926
Receivables	7B, 22	7 465	36 348
Investments	7C, 22	87 140	76 307
Total financial assets		105 943	117 581
Non-financial assets			
Land and buildings	8A	184 124	186 143
Infrastructure, plant and equipment and major facilities	8B	665 006	634 877
Inventories	8C	4 691	6 296
Intangibles	8D	2 054	3 397
Other	8E	4 470	3 433
Total non-financial assets		860 345	834 146
Total assets		966 288	951 727
LIABILITIES			
Payables			
Suppliers	9E, 22	9 354	9 126
Grants	9F, 22	293	50
Other	9G, 22	713	782
Total payables		10 360	9 958
Interest bearing liabilities			
Other	9A, 22	2 744	2 614
Total interest bearing liabilities		2 744	2 614
Provisions			
Employees	9B	23 246	21 289
Decommissioning costs	9C	183 596	174 856
Other	9D	2 661	1 461
Total provisions		209 503	197 606
Total liabilities		222 607	210 178
NET ASSETS		743 681	741 549

FINANCIAL STATEMENTS 2005-06

Balance Sheet as at 30 June 2006

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 (a) \$'000
EQUITY	10		
Contributed equity		413 856	393 369
Reserves		270 672	294 128
Retained surpluses		59 153	54 052
Total equity		743 681	741 549
Current assets	7E, 8F	109 233	122 998
Non-current assets	8F	857 055	828 729
Current liabilities	9H	37 229	34 934
Non-current liabilities	9H	185 378	175 244

(a) As restated in accordance with AEIFRS, refer note 3.

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

FINANCIAL STATEMENTS 2005-06

Statement of Cash Flows for the year ended 30 June 2006

	Notes	FINANCIAL YEAR	
		2006 \$'000 Inflows (Outflows)	2005 (a) \$'000 Inflows (Outflows)
OPERATING ACTIVITIES			
Cash received			
Goods and services		35 815	35 458
Interest		5 466	3 737
Net GST received from ATO		11 601	15 011
Appropriations		117 568	124 683
Total cash received		170 450	178 889
Cash used			
Employees		(59 746)	(57 511)
Suppliers		(59 344)	(94 892)
Total cash used		(119 090)	(152 403)
Net cash from operating activities	11	51 360	26 486
INVESTING ACTIVITIES			
Cash received			
Proceeds from sales of property, plant and equipment		323	606
Proceeds from sales/maturity of investments		14 000	-
Total cash received		14 323	606
Cash used			
Purchase of property, plant and equipment	(b)	(83 725)	(86 278)
Purchase of investments		(24 833)	(20 617)
Total cash used		(108 558)	(106 895)
Net cash used by investing activities		(94 235)	(106 289)

FINANCIAL STATEMENTS 2005-06

Statement of Cash Flows for the year ended 30 June 2006

	Notes	FINANCIAL YEAR	
		2006 \$'000 Inflows (Outflows)	2005 (a) \$'000 Inflows (Outflows)
FINANCING ACTIVITIES			
Cash received			
Appropriation - contributed equity		49 287	77 987
Total cash received		49 287	77 987
Net cash from financing activities		49 287	77 987
Net increase/(decrease) in cash held		6 412	(1 816)
Cash at 1 July		4 926	6 742
Cash at 30 June		11 338	4 926

Note:

(a) As restated in accordance with AEIFRS, refer note 3.

(b) Includes the cash flow impact of the replacement research reactor (OPAL) of \$58.031 million (2005: \$76.824 million).

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

FINANCIAL STATEMENTS 2005-06

Statement of changes in equity for the year ended 30 June 2006

	Retained Surpluses		Asset Revaluation Reserve		Other Reserves		Contributed Equity/Capital		Total Equity	
	2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000
Opening balance	54 052	72 812	255 918	255 527	38 210	33 055	393 369	350 579	741 549	711 973
Income and Expenses										
Revaluation adjustment	-	-	(3 356)	391	-	-	-	-	(3 356)	391
Subtotal income and expenses recognised directly in equity			(3 356)	391	-	-	-	-	(3 356)	391
Net Operating Results	(14 999)	(13 605)	-	-	-	-	-	-	(14 999)	(13 605)
Total income and expenses	(14 999)	(13 605)	(3 356)	391					(18 355)	(13 214)
Contribution by Owners										
Appropriations (equity injection)	-	-	-	-	-	-	20 487	42 790	20 487	42 790
Sub total Transactions with Owners	-	-	-	-	-	-	20 487	42 790	20 487	42 790
Transfers between equity components	20 100	(5 155)	-	-	(20 100)	5 155	-	-	-	-
Closing balance at 30 June	59 153	54 052	252 562	255 918	18 110	38 210	413 856	393 369	743 681	741 549

Note:

(a) 2005 comparatives are restated in accordance with AEIFRS, refer note 3.

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

FINANCIAL STATEMENTS 2005-06

Schedule of Commitments as at 30 June 2006

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 \$'000
BY TYPE			
CAPITAL COMMITMENTS			
Infrastructure, plant and equipment		8 067	16 233
Fuel elements purchase		6 141	6 135
Total capital commitments		14 208	22 358
By maturity			
Capital commitments payable			
One year or less		12 280	17 561
From one to five years		1 928	4 797
		14 208	22 358
OTHER COMMITMENTS			
Replacement Research Reactor Project (OPAL)	(b)	14 000	39 322
Disposition of spent fuel	(a)	46 079	46 471
Operating lease	(c)	2 548	2 685
Total other commitments		62 627	88 478
Total commitments payable		76 835	110 836
Other commitments receivable			
Replacement Research Reactor Project (OPAL)	(b)	2 552	39 322
Disposition of spent fuel	(a)	46 079	46 471
GST recoverable from Australian Taxation Office		1 292	2 033
Total other commitments receivable		49 923	87 826
Net other commitments		12 704	652
By maturity - other commitments (OPAL)			
One year or less		11 448	-
By maturity - operating lease - minimum payments			
One year or less		137	137
From one to five years		685	685
Over five years		1 726	1 863
		2 548	2 685

Schedule of Commitments as at 30 June 2006

Note:

- (a) In 1997-1998 the Government determined to provide \$98.915 million in 2006 dollars (\$86.4 million in 1997 dollars) to remove spent fuel rods from the Lucas Heights Science and Technology Centre and meet the costs of reprocessing offshore. An amount of \$52.836 million has been drawn down. The amount of \$46.079 million is not included in the commitment by maturity figures as the commitment payable is fully offset by the commitment receivable.
- (b) 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 net amount of \$11.448 million is included in the commitment by maturity while in 2005 \$39.322 million (excluding GST) is not included in the commitment by maturity figures as the commitment payable is fully offset by the commitment receivable.
- (c) ANSTO has a twenty five year lease contract with Central Sydney Area Health Services with an annual rental payable of \$137 000. The annual rental is subject to review every three years.

The timing of the other commitments payable is matched to the receipt of other commitments receivable.

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

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

FINANCIAL STATEMENTS 2005-06

Schedule of Contingencies as at 30 June 2006

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
Contingent Liabilities		
Guarantee (a)	15	15
Other (b)	-	-
Total Contingent Liabilities	15	15

Note:

- (a) The amount reported as contingent liabilities refers to a 3 year security bond in favour of Energy Australia.
- (b) In 2005, INVAP SE lodged two claims against ANSTO for additional compensation aggregating approximately \$14 million. These claims have been assessed and \$9.9 million has been agreed and accepted, of which \$6.2 million has been paid in 2006.
- (c) Provision for Common Law Claims of \$1.5 million had been written back in 2004-05. The likelihood of a claim against ANSTO is still present, this however is covered by COMCARE provision dealing with asbestos related claims against any authorities including ANSTO in the event of any litigation or claim for compensation.

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

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

Note	Description
1	Economic dependency
2	Summary of significant accounting policies
3	The impact of transition to Australian Equivalents to International Financial Reporting Standards (AEIFRS) from AGAAP
4	Segment and outcomes reporting
5	Income
6	Expenses
7	Financial assets
8	Non-financial assets
9	Liabilities
10	Equity
11	Cash flow reconciliation
12	Appropriations
13	Remuneration of members of the Board
14	Remuneration of executives
15	Replacement Research Reactor Project (OPAL) costs
16	Insurances
17	Remuneration of auditors
18	Board membership
19	Related party disclosures
20	Average staffing levels (full time equivalent)
21	Trust money
22	Financial instruments
23	Overseas pension schemes
24	Events subsequent to reporting date

1 Economic dependency

Australian Nuclear Science & Technology Organisation (ANSTO) is dependent on appropriations from the Parliament of the Commonwealth Government for its

continued existence and ability to carry out its normal activities.

2 Summary of significant accounting policies

(a) Basis of preparation of the financial statements

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

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 (or FMOs, being the *Commonwealth Authorities and Companies Orders (Financial Statements for reporting periods ending on or after 01 July 2005)*);
 - Australian Accounting Standards issued by the Australian Accounting Standards Board that apply for the reporting period; and
 - Interpretations issued by the AASB and Urgent Issues Group (UIG) that apply for the reporting period.

Schedule 1 of the *CAC Act* requires statements to be prepared having regard to:

- The explanatory notes;
- The Statements of Accounting Concepts (SACs);
- The AASB Framework for the Preparation and Presentation of Financial Statements; and
- Estimates Memorandums, Finance Briefs, Finance Circulars, Financial Management Guidance and other guidance/policies issued, by the Department of Finance and Administration.

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

This is the first financial report prepared under Australian Equivalent to International Financial Reporting Standards (AEIFRS). The impacts of adopting AEIFRS are disclosed in Note 3.

The Income Statement, Balance Sheet and Statement of Changes in Equity have been prepared on an accruals basis and are in accordance with the historical cost convention, except for certain assets which, as noted, are at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position.

Unless alternative treatment is specifically required by an accounting standard, assets and liabilities are recognised in the Balance Sheet when and only when it is probable that future economic benefits will flow and the amounts of the assets or liabilities can be reliably measured. Assets and liabilities arising under agreements equally proportionately unperformed are however not recognised unless required by an Accounting Standard. Liabilities and assets that are unrecognised are reported in the Schedule of Commitments and the Schedule of Contingencies.

Revenues and expenses are recognised in the Income Statement when and only when the flow or consumption or loss of economic benefits has occurred and can be reliably measured.

(b) Changes in accounting policies

Other than the adoption of the AEIFRS, the accounting policies used in the preparation of these financial statements are consistent with those used in 2004-05.

(c) Reporting by outcomes

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

(d) 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 has been taken to be the market value of similar properties as determined by an independent valuer. In some instances, buildings are purpose built and may in fact realise more or less in the market.

No 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.

(e) Statement of Compliance

The financial report complies with Australian Accounting Standards, which include Australian Equivalents to International Financial Reporting Standards (AEIFRS).

Australian Accounting Standards require ANSTO to disclose Australian Accounting Standards that have not been applied, for standards that have been issued but are not yet effective.

The AASB has issued amendments to existing standards, these amendments are denoted by year and then number, for example 2005-1 indicates amendment 1 issued in 2005.

The table over illustrates standards and amendments that will become effective for ANSTO in the future. The expected impact on the financial report of adoption of these standards is based on ANSTO's initial assessment at this date, but may change. ANSTO intends to adopt all of standards upon their application date.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

Title	Standard affected	Application date*	Nature of impending change	Impact expected on financial report
2005-1	AASB 139	1-Jan-06	Amends hedging requirements for foreign currency risk of a highly probable intra-group transaction.	No expected impact.
2005-4	AASB 139, AASB 132, AASB 1, AASB 1023 and AASB 1038	1-Jan-06	Amends AASB 139, AASB 1023 and AASB 1038 to restrict the option to fair value through profit or loss and makes consequential amendments to AASB 1 and AASB 132.	No expected impact.
2005-5	AASB 1 and AASB 139	1-Jan-06	Amends AASB 1 to allow an entity to determine whether an arrangement is, or contains, a lease. Amends AASB 139 to scope out a contractual right to receive reimbursement (in accordance with AASB 137) in the form of cash.	No expected impact.
2005-6	AASB 3	1-Jan-06	Amends the scope to exclude business combinations involving entities or businesses under common control.	No expected impact.
2005-9	AASB 4, AASB 1023, AASB 139 and AASB 132	1-Jan-06	Amended standards in regards to financial guarantee contracts.	No expected impact.
2005-10	AASB 132, AASB 101, AASB 114, AASB 117, AASB 133, AASB 139, AASB 1, AASB 4, AASB 1023 and AASB 1038	1-Jan-07	Amended requirements subsequent to the issuing of AASB 7.	No expected impact.
2006-1	AASB 121	31-Dec-06	Changes in requirements for net investments in foreign subsidiaries depending on denominated currency.	No expected impact.
	AASB 7 Financial Instruments: Disclosures	1-Jan-07	Revise the disclosure requirements for financial instruments from AASB 132 requirements.	No expected impact.

* Application date is for annual reporting periods beginning on or after the date shown

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

(f) Revenue recognition

Parliamentary appropriations

From 1 July 1999, the Commonwealth Budget has been prepared under an accruals framework. Under this framework, Parliament appropriates money to ANSTO as revenue appropriations and as equity injections (refer Notes 5A and 10).

Revenue from Government - Output Appropriations

Revenue from Government is revenue for the core activities of ANSTO and is recognised at the full amount appropriated for departmental outputs as revenue of the year of appropriation, adjusted by all applicable current year formal additions and reductions listed at Clause 2A.13 of this Policy. Any undrawn appropriation at the end of the financial year is recognised as Appropriation Receivable.

Equity injections

Amounts appropriated which are designated as 'equity injections' are recognised directly in Contributed Equity in full as appropriated by the Parliament (refer Note 10).

Operating revenue from goods and services

Operating revenue from independent sources comprises revenue earned from the provision of products, or services, to entities outside ANSTO. Revenue is recognised when the goods are provided, or when the fee in respect of the services provided is receivable.

Receivables for goods and services are recognised at the nominal amounts due less any provision for doubtful debts. Collectibility of debts is reviewed at balance date. Provision is made when collectibility 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 as the interest is received or is entitled to be received.

Revenue from sale of assets

Revenue is recognised when control of the asset has passed to the buyer.

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.

(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 wages and salaries (including non - monetary benefits) and other employee benefits expected to be settled within 12 months of their reporting date are also measured at their nominal amounts.

With all other employee benefits that are not expected to be consumed within twelve months of the service being rendered, these entitlements are discounted to present value in accordance with AASB 119. This measurement takes account of legal and constructive obligations to employees.

The provision for the employee entitlements encompasses annual leave and long service leave that ANSTO has a present obligation to pay resulting from

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

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. 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. The current Enterprise Agreement pay rates applicable on 1 July each year are considered in the calculation. The financial effect of this was an accrual of \$0.876 million (2005: \$0.417 million).

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.

(h) Superannuation

The Australian Nuclear Science and Technology Organisation contributes to the Commonwealth (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. Current contribution rates in 2006 were 10.1% of salary (PSS) and 22.5% of salary (CSS). An additional 3% is contributed for employer productivity benefits. The vast majority of staff are covered by one of

these two schemes. For those staff who do not contribute to either of these two schemes, ANSTO contributes 9% of salary to the Australian Government Employees Superannuation Trust fund. Additional employer contributions are made to nominated complying funds on behalf of several term employees at a rate of 9% where the employee chooses not to make a personal contribution, or 11% where the employee chooses also to contribute. Contributions during the year are detailed in Note 6A. No liability is shown for superannuation in the Balance Sheet as the employer contributions fully extinguish the accruing liability which is assumed by the Commonwealth.

(i) Leases

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

(j) Cash

For the purposes of the Statement of Cash Flows, cash and cash equivalents include at call deposits held in a bank and cash on hand.

(k) Financial instruments

Accounting policies for financial instruments are stated at Note 22.

(l) Bad and doubtful debts

Bad debts are written off during the period in which they are identified. Provision for doubtful debts is made when collection of the debt is judged to be less rather than more likely.

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

Acquisition

Items of buildings, infrastructure, plant and equipment and major facilities are recorded at cost on 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.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

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. This is particularly relevant to 'make good' provisions in property leases 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' taken up.

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

Basis of valuation

AASB 116 *Property, Plant and Equipment* allows entities to measure each class of assets covered by that Standard at either cost or fair value (revaluation method). FMO's policy 3A.1.1, requires entities to use fair value. Fair value is market value unless there is no or limited market based evidence of fair value. In such cases fair value is estimated using depreciated replacement cost.

Land, buildings, plant and equipment are carried at fair value, being revalued with sufficient frequency such that the carrying

amount of each asset is not materially different, at reporting date, from its fair value.

- Freehold land was revalued as at 30 June 2004
- Buildings on freehold land were revalued at 30 June 2004
- Plant and equipment were revalued at 30 June 2004
- Infrastructure was revalued at 30 June 2004
- The major national facility, HIFAR reactor including instrumentation was revalued at 30 June 2004
- Other national and major facilities were revalued at 30 June 2004

Fair value for each class of asset are determined as shown below.

FMOs allow progressive revaluation of a class of non-financial assets over more than one reporting period, provided that the requirements of AASB 116 are met. Land and building assets should be subject to formal revaluations once in every three (3) years. Plant and equipment assets are subject to a formal valuation every four years.

Asset Class

Fair Value Measured at

Land	Market selling price
Buildings	Market selling price
Site infrastructure	Market selling price
Electrical infrastructure	Market selling price
Plant and equipment	Market selling price
National & major facilities	Market selling price

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

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.

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

The valuation of land, buildings, infrastructure, plant and equipment including national and other major facilities was performed by independent valuers of the Australian Valuation Office (AVO), Mr. Frank Andreatta and Mr. Simon O'Leary (registered Valuer Nos. 2388 and 1128 respectively) at 30 June 2004.

Depreciation and amortisation

Items of property, plant and equipment, including buildings, 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.

The depreciation rates (useful lives) of ANSTO's property, plant and equipment 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.

Impairment

All assets were assessed for impairment at 30 June 2006. In 2005, only assets with a carrying value of more than \$75 000 were assessed for impairment. 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.

(n) Inventories

Stores are valued at cost. Provision is made for diminution in value.

Inventories of Cobalt-60 and enriched, natural and depleted uranium are valued on the basis of net realisable value.

Stocks of reactor fuel, heavy water and stores are valued at average purchase price.

(o) Intangibles

Software

Items of software are recorded at cost and depreciated as outlined below. Items with a cost of less than \$3,000 are expensed in the year of acquisition.

Software and licenses are reported at deemed cost.

Depreciation and amortisation rates	2006	2005
Buildings on freehold land	5 to 40 years	30 years
Plant and equipment	2 to 30 years	2 to 30 years
Infrastructure	20 years	20 years
National and major facilities	5 to 30 years	5 to 30 years

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

Amortisation rates	2006	2005
Purchased software	2 - 7 years	2 - 7 years
Licences	3 years	3 years

Amortisation

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

Amortisation rates applying to intangibles are as above.

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

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

Impairment

All intangibles were assessed for impairment at 30 June 2006 and 2005. 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.

(p) Patents

Due to the uncertain commercial value of patents, trademarks, designs and applications, 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 2006 there were 99 patents, trademarks, design and applications (105 at 30 June 2005) registered to ANSTO and no associated costs are recognised as an asset (nil at 30 June 2005).

(q) 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 to Australian currency are translated at the exchange rate prevailing at that date and any exchange differences are brought to account in the Income Statement.

(r) Taxation

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

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

- where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- for receivables and payables.
- for unbooked commitments as per Schedule of Commitments.

(s) Assets received free of charge

The acquisition of property, plant and equipment free of charge, or for a nominal amount, is recognised at fair value.

(t) Principles of consolidation

ANSTO's sole subsidiary company is ANSTO Inc., a company incorporated in Delaware, USA. In November 2004, the

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

Board decided to utilise ANSTO Inc. to promote the commercialisation of ANSTO technology in the US. The net transaction for this financial year is a profit of AUD \$11,135 (USD \$8,069) and in 2005 a loss of AUD\$ 6,514 (USD\$5,245). As the amount was not material, no consolidated financial statements have been prepared.

(u) 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.

(v) Rounding

Amounts are rounded to the nearest one thousand dollars except in relation to:

- remuneration of members of the Board
- remuneration of executives
- remuneration of auditors
- financial information about the subsidiary company, notes 2(t) and 7D.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

3. The impact of the transition to AEIFRS from previous AGAAP

Reconciliation of total equity as presented under previous AGAAP to that under AEIFRS

	AEIFRS 2005 \$'000	AGAAP 2005 \$'000	AGAAP 2004 \$'000
ASSETS			
Financial assets			
Cash	4 926	4 926	6 742
Receivables	36 348	36 348	86 873
Investments	76 307	76 307	55 690
Total financial assets	117 581	117 581	149 305
Non-financial assets			
Land and buildings (a)	186 143	166 094	162 219
Infrastructure, plant and equipment and major facilities (a)	634 877	503 576	450 811
Inventories	6 296	6 296	7 480
Intangibles	3 397	3 397	1 425
Other	3 433	3 433	811
Total non-financial assets	834 146	682 796	622 746
Total assets	951 727	800 377	772 051
LIABILITIES			
Payables			
Suppliers	9 126	9 126	18 672
Grants	50	50	57
Other	782	782	14 503
Total payables	9 958	9 958	33 232
Interest bearing liabilities			
Other	2 614	2 614	2 466
Total interest bearing liabilities	2 614	2 614	2 466
Provisions			
Employees (b)	21 289	21 443	20 557
Decommissioning Cost (c)	174 856	-	-
Other (c)	1 461	3 053	5 569
Total provisions	197 606	24 496	26 126
Total liabilities	210 178	37 068	61 824
NET ASSETS	741 549	763 309	710 227

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

3. The impact of the transition to AEFIRS from previous AGAAP (continued)

	AEIFRS 2005 \$'000	AGAAP 2005 \$'000	AGAAP 2004 \$'000
Equity			
Contributed equity	393 369	393 369	350 579
Reserves	294 128	295 496	289 950
Retained surpluses	54 052	74 444	69 698
Total equity	741 549	763 309	710 227
Reconciliation of total equity as presented under previous AGAAP to that under AEFIRS			
Total equity under previous AGAAP		763 309	710 227
Adjustment to retained earnings			
Employee Entitlements (b)		154	154
Derecognition of provisions (c)		1 592	1 592
Unwinding of discount relating to decommissioning costs		(8 326)	-
Depreciation relating to decommissioning costs		(15 180)	-
Total equity translated to AEFIRS		741 549	711 973
Reconciliation of profit or loss as presented under previous AGAAP to AEFIRS.			
Prior year profit as previously reported		9 901	
Unwinding of discount relating to decommissioning costs		(8 326)	
Depreciation relating to decommissioning costs		(15 180)	
Prior year profit (deficit) translated to AEFIRS		(13 605)	

The cash flow statement presented under previous AGAAP is equivalent to that prepared under AEFIRS.

(a) Property, Plant and Equipment

Under AASB 116, cost of an asset includes the estimated cost of dismantling, removing the asset and restoring the site to the extent that is recognised as a provision under AASB 137. There is an adjustment of \$151,350 million being estimated net present value of decommissioning cost after allowance for depreciation.

(b) Employee Benefits

AASB 119 requires annual leave which is not expected to be taken within 12 months of the financial year, to be discounted using market yields on National Government Bonds as at the reporting date. There is an adjustment of \$154,000 to reflect the expected portion of non-current annual leave.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

3. The impact of the transition to AIFRS from previous AGAAP (continued)

(c) Provisions, Contingent Liability and Contingent Asset

AASB 137 defines the criteria under which items may be called provisions. As a result, \$1.592 million of provisions in 2005 relating to superannuation fluctuation and waste treatment for reprocessing and fuel waste have been written back.

ANSTO, under this standard will be required to recognise provisions for decommissioning and removal of assets, and site restoration. The value must be recognised as part of the cost of the underlying asset (deferred expense), as a separate amount.

ANSTO has assessed the cost associated with the decommissioning and remediation of its facilities located at the Lucas Heights Science and Technology Centre and at Camperdown. The estimated net present value of the decommissioning cost plus the cost of unwinding of discount as at transition 1 July 2004 amounted to \$166.530 million.

	\$'000
Initial Decommissioning Cost	166 530
Add: Finance Costs (being unwinding of discount)	8 326
Balance as at 30 June 2005, refer Note 9C	174 856

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

4 Segment and outcomes reporting

Reporting by segments

ANSTO operates in a single industry within Australia, namely in the nuclear scientific research industry.

Reporting by outcomes:

ANSTO has three outcomes and each have one output.

Outcome 1: Replacement Research Reactor Project (OPAL)

Outcome 2: Disposal of spent fuel

Outcome 3: Core business: science and technology

Major Classes of Departmental Revenues and Expenses by Output Groups and Output

	Outcome 1		Outcome 2		Outcome 3		Total	
	Output 1		Output 2		Output 3			
	2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000
Operating revenues								
Revenue from Government			316	13 835	117 252	110 848	117 568	124 683
Sale of goods and services					38 427	36 449	38 427	36 449
Interest					5 384	3 792	5 384	3 792
Net gain from sale of assets					109	246	109	246
Other					278	351	278	351
Total operating revenues	0	0	316	13 835	161 450	151 686	161 766	165 521
Operating expenses								
Employees			316	344	61 388	58 370	61 704	58 714
Suppliers			864	11 441	48 468	55 122	49 332	66 563
Depreciation and amortisation					52 107	42 783	52 107	42 783
Finance costs					8 897	8 474	8 897	8 474
Write-down and impairment of assets					2 176	339	2 176	339
Other					2 549	2 253	2 549	2 253
Total operating expenses	0	0	1 180	11 785	175 585	167 341	176 765	179 126

Note:

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

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

5 Income

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 \$'000
5A. Revenues from Government			
Appropriation for outputs		117 568	124 683
5B. Goods and services			
Radioisotope sales		20 952	20 730
Services and contract research		5 829	5 389
Silicon irradiation		4 606	3 907
CSIRO site support		1 276	950
Training courses		251	100
Land management		2 540	2 538
Australian Synchrotron Research Project		1 423	1 623
AINSE interactions		1 550	1 212
Total sales of goods and services		38 427	36 449
5C. Grants		272	329
5D. Interest		5 384	3 792
5E. Net gain from sale of assets			
Infrastructure, plant and equipment:			
Revenue from sale of assets		264	551
Net book value of assets sold		(155)	(305)
Net gain from disposal of infrastructure, plant and equipment		109	246
5F. Net foreign exchange gains - non speculative		6	22
5G. Sales of goods and services			
Goods		20 952	20 730
Services		17 475	15 719
Total sales of goods and services	5B	38 427	36 449

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

5 Income (continued)

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 \$'000
Provision of goods to:			
Related entities		-	-
External entities		20 952	20 730
Total sales of goods		20 952	20 730
Rendering of services to:			
Related entities		2 188	1 785
External entities		15 287	13 934
Total rendering of services		17 475	15 719

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

6 Expenses

		FINANCIAL YEAR	
		2006	2005
		\$'000	\$'000
	Notes		
6A. Employee expenses:			
Salaries		46 023	45 988
Superannuation		7 771	5 850
Annual leave		5 194	4 636
Long service leave		2 418	1 826
Separation and redundancy		298	96
Total employee expenses		61 704	58 396
6B. Supplier expenses:			
Goods from related entities		-	-
Goods from external entities		14 226	13 616
Services from related entities		8 226	7 807
Services from external entities		26 427	45 333
Operating lease rentals		453	125
Total supplier expenses		49 332	66 881
6C. Depreciation and amortisation			
Depreciation of property, plant and equipment (a)	8B	50 198	39 958
Amortisation of intangible assets - licence	8D	4	2
Amortisation of intangible assets - software	8D	1 905	2 823
Total depreciation and amortisation		52 107	42 783
6D. Writedown of assets			
Financial assets:			
Provision for doubtful debt (no longer required)		18	(274)
Receivables for goods and services		1	3
Foreign exchange loss		19	67

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

6 Operating expenses (continued)

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 \$'000
Non financial assets:			
Materials - Write off obsolete stock		812	1
Loss from sale of assets		223	87
Fixed Assets Revaluation Writedown/Impairment		1 057	234
Nuclear material stock devaluation		46	221
Total writedown of assets		2 176	339
6E. Grants		2 549	2 253
6F. Finance costs			
Unwinding of discount on Decommissioning Costs		8 740	8 326
Interest		157	148
Total finance costs		8 897	8 474
Total operating expenses		176 765	179 126
(a) Depreciation of property, plant and equipment:			
The aggregate amounts of depreciation expensed during the reporting period for each depreciable class of property, plant and equipment are as follows:			
Buildings on freehold land		11 076	7 704
Plant and equipment		28 071	24 209
Infrastructure		3 255	2 088
National and major facilities		7 796	5 597
Total allocated		50 198	39 958

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

7 Financial assets

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 \$'000
7A. Cash			
Cash at bank for operating needs		11 338	4 926
Total cash		11 338	4 926
7B. Receivables			
Goods and services (a)		5 561	7 270
Less provision for doubtful debts (c)		83	1 653
		5 478	5 617
Interest accrued		104	186
Other (b)		25	28 933
GST receivable		1 858	1 612
Total receivables (net)		7 465	36 348
(a) Goods and services (trade debtors)			
Age analysis of trade debtors			
Current		4 342	4 468
Overdue:			
Less than 30 days		552	811
30 to 60 days; and		412	181
60 to 90 days		33	72
More than 90 days		222	1 738
		5 561	7 270

(b) In 2006, \$nil (2005: \$28.800 million) represents appropriations receivable from Government for undrawn equity injection.

(c) All provisions relate to accounts outstanding for more than 90 days.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

7 Financial assets (continued)

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 \$'000
7C. Investments			
Bank accepted bills, s18 of the <i>CAC Act</i>		82 140	67 307
Term deposit, s18 of the <i>CAC Act</i>		-	9 000
Investment in the Australian Synchrotron Project		5 000	-
Total investments		87 140	76 307
7D. Investment in subsidiary			
ANSTO Inc. was incorporated in Delaware, USA on 27 October 1999. At 30 June 2006: US\$100 (2005: US\$100) of capital has been invested in this wholly owned subsidiary. Refer note 2(t).			
7E. Total financial assets			
Current		105 943	117 581
Non-current		-	-
Total financial assets		105 943	117 581

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

8 Non-financial assets

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 \$'000
8A. Land and buildings			
Land - at independent valuation - 30 June 2004 (fair value)	(a), (b)	82 027	82 027
		82 027	82 027
Buildings - at cost		41 056	31 628
Less accumulated depreciation		5 533	2 466
		35 523	29 162
Buildings - at independent valuation - 30 June 2004 (fair value)	(a), (b)	80 206	80 192
Less accumulated depreciation	(a), (b)	13 632	5 238
		66 574	74 954
Total buildings		102 097	104 116
Total land and buildings		184 124	186 143
8B. Infrastructure, plant, equipment and major facilities			
(i) Plant and equipment			
Plant and equipment - at cost		176 492	164 376
Less accumulated depreciation		33 280	15 874
		143 212	148 502
Plant and equipment - at independent valuation - 30 June 2004 (fair value)	(a), (b)	71 888	69 403
Less accumulated depreciation	(a), (b)	23 815	8 713
		48 073	60 690
Plant and equipment under construction		13 731	21 281
Total plant and equipment		205 016	230 473

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

8 Non-financial assets (continued)

		FINANCIAL YEAR	
		2006	2005
		\$'000	\$'000
	Notes		
(ii) Infrastructure			
Electrical/site services			
Electrical/site services facilities - at cost		9 886	2 059
Less accumulated depreciation		708	100
		9 178	1 959
Electrical/site services facilities at independent valuation - 30 June 2004 (fair value)	(a), (b)	20 997	20 992
Less accumulated depreciation	(a), (b)	4 634	1 988
		16 363	19 004
Total infrastructure		25 541	20 963

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

8 Non-financial assets (continued)

	Notes	FINANCIAL YEAR	
		2006 \$'000	2005 \$'000
(iii) Major national and major research facilities			
Major national research facilities - at cost		3 395	1 808
Less accumulated depreciation		1 656	368
		1 739	1 440
Major national research facilities at independent valuation			
- 30 June 2004 (fair value)	(a), (b)	20 225	21 923
Less accumulated depreciation	(a), (b)	9 627	4 677
		10 598	17 246
Major research facilities at cost		295	-
Less accumulated depreciation	(a), (b)	16	-
		279	-
Major research facilities at independent valuation			
- 30 June 2004 (fair value)	(a), (b)	9 937	10 156
Less accumulated depreciation	(a), (b)	1 537	803
		8 400	9 353
Replacement Research Reactor (OPAL) Project capitalised cost to date		413 433	355 402
Total major national and major research facilities		434 449	383 441
Total infrastructure, plant, equipment and major facilities		665 006	634 877
Total land, buildings, infrastructure, plant, equipment and major facilities		849 130	821 020

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

8 Non-financial assets (continued)

Movement summary 2005-06 for all 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 2005	82 027	111 821	193 848	667 399	861 247
Additions - new assets	-	9 442	9 442	73 702	83 144
Disposals	-	-	-	(824)	(824)
Gross value as at 30 June 2006	82 027	121 263	203 290	740 277	943 567
Accumulated depreciation/ amortisation 1 July 2005	-	7 704	7 704	32 523	40 227
Depreciation/amortisation	-	11 076	11 076	39 122	50 198
Recoverable Amount write downs	-	386	386	4 026	4 412
Adjustment for disposals	-	-	-	(400)	(400)
Accumulated depreciation/ amortisation 30 June 2006	-	19 166	19 166	75 271	94 437
Net book value as at 30 June 2006	82 027	102 097	184 124	665 006	849 130
Net book value as at 30 June 2005	82 027	104 116	186 143	634 877	821 020

Note:

- (a) In 2003-2004, an independent valuation of land, buildings, plant & equipment and infrastructure was performed by Mr. Frank Andreatta and Mr. Simon B O'Leary (registered valuer Nos. 3775 and 1128 respectively) of the Australian Valuation Office. Refer Note 2(k).
- (b) In accordance with the Finance Minister's Orders (or FMOs, being the *Commonwealth Authorities and Companies Orders (Financial Statements for reporting periods ending on or after 01 July 2005)*), all revalued assets are shown on a gross basis: asset values are at fair value and accumulated depreciation has been written back. The resulting adjustment has been transferred directly to the asset revaluation reserve and/or Income Statement if the reserve is insufficient.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

8 Non-financial assets (continued)

Summary of all assets under construction as at 30 June 2006

Item	Land	Buildings	Total Land and Buildings	Infrastructure, plant, equipment national and major facilities	Total
	\$'000	\$'000	\$'000	\$'000	\$'000
As at 30 June 2006					
Gross value	-	-	-	427 164	427 164
Accumulated depreciation/amortisation					
Net value as at 30 June 2006	-	-	-	427 164	427 164
Net value as at 30 June 2005	-	-	-	376 683	376 683

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

8 Non-financial assets (continued)

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
8C. Inventories		
Raw materials and stores - not held for resale		
Stores - at cost	2 525	2 055
Cobalt-60 sources - at net realisable value	414	147
Reactor fuel and heavy water - at average purchase price	757	2 163
Nuclear materials - at net realisable value	142	135
Provision for stock diminution	(1 360)	(392)
	2 478	4 108
Work in progress		
Work in progress - at cost	581	819
Finished goods - at cost	1 632	1 369
Total inventories	4 691	6 296
8D. Intangibles		
Licences at deemed cost	1 009	999
Less accumulated amortisation	1 000	999
	9	-
Design fees at cost	80	80
Less accumulated amortisation	72	70
	8	10
Software at cost	9 721	9 435
Less accumulated amortisation	7 720	6 048
	2 001	3 387
Software at deemed cost	704	458
Less accumulated amortisation	668	458
	36	-
Total intangibles	2 054	3 397

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

8 Non-financial assets (continued)

Movement summary 2005-06 for all intangibles

	Licences \$'000	Software \$'000	Total \$'000
Gross value as at 1 July 2005	1 078	9 892	10 970
Additions - new assets	11	570	581
Disposals		(37)	(37)
Gross value as at 30 June 2006	1 089	10 425	11 514
Accumulated depreciation/amortisation 1 July 2005	1 068	6 505	7 573
Depreciation/amortisation	4	1 905	1 909
Adjustment for disposals		(22)	(22)
Accumulated depreciation/amortisation 30 June 2006	1 072	8 388	9 460
Net book value as at 30 June 2006	17	2 037	2 054
Net book value as at 30 June 2005	10	3 387	3 397

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
8E. Other		
Prepayments	4 470	3 433
Total other	4 470	3 433
Total non-financial assets	860 345	834 146
8F. Total non-financial assets		
Current	3 290	5 417
Non current	857 055	828 729
Total non-financial assets	860 345	834 146

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

9 Liabilities

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
9A. Interest bearing liabilities		
Other - (a)	2 744	2 614
Total interest bearing liabilities	2 744	2 614
Provision and payables		
9B. Employees		
Accrued salaries and wages	609	185
Annual leave	8 206	7 916
Long service leave	14 431	13 188
Aggregate employee entitlement liability	23 246	21 289
9C. Decommissioning cost		
Decommissioning cost	183 596	174 856
	183 596	174 856
9D. Other		
Waste management cost (b)	1 509	1 427
Other claims (c)	1 152	34
	2 661	1 461
9E. Suppliers		
Trade creditors	9 354	9 126
	9 354	9 126
9F. Grants		
Non-profit entities	293	50
	293	50

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

9 Liabilities

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
9G. Other		
Revenue received in advance	713	782
	713	782
Total provisions and payables	219 863	207 564
Total liabilities	222 607	210 178
9H. Total liabilities		
Current	37 229	34 934
Non current	185 378	175 244
Total liabilities	222 607	210 178

Note:

- (a) Relates to prepaid revenue under a lease of property.
- (b) A specific appropriation received to cover costs associated with the movement of low level waste to a repository yet to be established.
- (c) Provision to cover product warranty and also net disposal cost of industrial sources.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

10 Equity

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
Contributed equity		
Replacement research reactor equity injections		
Balance 1 July	365 349	328 148
Equity injections from Government - Replacement Research Reactor (OPAL)	20 487	37 201
Balance 30 June - (d)	385 836	365 349
Other equity injections		
Balance 1 July	28 020	22 431
Equity injections from Government - Other	-	5 589
Balance 30 June - (d)	28 020	28 020
Total contributed equity	413 856	393 369
Reserves, including movements		
Asset revaluation reserve		
Balance 1 July	255 918	255 527
Net (devaluation) revaluation	(3 356)	391
Balance 30 June	252 562	255 918
Fuel elements reserve		
Balance 1 July	12 400	12 400
Transferred to retained surpluses	(4 700)	-
Balance 30 June - (a)	7 700	12 400
Instrumentation reserve		
Balance 1 July	6 200	6 200
Balance 30 June - (b)	6 200	6 200
Spent fuel reserve		
Balance 1 July	2 010	-
Transferred to retained surpluses - (c)	-	2 010
Balance 30 June - (c)	2 010	2 010

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

10 Equity (continued)

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
RRRP training & business initiatives reserve		
Balance 1 July	6 800	6 800
Transferred to retained surpluses	(6 800)	-
Balance 30 June - (e)	-	6 800
New main entrance reserve		
Balance 1 July	8 300	5 155
Transferred (to)/from retained surpluses - (f)	(7 600)	3 145
Balance 30 June	700	8 300
Reactor licensing reserve		
Balance 1 July	1 500	2 500
Transferred to retained surpluses - (g)	-	(1 000)
Balance 30 June	1 500	1 500
Australian research project reserve		
Balance 1 July	1 000	-
Transferred (to)/from retained surpluses - (h)	(1 000)	1 000
Balance 30 June	-	1 000
Total reserves	270 672	294 128
Retained surpluses		
Retained surpluses 1 July	54 052	72 812
Transfer from fuel element reserve	4 700	-
Transfer to spent fuel reserve	-	(2 010)
Transfer to RRP training & business initiatives reserve	6 800	-
Transfer from/ (to) new main entrance reserve	7 600	(3 145)
Transfer from reactor licensing reserve	-	1 000
Transfer from/ (to) Australian research project reserve	1 000	(1 000)
Operating loss	(14 999)	(13 605)
Retained surpluses 30 June	59 153	54 052
Total equity	743 681	741 549

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

10 Equity (continued)

(a) Fuel elements reserve

This reserve was established to fund the purchase of core fuel and development cost for the first few years of the replacement research reactor operation.

(b) Instrumentation reserve

In addition to the 1997 Government decision to fund the construction of a replacement research reactor at Lucas Heights, ANSTO has identified a planned future capital investment for the development of instrumentation associated with the replacement research reactor.

(c) Spent fuel reserve

This reserve represents unused spent fuel appropriation that will be used to fund costs associated with the return of reprocessed fuel back to Australia.

(d) Equity injection

In 2005 there was \$28.880 million undrawn equity injections, refer note 7B(b). There were no undrawn amounts in 2006.

(e) RRRP training and business initiatives reserve

In addition to the 1997 Government decision to fund the construction of a replacement research reactor at Lucas Heights, ANSTO has identified a planned future capital investment for the development of ancillary facilities, business initiatives and operator training to fully utilise the replacement research reactor capabilities.

(f) New main entrance reserve

This reserve was to meet contracted construction costs relating to a new main entrance.

(g) Reactor licensing reserve

This reserve is to meet future licensing costs for decommissioning the HIFAR reactor and commissioning the replacement research reactor.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

11 Cash flow reconciliation

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
Reconciliation of Operating Loss to Net Cash from Operating Activities:		
Operating loss	(14 999)	(13 605)
Non-cash items		
Depreciation/amortisation	52 107	42 783
Net gain from sale of assets	(109)	(246)
Write off obsolete stock	812	1
Nuclear materials (devaluation)	(46)	(221)
Write off fixed assets	1 057	234
Net loss from sale of assets	223	87
Unwinding of Discount - Decommissioning Costs	8 740	8 326
Changes in assets and liabilities		
Decrease in receivables	139	1 727
Decrease in other receivables	109	13 744
(Increase) in GST receivables	(246)	(80)
(Increase) in prepayments	(1 037)	(2 622)
Decrease in inventories	839	1 404
Increase/(decrease) in creditors	228	(9 780)
Increase in employee entitlements	1 957	886
Increase/(decrease) in revenue received in advance	174	(13 728)
Increase/(decrease) in accrued interest	82	(56)
Increase/(decrease) in other provision	1 200	(2 516)
Increase in interest bearing liabilities	130	148
Net cash from operating activities	51 360	26 486

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

12 Appropriations

Particulars	Departmental Outputs		Equity		Total	
	2006	2005	2006	2005	2006	2005
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Balance brought forward from previous year	-	13 835	28 800	63 997	28 800	77 832
Appropriation Acts 1	117 568	110 848	-	-	117 568	110 848
Appropriation Acts 2	-	-	20 487	42 790	20 487	42 790
Available for payment of CRF	117 568	124 683	49 287	106 787	166 855	231 470
Payments made out of CRF	117 568	124 683	49 287	77 987	166 855	202 670
Balance carried forward to next year	-	-	-	28 800	-	28 800
Represented by:						
Appropriation Receivable	-	-	-	28 800	-	28 800

This table reports on appropriations made by Parliament from Consolidated Revenue Fund (CRF) for payment to ANSTO.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

13 Remuneration of members of the Board

	FINANCIAL YEAR	
	2006 \$	2005 \$
Members' remuneration is determined by the Remuneration Tribunal and payment is made in accordance with Section 12 of the <i>ANSTO Act 1987</i> (as amended). Included in operating expenses (Note 6) are:		
Aggregate amounts of superannuation payments in connection with the retirement of members of the Board	28 989	17 508
Other remuneration received, or due and receivable by members of the Board	513 815	453 491
	542 804	470 999
The number of members included in these figures is shown below in each relevant remuneration band:		
Remuneration between	Number	Number
\$Nil and \$14 999	2	1
\$15 000 and \$29 999	3	3
\$30 000 and \$44 999	1	1
\$45 000 and \$59 999	1	1
\$300 000 and \$314 999 (a)	-	1
\$360 000 and \$374 999 (a)	1	-
	8	7

(a) Includes incentives payment

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

14 Remuneration of executives

	FINANCIAL YEAR	
	2006 \$	2005 \$
Executive remuneration is determined by the ANSTO Enterprise Agreement 2006 which is underpinned by the ANSTO Award. Included in operating expenses (Note 6) is total remuneration received or due and receivable, by executives (excluding the Executive Director who is included in Note 13) who earn \$130 000 or more in connection with the management of ANSTO.	2 704 456	2 144 176
The number of executives included in these figures is shown below in each relevant remuneration band:		
Remuneration between	Number	Number (b)
\$130 000 and \$144 999	1	3
\$145 000 and \$159 999	7	2
\$160 000 and \$174 999	2	1
\$175 000 and \$189 999	-	2
\$190 000 and \$204 999	-	1
\$205 000 and \$219 999	2	2
\$220 000 and \$234 999	1	-
\$235 000 and \$249 999	1	-
\$265 000 and \$279 999 (a)	-	1
\$280 000 and \$294 999 (a)	1	-
	15	12

(a) Includes termination payment of \$172 759 (2005: \$135 000)

(b) Change in 2005 comparatives is due to increase in minimum level from \$100 000 to \$130 000

15 Replacement research reactor project (OPAL) costs

Following the requisite approval from the Minister for Industry, Science and Resources, 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 cost of construction of the replacement research reactor is A\$278.5 million excluding GST (November 1999 dollars).

The Government has agreed to maintain the purchasing power of the \$278.5 million in regard to foreign currency movements, changes in prices arising from movements in price indices attributable to the contract, and for the changes in the Government parameters where appropriate.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

16 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.

17 Remuneration of auditors

	FINANCIAL YEAR	
	2006 \$	2005 \$
Remuneration to the Auditor-General for auditing the financial statements for the reporting period	105 000	98 000

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

18 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	Term Concludes
I O Smith	17 May 2004		16 May 2008
I D Blackburne	1 July 2001	30 June 2006	
A Van der Schaaf	25 July 2002		24 July 2007
K Schindhelm	20 March 2003		19 March 2008
G Cook	13 June 2001	31 December 2005	
M Eager	1 January 2002		31 December 2006
C Hillyard	22 July 2004		21 July 2009
Z Switkowski (*)	1 January 2006		31 December 2010

For the 2005-06 financial year the aggregate remuneration paid to members of the Board is disclosed in Note 13.

The aggregate of superannuation payments paid to the Commonwealth Superannuation Scheme (CSS) and Public Sector Superannuation Scheme (PSS), in connection with the retirement of members of the Board was \$28 989 (2005: \$17 508).

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

18 Board membership (continued)

(*) Dr. Z. Switkowski stood aside on 6 June 2006 to take up the appointment of Chairman of the Prime Minister's Taskforce undertaking the Review of Uranium Mining Processing and Nuclear Energy in Australia.

19 Related party disclosures

Several ANSTO Board Members were associated with entities with which ANSTO had commercial transactions during the year. All such transactions were in accordance with ANSTO's normal commercial terms and conditions.

20 Average staffing levels (full time equivalent)

	FINANCIAL YEAR	
	2006	2005
The average staffing levels for ANSTO during the year were:	872	840

21 Trust money

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.

	\$'000	\$'000
Balance 1 July	7	6
Add: interest received	-	1
Balance 30 June	7	7

The audit conducted last year by Australian National Audit Office (ANAO) relating to trust monies revealed that ANSTO's trust monies only relate to security deposits.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

22 Financial instruments

(a) terms, conditions and accounting policies

<i>Financial Instruments</i>	Notes	Accounting Policies and Methods (including recognition criteria and measurement basis)	Nature of underlying instrument (including significant terms & conditions affecting the amount, timing and certainty of cash flow)
<i>Financial assets</i>		Financial assets are recognised when control over future economic benefits is established and the amount of the benefit can be reliably measured.	
Cash at bank	7A	Cash is recognised at cost. Interest is accrued as it is earned.	All Australian dollar cash balances are with the Commonwealth Bank of Australia. At 30 June current rates were 4.5%pa (2005 4.25%pa), calculated daily
Fixed term investment	7C	The deposits or investments are recognised at cost. Interest is accrued as it is earned.	The deposits & investments are with the Commonwealth Bank of Australia, and earn a weighted average effective rate of interest of 5.51% (2005, 5.38%pa) payable on maturity.
Investment in Australian Synchrotron Project	7C	Investment in Australian Synchrotron Project in Victoria recognised at cost.	ANSTO will become entitled to certain share entitlements in the Australian Holding Company of the Australian Synchrotron plus additional rights that will be recognised under the subscription Agreement of the Australian Synchrotron Company.
Receivables for goods & services	7B	Receivables are recognised at the nominal amounts due less any provision for bad and doubtful debts. Provisions are made when collection of the debt is judged to be less rather than more likely.	Credit terms are net 30 days (2005 - 30 days).
Other debtors	7B	Receivables are recognised at the nominal amounts due less any provision for bad and doubtful debts.	Majority of the amount in 2005 (\$28.800 million) is receivable from Department of Finance and Administration for undrawn equity injection.
<i>Financial Liabilities</i>		Financial liabilities are recognised when a present obligation to another party is entered into and the amount of the liability can be reliably measured.	
Trade creditors	9E	Creditors and accruals are recognised at their nominal amounts, being the amounts at which the liabilities will be settled. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).	Settlement is usually made net 30 days.
Revenue received in advance	9F, 9G	Revenue received in advance is initially brought to account as "other payables" and subsequently recognised as revenue when earned.	Revenue earned is brought to account when the transaction is completed.

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

22 Financial instruments (continued)

(b) Interest rate risk - consolidated

Financial Instruments	Notes	Floating Interest Rate		Fixed Interest Rate				Non-Interest Bearing		Total		Weighted Average Effective Interest Rate	
		2006 \$'000	2005 \$'000	1 year or less		2 - 5 years		2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000	2006 \$'000	2005 \$'000
Financial assets													
Cash at bank	7A	11 337	4 925							11 337	4 925	4.32%	4.25%
Cash on hand	7A							1	1	1	1	n/a	n/a
Fixed term investment	7C	82 140	76 307							82 140	76 307	5.52%	5.38%
Investment in Australian Synchrotron	7C							5 000		5 000	-	n/a	n/a
Receivables for goods and services	7B							7 336	7 229	7 336	7 229	n/a	n/a
Interest accrued	7B							104	186	104	186	n/a	n/a
Other	7B							25	28 933	25	28 933	n/a	n/a
Total financial assets		93 477	81 232					12 466	36 349	105 943	117 581		
Total assets										966 288	951 727		
Total financial liabilities													
Trade creditors	9E							9 354	9 126	9 354	9 126	n/a	n/a
Grant received in advance	9F							293	50	293	50	n/a	n/a
Interest bearing liabilities	9A					2 744	2 614			2 744	2 614	6%	6%
Other	9G							713	782	713	782	n/a	n/a
Total financial liabilities						2 744	2 614	10 360	9 958	13 104	12 572		
Total liabilities										222 607	210 178		

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

22 Financial instruments (continued)

(c) Net fair values of financial assets and liabilities

		FINANCIAL YEAR			
		2006		2005	
	Note	Total carrying amount \$'000	Aggregate net fair value \$'000	Total carrying amount \$'000	Aggregate net fair value \$'000
Financial assets					
Cash at bank	7A	11 337	11 337	4 925	4 925
Cash on hand	7A	1	1	1	1
Fixed term investments	7C	82 140	82 140	76 307	76 307
Investment in Australian Synchrotron	7C	5 000	5 000	-	-
Receivables for goods and services	7B	7 336	7 336	7 229	7 229
Interest accrued	7B	104	104	186	186
Other	7B	25	25	28 933	28 933
Total financial assets		105 943	105 943	117 581	117 581
Financial liabilities					
Trade creditors	9E	9 354	9 354	9 126	9 126
Grant received in advance	9F	293	293	50	50
Interest bearing liabilities	9A	2 744	2 744	2 614	2 614
Other	9G	713	713	782	782
Total financial liabilities		13 104	13 104	12 572	12 572

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

22 Financial instruments (continued)

(c) Net fair values of financial assets and liabilities (continued)

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

ANSTO's maximum exposures to credit risk at reporting date in relation to each class of recognised financial assets is the carrying amount of those assets as indicated in the Balance Sheet.

23 Overseas Pension Schemes

A number of defined benefit pension/superannuation schemes are maintained at overseas Australian Government posts for the benefit of local engaged staff. The Department of Foreign Affairs and Trade (Department) maintains such a scheme for local staff formerly employed by ANSTO in London.

The amounts recognised in the balance sheet are as follows:

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
Present value of funded obligations	-	129
Fair value of plan assets	-	110
Net liability in balance sheet	-	19
Movements in the net liability recognised in the balance sheet as follows:		
Net liability at the start of the year	19	10
Exchange differences on foreign plans		(1)
Net expense recognised in the income statement	-	14
Contributions	-	(4)
Transfer of benefit	(19)	-
Net liability at the end of the year	-	19

FINANCIAL STATEMENTS 2005-06

Notes to and forming part of the Financial Statements for the year ended 30 June 2006

	FINANCIAL YEAR	
	2006 \$'000	2005 \$'000
Principal actuarial assumptions at the reporting date (expressed as weighted averages):		
Discount rate at 30 June 2006	0.00%	5.00%
Expected return on assets at 30 June 2006	0.00%	7.50%
Salary Growth	0.00%	4.50%
Price Inflation	0.00%	2.50%
Pension growth	0.00%	2.50%

The Department has a pension scheme for locally engaged staff at its post in London.

The pension scheme is a defined benefit which is linked to employee's final salaries.

The Department recognises actuarial gains or losses immediately as per AASB 119.

As of the 1 July 2005 the pension scheme was transferred to the Department of Foreign Affairs and Trade administered accounts.

24 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.

APPENDICES



APPENDIX 1

Equality of Employment Opportunity

Objectives

1. To ensure that Equal Employment Opportunity (EEO) principles and practices are actively incorporated into all people management practices.
2. To ensure that the structures and processes used to implement EEO adjust to changing employment needs.
3. To confirm and communicate the vision that ANSTO's employment activities reflect ANSTO's values.

ANSTO actively seeks to implement EEO and diversity principles in its management practices. Human resource processes and systems were reviewed and documented as part of ISO 9001 certification and EEO practices have been included in these processes. All new employees are introduced

to the principles of EEO as part of their induction program.

While there is a predominance of male employees in ANSTO, women are relatively well represented in key management and research scientist roles.

ANSTO has sought to accommodate employees seeking part-time employment wherever feasible, and it is noted that this has been utilised by both male and female employees.

Access to parental leave has been improved via new provisions, which also provide for increased paid maternity leave.

All employees and their families continue to have access to the services of counsellors through the Employee Assistance Program, provided as an employee benefit through an external provider.

Staff in specific employment categories

This information is based on data obtained from 914 staff.

Note: Staff had the option of choosing not to provide information when answering questions.

	Number employed		% of total staff		Average salary	
	2004-05	2005-06	2004-05	2005-06	2004-05	2005-06
Female	208	232	24%	25%	\$53 074	\$53 777
Male	652	682	76%	75%	\$63 042	\$65 708

	Number employed		% of total staff		Average salary	
	2004-05	2005-6	2004-05	2005-06	2004-05	2005-06
People with disabilities	15	18	2%	1.9%	\$56 034	\$56 998
Aboriginal and Torres Strait Islanders	8	10	0.9%	1.09%	\$53 213	\$57 125
Non-English speaking background	22	33	2.4%	3.6%	\$61 096	\$61 956

APPENDIX 2

Freedom of Information

In compliance with Section 8 of the *Freedom of Information Act 1982*, the following is the annual statement on consultative arrangements, categories of documents maintained, and facilities and procedures for access to documents relating to ANSTO.

Details of the functions of the organisation, membership of the Board and decision-making powers of the Board and the Executive are provided elsewhere in the annual report.

Arrangements for external participation

Liaison groups

A technical advisory committee advises the ANSTO Board on the quality and the relevance of the portfolio of research projects being undertaken at ANSTO. The committee provides an expert overview of the research and also advises on any matters affecting the quality of the research outputs as observed by the Committee. Members are drawn from both Australia and overseas.

The Local Liaison Working Party (LLWP), established in 1967, comprises representatives from the NSW Police, Ambulance, Fire Brigades, Rural Fire Service, the NSW Department of Environment and Conservation, the NSW Department of Health, the Australian Federal Police, the Georges River District Emergency Management Officer, the State Emergency Management Committee, the State Emergency Service, Sutherland Shire Council and ANSTO, as well as an observer from the Australian Radiation Protection and Nuclear Safety Agency. The LLWP reviews procedures applicable to a potential accident at the Lucas Heights Science and Technology

Centre (where ANSTO is located) that could have implications for the public.

The ANSTO Health, Safety and Environment Committee provides an overview of the safety and environmental arrangements for ANSTO activities and compliance with the ARPANSA regulations. It is chaired by an external member with extensive safety experience who works with Airservices Australia and has one other external member with wide experience in safety and environmental management who is a past Chairman of the Queensland Mines Rescue Service.

ANSTO state government arrangements

As it is located in New South Wales, ANSTO liaises with a range of NSW departments and authorities responsible for safety, environmental planning and related matters.

Associated organisations

The Australian Institute of Nuclear Science and Engineering, an association of ANSTO, the Institute of Geological and Nuclear Science (NZ) and 39 universities, arranges access by staff and students of Australasian universities to the major facilities at ANSTO.

Other arrangements

Less formal arrangements exist for promoting discussions, the exchange of views and/or collaboration with organisations outside the Commonwealth administration. These organisations include local government authorities, universities, standards bodies, professional societies, unions and staff associations, industrial groups and international nuclear agencies.

APPENDIX 2

Freedom of Information

Categories of documents held

Computer software packages, computer printouts, technical books and reports, and International Nuclear Information System documents are available for purchase. Single copies of the annual report, *Nuclear Matters*, strategic plans, ANSTO emergency plans, environmental monitoring reports, general information literature and videos (under loan arrangements) are available on request.

Documents relating to decision-making processes include Cabinet documents about matters in which ANSTO has an interest; ministerial correspondence and directions; ANSTO Board agenda, memoranda and decisions; deeds, legal contracts and formal agreements; minutes and submissions; employment, delegations, security, finance and accounting handbooks and manuals.

General correspondence includes ministerial briefs; speeches; conference papers for national and international meetings; parliamentary questions and answers; cables, telexes and facsimiles; and general records files. Technical documents held include scientific and technical reports and laboratory notes comprising patents and inventions; computer media; plant and equipment operating manuals; maintenance, quality assurance and safety manuals; reactor operating authorisations, records and log books; radioisotope quality control procedures manuals; radioisotope catalogues and price lists; engineering service general records; nuclear material movement vouchers and accounting records; photographs; and radiographs. Health and safety documents include staff medical records; safety-related survey records; film badge and radiological

records; accident reports; and emergency response procedures.

Administration documents held include personnel records such as staff promotion files; organisation and establishment reports; compensation files; computer media with administrative instructions and information storage; staff lists and classifications; accounting records; pay-roll, flexitime and overtime records; tender and contract documents; building plans, specifications and instructions; directives; orders; memoranda; bulletins; notices; and information. Other documents held include drawing office records such as plans, microfilm, drawings, maps and photographs.

Facilities for access

By arrangement, FOI inquirers can peruse information in the Reception and Information Centre at the entrance to the Lucas Heights Science and Technology Centre. Other arrangements for access may be made by contacting the FOI Coordinator, ANSTO, Private Mail Bag 1, Menai, NSW 2234, Australia (email samantha.thorogood@ansto.gov.au).

ANSTO also has a free enquiry service for members of the public requiring information about the Organisation and its research, called the Community Right to Know Charter. Interested parties are encouraged to contact enquiries@ansto.gov.au for any information.

Information about ANSTO is available on the internet through the organisation's homepage at www.ansto.gov.au.

The ANSTO Chief of Operations has been appointed as an authorised officer under Section 23 of the *FOI Act*.

APPENDIX 3

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*, 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

(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:

APPENDIX 3

Functions and powers of the organisation under the ANSTO Act

- (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 co-operate 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.
- (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.
- (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;
 - (b) for purposes for which it is appropriate for the Parliament as the national Parliament of Australia to authorise the Organisation to perform functions;
 - (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;
 - (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;
 - (e) for purposes related to external affairs; and
 - (f) for purposes in or in relation to a Territory.

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 4

Replacement Research Reactor Environmental Impact Assessment Status Report

Twelfth status report on the implementation of the conditions arising from the environmental impact assessment of the replacement research reactor at Lucas Heights. Submitted to the Minister for the Environment and Heritage by the Australian Nuclear Science and Technology Organisation

March 2006

Introduction

The then Minister for the Environment and Heritage indicated in a Media Release on 30 March 1999 that he had decided that there were no environmental reasons, including on safety, health, hazard or risk grounds, to prevent construction of the replacement research reactor at Lucas Heights, subject to a number of conditions. On 3 May 1999, the then Minister for Industry, Science and Resources announced that he had accepted the Minister for the Environment's recommendations, and noted that their implementation will ensure that the replacement reactor at Lucas Heights is built and operated in accordance with best international practice.

This is the twelfth report to the Minister for the Environment and Heritage on the status of ANSTO's implementation of the 29 conditions arising from the environmental approval for the replacement research reactor at Lucas Heights. This report is required by Condition 29. Subsequent reports will be completed on a six-monthly basis until such time that the Minister is satisfied that all conditions have been satisfied.

A significant milestone was reached with the commencement of Cold Commissioning (Stage A Commissioning) on 13 February 2006. This involves the testing of all reactor systems and

equipment without fuel being loaded. During cold commissioning, INVAP and ANSTO check that all systems operate and perform as expected. Inspectors from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) are observing the process, and at its conclusion ANSTO will provide the CEO of ARPANSA with detailed results.

As previously reported, INVAP submitted revision 10 of the Contract Master Schedule in April 2005. This schedule indicated that the Project Completion Date should be extended by six months, from July 2006 to January 2007. ANSTO has recently accepted this schedule, the delay being primarily due to regulatory processes.

Individual Conditions

The 29 approval conditions are given below, and the current status of implementation of each condition is discussed.

1. The construction and operation of the proposed reactor at the Lucas Heights Science and Technology Centre (LHSTC) must be in accordance with the undertakings and commitments provided by the Australian Nuclear Science and Technology Organisation (ANSTO) in the Final Environmental Impact Statement (Replacement Nuclear Research Reactor, 1997/98, Volumes 1, 2 and 3), and as summarised in Chapter 18 of Volume 3. If there is conflict between the ANSTO undertakings and the recommendations below, the recommendations will take precedence.

Compliance with all undertakings and commitments given by ANSTO within the EIS was a mandatory component of the tender

process. INVAP demonstrated that it would comply with those EIS undertakings and commitments through all phases of the replacement reactor project, and compliance with those EIS undertakings and commitments is now part of the contractual arrangements. Construction commitments, as documented in Chapter 18 of the EIS Volume 3, were included in the Construction Environmental Management Plan (CEMP) (see Condition 2) in the form of a checklist. This checklist provides a direct reference between the EIS commitments and the actions taken during construction to ensure compliance.

2. ANSTO must prepare a construction environmental management plan (EMP), to the satisfaction of the Minister for the Environment and Heritage, prior to construction commencing. The EMP will address all commitments and undertakings made by the proponent for environmental management during construction, and as summarised in Chapter 18 (Volume 3) of the Final Environmental Impact Statement. The following associated recommendations must also be addressed:

- *an Erosion and Sedimentation Control Plan must be prepared as part of the EMP. Measures proposed to be implemented must be referred to the NSW Environment Protection Authority (EPA) and the NSW Department of Land and Water Conservation for comment prior to their adoption in the EMP. The Plan shall conform with the principles and objectives of the following NSW EPA handbooks:*
 - *Managing Urban Stormwater: Treatment Techniques 1997;*

- *Managing Urban Stormwater: Soils and Construction 1998; and*
- *Managing Urban Stormwater: Source Control (draft release 1998);*
- *a Remedial Action Plan must be developed, as part of the EMP, in accordance with NSW EPA guidelines for the treatment of hydrocarbon-impacted soil. Any requirements for off-site disposal of contaminated soils must be to the satisfaction of the NSW EPA;*
- *an Air Quality Management Plan must be prepared, as part of the EMP, in consultation with the NSW EPA and the NSW Department of Land and Water Conservation. A primary objective of the Plan will be to ensure that particulate levels at the nearest residence are below 50 µg m-3 (PM10) during construction works;*
- *appropriate works must be installed to protect the identified Aboriginal shelter site (PAD 1) from construction water run-off and sediment. Provision will be made in the EMP for liaison between the proposed ANSTO EMP Environmental Officer and the NSW National Parks and Wildlife Service concerning environmental management in the vicinity of the site, if required;*
- *a Noise Management Control Plan must be prepared, as part of the EMP, with the objective of ensuring that noise impacts to the public are minimised. The Plan must be prepared to meet NSW EPA requirements;*
- *the EMP must include a comprehensive monitoring program to ensure that run-off and discharges from the construction*

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Replacement Research Reactor Environmental Impact Assessment Status Report

site meet nutrient, sediment and other surface water quality criteria for protection of the environment. At least 12 months baseline data must be collected prior to construction works commencing. The program will include measures to be implemented should acceptability criteria be exceeded; and

- *a program of groundwater monitoring must commence at least twelve months prior to construction commencing. This program will be detailed in the EMP. Prior to construction commencing, an independent report reviewing the results of the program and requirements for further monitoring during construction and operation of the reactor must be prepared (see also Recommendation 11 below). This report must be submitted to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Department of the Environment and Heritage for agreement.*

As noted above, the Minister for the Environment and Heritage approved the Construction Environmental Management Plan (CEMP) in April 2002. The CEMP was reviewed in November 2004, and no significant changes were required.

See response to Condition 11 for discussion of groundwater monitoring.

3. ANSTO must consult with the NSW Roads and Traffic Authority to determine if upgrading of the intersection between New Illawarra Road and the LHSTC entrance is needed, in particular extension of the southbound deceleration lane. Any works

required will be completed prior to construction commencing and at ANSTO's expense.

The Department of the Environment and Heritage advised on 27 March 2002 that they regarded this condition as having been satisfied.

4. Monitoring of water quality must continue into the operational phase until sufficient data has been collected to indicate that the site, and stormwater run-off, has stabilised.

This condition flows on from Condition 2. The water quality monitoring program will continue into the operational phase until sufficient data has been collected to indicate that the site, and stormwater run-off, has stabilised.

5. A Stormwater Control Plan must be developed during the design stage to ensure that the site system is constructed to current best practice and in accordance with NSW EPA guidelines. The plan will also consider options for containment of one-off larger volume spills, such as fire fighting foams. The plan must be prepared to the satisfaction of the Department of the Environment and Heritage.

As advised in the fourth report, the Department of the Environment and Heritage has advised that they are satisfied that the site Stormwater Control Plan fulfils the requirements of this condition. The Stormwater Control Plan was reviewed in November 2004, and no significant changes were required.

6. ANSTO must review the Lucas Heights Buffer Zone Plan of Management (1986), in consultation with relevant stakeholders, to

ensure measures required for the protection of the environment during the construction and operation of the proposed replacement reactor are implemented, and to ensure that the biological and conservation values of the buffer zone are maintained. The revised plan must be prepared to the satisfaction of the Department of the Environment and Heritage.

As advised in the fourth report, the Department of the Environment and Heritage has advised that they are satisfied that the revised Buffer Zone Plan of Management fulfils the requirements of this condition.

7. Radioactive gaseous emissions discharged via stacks from buildings associated with radiopharmaceutical production (primarily Buildings 23 and 54) must not increase above existing levels regardless of any future production increases. This requirement should be recognised by ARPANSA as part of its licensing of emissions from radiopharmaceutical facilities at the LHSTC. The objective of this approach is to ensure implementation of existing and emergent technologies to further contain or reduce such emissions.

Emissions have remained above the levels achieved in 2000. However, the levels have been well below the ARPANSA release limits. During this reporting period, there were a few instances when releases exceeded notification levels, and ARPANSA was notified accordingly.

However, there has been steady progress on the collection and collation of data to schedule the processes so that emission levels are always under notification levels. This is discussed further in our response to Condition 8.

8. ANSTO, in consultation with ARPANSA, should re-examine the issue of coordination and timing of processes which give rise to gaseous emissions from stacks with a view to minimising the impacts of radioactive gaseous discharges, to the extent practicable.

As previously reported, a continuous monitoring system has operated on the B54 stack over several years, recording specific noble gas releases at approximately 15 minute intervals, and has proven its capacity to feed back to the production process. This work on timing of process steps in Building 54 has resulted in a reduction in airborne emissions.

Similar equipment installed on critical stacks at LHSTC (HIFAR stacks and Building 23a) and also at the National Medical Cyclotron continues to undergo testing and commissioning. Hardware commissioning is well advanced, and software development and testing is ongoing.

9. A review of the method of molybdenum-99 production process must be undertaken by ANSTO, in consultation with ARPANSA, to investigate means whereby the isotope can be produced and isolated with decreased releases of subsidiary radioactive waste products. This should be completed to the satisfaction of ARPANSA.

As previously reported, the Mo-99 production process has been thoroughly reviewed, and a new process identified that will enable ANSTO to meet increasing demand for technetium-99m whilst reducing emissions.

Since the last report, the Mo-99 project team has addressed issues that arose out of the HAZOP (Hazard and Operability) study undertaken in 2005, and has almost completed the detailed design of the plant. These

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Replacement Research Reactor Environmental Impact Assessment Status Report

activities enabled finalisation of the Stage 1 Submission to ARPANSA, transmitted in January 2006. Dialogue with ARPANSA on that submission is ongoing. We expect to provide the Stage 2 Submission to ARPANSA by the end of May 2006.

Upgrading of ANSTO's building 54 is well advanced and scheduled for completion in mid-2006. Commissioning of the new plant is – subject to ARPANSA approval – expected to commence in September 2006.

10. A high priority must be given to the review and licensing of radioactive waste discharges to sewer by ANSTO. As part of this, ANSTO should be required to undertake further assessment and analysis to ensure that all possible exposure pathways and future events at the Cronulla Sewage Treatment Plant are taken into account. Monitoring and assessment of individual discharges within the LHSTC is also desirable, to enable understanding of the various sources and their relative contributions. This assessment must be prepared to the satisfaction of ARPANSA and prior to reactor operations commencing.

As previously reported, this condition has been satisfied.

11. As part of the groundwater monitoring program (see Recommendation 2 above), ANSTO must establish bores at appropriate locations in the LHSTC and the buffer zone to ensure coverage of contaminants from the site overall and aquifer flows downstream of the proposed reactor. The locations and monitoring regimes must be agreed with ARPANSA.

As previously reported, this condition has been satisfied.

12. ANSTO must consult with ARPANSA with a view to establishing a radiological site characterisation, or 'footprint' for the reactor site and LHSTC/buffer zone in general. The objective of this characterisation is to provide a fundamental basis for ongoing radiological monitoring programs and the detection of radiological trends over time. The current radiological monitoring should be reviewed on the basis of the site characterisation. The characterisation and monitoring review must be completed prior to commissioning of the proposed reactor.

As previously reported, this condition has been satisfied.

13. The Preliminary Safety Analysis Report (PSAR), to be prepared at the detailed design stage, must be subject to independent peer review to the satisfaction of ARPANSA.

As previously reported, this condition has been satisfied.

14. The assumptions used in deriving the Reference Accident effectively constitute design parameters for the proposed reactor and must be incorporated in the final design to the satisfaction of ARPANSA. In the event of changes, such that the Reference Accident examined may no longer be valid, agreement to any major design changes must be sought from the Minister for the Environment and Heritage prior to design finalisation.

As previously reported, this condition has been satisfied.

15. The PSAR must demonstrate that the design of reactor components (eg reactor pool, beam tube penetrations) effectively excludes the failure of these components for earthquakes of lower frequency than the design basis earthquake, to rule out a fast loss of coolant accident as a credible incident. This will need to be demonstrated to the satisfaction of ARPANSA.

As previously reported, this condition has been satisfied.

16. The consequences resulting from loss of off-site electricity for water supply and fire fighting purposes must be examined as part of the PSAR. If risks are significant, on-site power provisions for water pumps should be provided to the satisfaction of ARPANSA.

As previously reported, this condition has been satisfied.

17. The safety implications of an inter-linked store for spent fuel elements must be assessed in detail in the PSAR, to the satisfaction of ARPANSA.

As previously reported, this condition has been satisfied.

18. The final design of the reactor should include a fixed and possibly automatic fire suppression system within the containment building, to the satisfaction of ARPANSA. The PSAR should also examine the need for a drencher system for the cooling towers.

As previously reported, this condition has been satisfied.

19. The risk of a common mode failure involving both HIFAR and the replacement reactor during the commissioning period,

and resourcing requirements to ensure adequate infrastructure and staffing safety, must be addressed as part of the PSAR to the satisfaction of ARPANSA. The results of the PSAR analysis should also be reflected in emergency plans.

As previously reported, this condition has been satisfied.

20. In the event of dual operation occurring for a longer period than six months, ANSTO must obtain separate approval and authorisation from ARPANSA. This authorisation should specify safety, infrastructure and occupational requirements to ensure that doses are minimised during any extended commissioning period.

ANSTO does not expect the period of dual operation to be longer than six months. If required, it will be subject to authorisation by ARPANSA.

21. The Safety Analysis Report for the reactor must include provision for ongoing monitoring and audit of the frequency and severity of external events to ensure that assessed risks to the replacement reactor remain valid and acceptable, taking into account new developments in the vicinity of the reactor over time.

External events were analysed in the PSAR, and were subsequently revisited in the Safety Analysis Report submitted to ARPANSA as part of the Application for the Facility Licence, Operating Authorisation, and will be further analysed at regular intervals during operation. The results of these analyses have been, and will be, subject to review by ARPANSA.

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22. Existing emergency plans and arrangements must be updated and subject to independent review at the detailed design stage and prior to the proposed reactor becoming operational. This must be completed to the satisfaction of ARPANSA. The independent review of the plans should include opportunities for input by relevant State emergency agencies and the general public.

An independent review of the emergency plans and arrangements has been undertaken by Emergency Management Australia, in accordance with this condition. The results of that review were taken into account in finalising the emergency plan which forms part of the application for an operating licence for the replacement research reactor.

Periodic review of emergency management plans will continue throughout the life of the replacement reactor.

As previously reported, in November 2003 NSW authorities announced a change in responsibilities for emergency planning for the LHSTC, with the State Emergency Management Committee now assuming those responsibilities from Sutherland Local Emergency Management Committee. Revised emergency plans were issued by the NSW Government in November 2005.

23. The emergency management plan must also include a specific plan aimed at facilitating community understanding of credible hazards and risks from the reactor, mitigation measures, emergency arrangements and implications for the community. The plan should consider the best combination of media to achieve the

above objectives. The plan must be prepared to the satisfaction of the Minister for the Environment and Heritage, in consultation with the Minister for Industry, Science and Resources and the Minister for Health, prior to the reactor being commissioned.

The NSW Government has taken responsibility for providing public information about the revised emergency plans.

24. ANSTO must develop a specific program for ongoing community consultation and dissemination of information during the design, construction and commissioning phases of the reactor, to the satisfaction of the Minister for the Environment and Heritage.

In July 2001 the then Minister for the Environment and Heritage advised that he was satisfied with the draft community information program, and the results of that programme have been previously reported.

However, in order to specifically ensure ongoing community consultation and dissemination of information related to OPAL and ANSTO's operations more generally, an external company was engaged to work with ANSTO officers in facilitating an ongoing series of Community Discussions. To date, five of these Discussions have been held, in June and September 2004, March and October 2005 and March 2006, in order to provide information to the local community and to invite any questions about the reactor or any other aspects of ANSTO operations.

These Discussions were widely advertised throughout surrounding areas, and parties previously identified as having an interest in

ANSTO and OPAL were directly invited. The aim of using external facilitators is to ensure that all participants feel engaged and comfortable in contributing to the discussions and asking questions. Various issues of concern were noted during the Discussions, and questions asked and the answers have been published on the ANSTO web site. The next Discussion will take place in September 2006.

Presentations have also been given to sixteen community groups since March 2005, and we have undertaken four mail outs to about 5,000 recipients, many of whom are local residents, of our 'News Flash', a regular publication that contains stories on ANSTO work and research, often related to OPAL. We have also attended large community events in the Sutherland, Liverpool and Wollongong areas since March, where we have disseminated information on our operations. Our focus on providing resources to teachers Australia-wide and supporting science teachers associations in most states has met with very positive responses. Our customised site tours continue to attract a large number of schools, community groups and individuals to the ANSTO site.

25. A high priority must be given by ANSTO to finalising a 'Community Right to Know Charter' between ANSTO and the community. This charter, as a minimum, must establish principles for information exchange, the obligations of parties in providing and using information, timely mechanisms for dispute resolution, and a process for periodic review and update. The use of a recognised mediator to facilitate completion of the charter should be considered. If a charter has not been

agreed within 12 months of the date of these recommendations, the outstanding issues of dispute should be referred to the Minister for the Environment and Heritage for resolution, in consultation with the Minister for Industry, Science and Resources and the Minister for Health.

As previously reported, this condition has been satisfied.

26. Reactor construction should not be authorised until arrangements for the management of spent fuel rods from the replacement reactor have been demonstrated to the satisfaction of ARPANSA and the Minister for the Environment and Heritage.

As previously reported, this condition has been satisfied.

27. The Minister for Industry, Science and Resources and the Minister for Health should give timely consideration to strategies for the long term management and eventual permanent disposal of Australia's long-term intermediate-level nuclear wastes, and associated issues.

This is not a matter for which ANSTO is responsible. The responsibility for the Commonwealth radioactive waste management facilities rests with the Department of Education, Science and Training (DEST). As announced by the Minister for Education, Science and Training on 15th July 2005, the Department is currently examining three sites on Commonwealth land in the Northern Territory for the establishment of a suitable facility, referred to as the Commonwealth Radioactive Waste

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Replacement Research Reactor Environmental Impact Assessment Status Report

Management Facility (CRWMF). Those examinations may also encompass any site or sites nominated by the Northern Territory Government or a Land Council. In examining those sites, it is the intention of the Australian Government to co-locate the Commonwealth low level waste facility with the Commonwealth store for intermediate level waste. Whilst this is a matter beyond ANSTO's control, we note that the adoption of the Commonwealth Radioactive Waste Management Act 2005 and DEST advice indicates the Government's strong political, budgetary and legislative commitment to the CRWMF.

28. ANSTO must continue, as a high priority, to review and upgrade its environmental management systems (EMS) to achieve ISO 14000 standards. The EMS should be certified by a suitably accredited independent body and be in place prior to the replacement reactor being commissioned.

As previously reported, this condition has now been satisfied.

29. ANSTO must report to the Minister for the Environment and Heritage on measures taken, or to be taken, to implement the above recommendations, including the undertakings and commitments referred to at Recommendation 1. This is to be done by way of an initial written report to the Minister prior to construction commencing and thereafter at six monthly intervals until all recommendations have been addressed to the satisfaction of the Minister for the Environment and Heritage. These reports must be made publicly available by ANSTO, following their acceptance by the Minister.

This report constitutes the twelfth report to the Minister for Environment and Heritage as provided by this condition. Previous reports have been published on the ANSTO web site following their acceptance by the Minister.

APPENDIX 5

Ecologically sustainable development and environmental protection

Ecologically sustainable development and environmental protection

This appendix constitutes ANSTO's report on its performance in relation to ecologically sustainable development and environmental matters as required under Section 516A of the *Environment Protection and Biodiversity Conservation Act 1999*.

Environmental sustainability principles embedded

ANSTO's commitment to environmental protection and sustainability principles is embedded at the highest level, in our Health, Safety and Environment Policy, which places the protection of human health and safety and the environment as ANSTO's highest priority. The organisation has defined strategic directions and maps its social, economic and environmental core values. These priorities are integral to ANSTO's Business Management System – the framework that defines how we conduct our business and deliver outcomes to our customers and stakeholders in a safe, consistent and environmentally responsible manner. Specific local arrangements and objectives for protecting human health, safeguarding our operations and minimising our environmental footprint derive from these overarching documents. The measures adopted to achieve our environmental commitments are documented in environmental management plans that underpin ANSTO's ISO 14001 compliant Environmental Management System.

Monitoring and reporting environmental performance

Under the Health, Safety and Environment Policy, we commit to providing verifiable evidence that ANSTO has fulfilled the policy's objectives. This is done through a comprehensive program of monitoring and auditing. The details of the environmental sampling and measurement program, together with its results, are published in a series of annual reports entitled *Environmental and Effluent Monitoring at ANSTO Sites*.

At an operational level, the Environmental Management Committee (EMC) oversees the EMS, reviewing incidents, documentation, internal and external audits and monitoring compliance. It reports to an independent committee – the ANSTO Health, Safety and Environment Committee – which includes external members as well as ANSTO general managers and senior staff. In 2005-06, the AHSEC and EMC met three and eight times, respectively.

Whilst ANSTO's reporting of health and safety performance indicators is well-established, the development of key performance indicators for the environmental aspects of the organisation's activities has been an important focus over the course of the year. This will enable our senior management and Board to better monitor ANSTO's achievements against environmental and other performance targets.

APPENDIX 5

Ecologically sustainable development and environmental protection

ANSTO has released its second Corporate and Social Responsibility report, which focuses on the ways in which we respond to environmental, safety and social issues that affect staff, the Australian community, our customers and other stakeholders. We also report annually to the Department of Environment and Heritage about any of our activities that fall under the National Environmental Protection Measures. Overall, ANSTO commits significant resources to the effective monitoring, management and reporting of its environmental impacts and responsibilities.

Measures that ANSTO takes to manage its environmental impacts include:

- maintaining and developing an environmental management system certified to ISO 14001
- formal consideration of safety and environmental aspects prior to undertaking any new operational activities
- formal review of ongoing operations to ensure that all environmental aspects and their controls are identified
- reducing the number of private vehicles used by staff through providing bus services to local railway stations.

Positive effects arising from ANSTO's activities:

- undertaking research into significant environmental issues that include climate change, acid mine drainage and purification of waste water. This contributes to the body of scientific knowledge and improves environmental outcomes.

Finally, ANSTO's commitment to ecologically sustainable development means that we place special emphasis on reducing waste, recycling and minimising the consumption of electricity and water. 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 6

Commonwealth Disability Strategy

ANSTO's primary role under the Commonwealth Disability Strategy is as an employer, and as such we are committed to equity and fairness in the workplace and in our recruitment practices.

All our job advertisements state that ANSTO is an equal opportunity employer. All new employees are made aware of our practices during induction and in our orientation program. All employees participate in our compulsory on-line compliance training covering workplace rights and wrongs, privacy, ethics and bullying.

Our human resources policies, which include our approach to employees with disabilities, are incorporated into ANSTO's Business Management System and are available to employees online.

Formal complaints and grievance processes are set out in ANSTO's 2006 Enterprise Agreement. It is through this Agreement that any complaints or grievances raised by people with disabilities in relation to ANSTO's employment practices may be directed. ANSTO also has a separate whistleblower directive which safeguards any employee who seeks to raise a complaint or grievance. The Agreement also contains a supported wage arrangement for employees with disabilities. We maintain a network of internal contact officers with whom difficulties may be discussed.

All staff have access to an independent employee assistance program, which is publicised throughout the organisation. ANSTO has secondary roles as a policy adviser and as a regulator.

As a policy adviser, we consider what effect our products and services may have on people with disabilities, and we provide explanatory information where required.

As a regulator, we ensure that internal policies and procedures comply with the relevant legislation and that staff are kept informed of requirements under organisational policy.

APPENDIX 7

Research Performance Assessment

ANSTO agreed to assess its research performance as part of its 2004-07 Triennium Funding Agreement. The TFA set out four aspects to this assessment:

1. Quality of research
2. Systems for ensuring research quality and achievements
3. The application and/or dissemination of research outputs
4. The development of researchers.

ANSTO developed the assessment procedures in close consultation with CSIRO and the Australian Institute of Marine Science and in the context of development of the Research Quality Framework. The process was approved by Minister Nelson, as the then Minister for Education, Science and Training.

Assessment process

The process began in July 2005 when a call for individual evidence portfolios was issued to all ANSTO researchers. Evidence portfolios were received from 138 staff. This was more than 95% of researchers who are formally defined as such and included early career researchers and a number of professional scientific staff who chose to participate in the process.

Evidence portfolios addressed both quality and impact of research. Researchers provided examples of up to four research outputs produced within the period beginning 1 January 2000.

The evidence portfolios were assessed by independent international experts whose fields correlated with those of the individual researchers. Assessors were asked to rate the quality and impact of the research to give an overall rating (see box overleaf for ranking

scale). As much as possible, assessors examined more than one portfolio and each portfolio was examined by at least two assessors.

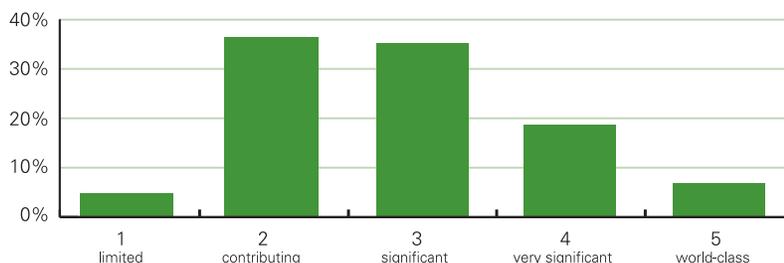
Assessments were aggregated into clusters – typically comprising 10 to 15 researchers – within each research institute. Leaders of each cluster analysed the aggregated rankings and assessed the cluster against its competition. The institute head also prepared an overall report for the panel. These analyses were reviewed by external panels convened for this purpose. Of the total of 17 panel members, nine were from overseas. Each panel was chaired by a member of ANSTO's Technical Advisory Committee.

The TAC met on 18–20 April 2006 to consider the reports of those panels, along with reports on ANSTO's systems for managing research, application and dissemination of research, and development of researchers. The TAC also met with the organisation's Executive Director, Chief of Research, Chief of Operations, heads of its research institutes, the coordinator of its National Interest and Capability Enhancement research theme, and managers with responsibility for research management systems, human resources and dissemination of research to industry, government and the community.

The TAC prepared a report on its overall findings and presented this to the Board on 20 April. Overall, the TAC regarded the assessment process as well designed and executed. It strongly endorsed the objective in ANSTO's Strategic Directions for 2005–10 that:

“Through research quality assessment, ANSTO will demonstrate research quality and productivity that are comparable with best-in-class peers within five years of its first assessment.”

The aggregation of assessment rankings of ANSTO research staff



The Board accepted all of the TAC's findings and recommendations. The Board is committed to ensuring that the recommendations of the TAC and the institute review panels are implemented.

Results

Quality of research

The aggregation of assessment rankings of ANSTO research staff is shown in the table above.

The TAC's primary finding regarding the aggregation of rankings was that:

"the overall assessment profile is consistent with expectations for a high-quality research institution of the nature of ANSTO. For example, the aggregated external assessment places approximately 60% of ANSTO staff in the top 25% internationally. The distribution of assessments reflects the breadth of activities within the research portfolio and the stages of growth of the organisation, staff and projects."

Nonetheless, the committee said that further improvements must be sought and made recommendations to that effect.

Systems for ensuring research quality and achievements

ANSTO's research management systems were

considered by the TAC to be "robust, thorough and appropriate for the purpose." It noted the improvements in recent years.

Application and dissemination of research outputs

The TAC found that, "processes for internal review, publication and presentation of results of scientific research are successfully promoted and monitored by research management at all levels." It highlighted the establishment of Access ANSTO as a major step forward for relationship with industry. The processes for communicating with government and the community were considered to be "entirely appropriate."

Development of researchers

The TAC reported that the "systems that are now in place for the development of ANSTO researchers are eminently satisfactory." However, the committee emphasised the importance of effective implementation, the need for appropriate succession planning, the benefits of a more formal scheme for support of postgraduate students complementary to that for postdoctoral fellows and recommended the development of a strategic framework for researcher training.

APPENDIX 7

Research Performance Assessment

Actions for follow-up

ANSTO will undertake a similar research performance assessment in four years. In the interim the TAC will continue to meet annually and institute and project reviews will be undertaken regularly.

Based on the assessment of ANSTO's research performance undertaken in 2006, ANSTO will report in its subsequent annual reports on:

- Appointments of key management and research project staff
- Establishment, evolution, operation and quality of organisation-to-organisation collaborative agreements

- Consolidation of long-term and strategic partnerships
- Project monitoring
- The framework for staff development and recruitment
- Postgraduate appointments and subsequent employment
- Developments regarding nuclear science and technology in Australian universities.

This will be in addition to reporting of performance indicators set out in the organisation's TFA and its section of DEST's Portfolio Budget Statement.

Ranking scale

5	World class	Sustained leadership and accomplishment exemplified by outputs that includes highly original work that ranks with the best of its kind. Within the top 5% of the field internationally.
4	Very significant	Making a very significant contribution to the field. Within the top 10% of the field internationally.
3	Significant	Demonstrating a platform of research output that has generated substantial new ideas, interpretations or critical findings and makes an internationally recognised contribution to existing paradigms and practices; within the top 25% of the field internationally.
2	Contributing	Demonstrating a platform of research activity (or developing research activity) and output that is based on a sound/justifiable methodology, and makes a contribution to the research within the discipline and/or to applied knowledge.
1	Limited	The research outputs will have been assessed as either limited significance or impact, contribute little additional understanding or insight in the discipline or field, and/or is considered to be lacking in the appropriate application of theory and/or methods.

APPENDIX 8

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ACRONYMS

AHSEC	ANSTO Health, Safety and Environment Committee
AINSE	Australian Institute of Nuclear Science and Engineering
AMS	Accelerator mass spectrometry
ANAO	Australian National Audit Office
ANSTO	Australian Nuclear Science and Technology Organisation
ANTARES	Australian National Tandem Accelerator for Applied Research
APIA	Australian Pipeline Industry Association
ARI	ANSTO Radiopharmaceuticals and Industrials
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASNO	Australian Safeguards and Non-proliferation Office
ASRP	Australian Synchrotron Research Program
AusAID	Australian Agency for International Development
CAC Act	Commonwealth Authorities and Companies Act 1997
CBRN	Chemical biological radiological and nuclear
CEMP	Construction Environmental Management Plan
CNEA	Argentine Atomic Energy Commission
CRC	Cooperative Research Centre
CRWMF	Commonwealth Radioactive Waste Management Facility
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CT	Computerised Tomography
DEST	Department of Education, Science and Training
EEO	Equal Employment Opportunity
EIS	Environmental impact statement
EMC	Environmental Management Committee
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environment Protection Authority
EUROPART	EUROpean research project for the PARTitioning of minor actinides and some long-lived fission products from high active wastes issuing from the reprocessing of spent nuclear fuels.
FOI	Freedom of Information
HAZMAT	Hazardous Materials
HAZOP	Hazard and Operability study
HIFAR	High Flux Australian Reactor
IAEA	International Atomic Energy Agency
INVAP	Company building OPAL

ISL	International Science Linkages program
ISO	International Organisation for Standardisation
IsoTrans	Isotopic Tracers in Atmospheric Transport
ITER	International Thermonuclear Experimental Reactor
KOALA	Quasi-laué diffractometer
LHSTC	Lucas Heights Science and Technology Centre
LLWP	Local Liaison Working Party
mSv	millisieverts
NH&MRC	National Health and Medical Research Council
NORM	Naturally-occurring radioactive materials
NRP	National Research Priority
OECD	Organisation for Economic Co-operation and Development
OH&S	Occupational health and safety
OPAL	Open Pool Australian Light-water reactor
PACCT	Publicly funded agencies committee on counter terrorism
PET	Positron Emission Tomography
PLATYPUS	Reflectometer instrument
PSAR	Preliminary Safety Analysis Report
QUOKKA	Small-angle neutron scattering instrument
R&D	Research and Development
RCA	Regional Cooperative Agreement
RIP	Resin-in-pulp
RPA	Research Performance Assessment
RQF	Research Quality Framework
RSRS	Regional Security of Radioactive Sources project
RRR	Replacement research reactor
SAXS	Small angle X-ray scattering instrument
SIKA	Cold-neutron 3-axis spectrometer
SmP	Science meets Parliament
STAR	Small Tandem for Applied Research
SXSI	Soft X-ray Synchrotron Instrument
Synroc	Ceramic titanate immobilisation technology
TAC	Technical Advisory Committee
TFA	Triennium Funding Agreement
USDOE	United States Department of Energy

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