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**The Australian Nuclear Association is a Member of the Pacific Nuclear Council & International Nuclear Societies Council, and an Affiliate of the World Nuclear Association**

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# NUCLEAR AUSTRALIA

**NEWSLETTER OF THE  
AUSTRALIAN NUCLEAR ASSOCIATION INC.**

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## **Editorial**

The ANA is pleased to announce the formation of Australian Nuclear Association Queensland Inc due to the initiative of a group of persons in Queensland interested in promoting the peaceful uses of nuclear science and technology in that state. The ANA's committee approved the use of the ANA's name in the incorporation of this organisation in Queensland and wishes it every success. The ANA has entered into a Memorandum of Understanding with the organisation to ensure full cooperation in its activities. The ANA hopes that this initiative will be repeated in other states in which the ANA has a small number of members. For further information on the activities of the group please contact Mr David Burden, the President of ANA Queensland Inc, by email at: [d.burden@clarkekann.com.au](mailto:d.burden@clarkekann.com.au)

The next item of good news is that the Australian Radiation Protection & Nuclear Safety Authority (ARPANSA) has approved the restart of ANSTO's OPAL research reactor with its reload of new nuclear fuel. The new fuel was modified from the original design and produced by CERCA, France, to replace the initial load of fuel supplied by the reactor builder INVAP of Argentina and its contractors.

The \$400M research reactor was shut down in July 2007 just three months after it was opened by the Prime Minister when fuel plates started to become loose. It is expected that the reactor will soon be operating at its full power (see: [www.ansto.gov.au](http://www.ansto.gov.au) for updates). While the reactor was shut down, ANSTO had to import important radiopharmaceuticals from South Africa and Canada at considerable cost, reported to be about \$100,000 per week.

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## **50th Anniversary of HIFAR and 25th Anniversary of the ANA**

A little-advertised event was the 50th Anniversary on 18th April 2008 of the Official Opening of the HIFAR reactor at Lucas Heights by the Prime Minister, the Rt. Hon. R. G. Menzies on 18th April 1958. The reactor first reached criticality on Australia Day, 26 January 1958, and provided excellent services of neutron beams for research and radioisotopes for a variety of applications especially in nuclear medicine before it was closed down in 2007 and replaced by the OPAL reactor.

An important event that will be recognised by the ANA is the 25th Anniversary of the foundation of the ANA on 25th October 1983. The Committee is planning to hold a celebration lunch probably on Thursday, 23rd October, and details of the venue, timing and cost will be advertised in the next newsletter. The ANA's Annual Award will also be presented at the event instead of at the traditional function normally held in December.

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## Progress Report on the Pacific Nuclear Council and 16PBNC

The last meeting of the Pacific Nuclear Council was held in Seoul, Republic of Korea, on 18 April 2008, in association with the Annual Meeting of the Korean Atomic Industrial Forum and the Korean Nuclear Society. Dr Clarence Hardy chaired the PNC meeting as PNC President and was invited by the KAIF to present a plenary paper on "The Role and Activities of the PNC" as well as a technical paper on "Australian Uranium Resources and Production in a World Context".

The PNC dealt with its usual large agenda of items which covered a whole day. Dr Hardy presented the Final Report of the PNC Task Group on Public Information and Education in Nuclear Science & Technology which was approved. The Report will be placed shortly on the PNC website at [www.pacificnuclear.org](http://www.pacificnuclear.org). Dr Hardy has been the leader of this Task Group for the last two years.

There are currently 14 members of the PNC including nuclear societies and non-profit trade organisations in nine countries in the Pacific Basin plus one commercial member from the USA. These represent over 60,000 professionals in nuclear science and technology and 57% of the world's nuclear power reactors. The meeting received an application from the Vietnam Nuclear Society to become a member and this will be decided shortly by a ballot of members.

A special meeting of the PNC Working Group on Advanced Nuclear Power Systems and Nuclear Fuel Cycles was held in Seoul on 16 April and

attended by Dr Hardy. The meeting received detailed reports from Canada, Korea and the USA on their work on these systems which is related to GNEP (Global Nuclear Energy Project). The PNC Working Group will meet again in Anaheim, California, in June to continue its review of this important field.

The final meeting of the PNC for 2008 will be held in Aomori, Northern Japan, on 13 October in association with the 16<sup>th</sup> Pacific Basin Nuclear Conference (see below). Dr Hardy completes his two-year term as President at the PNC meeting.

The 16th Pacific Basin Nuclear Conference (16PBNC) will be hosted by the Atomic Energy Society of Japan and the Japan Atomic Industrial Forum and held at Aomori in northern Japan from 13-17 October 2008. There is a large nuclear centre at Aomori including a reprocessing plant, an enrichment plant and waste management facilities and tours will be arranged to the centre.

The topics include all aspects of nuclear power, the nuclear fuel cycle, applications of isotopes and radiation, research reactors, nuclear education, etc. Abstracts of 390 proposed papers have been accepted. The registration fee is Y80,000 (about A\$800).

Early registration at one of the conference hotels is advised as over 600 persons are expected to attend and Aomori is only a small city. Information on the conference can be obtained from the website: [www.pbnc2008](http://www.pbnc2008) or email: [info@pbnc2008.org](mailto:info@pbnc2008.org)

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## Latest Australian and International News

**ANSTO** - Dr Ian Smith, ANSTO's Chief Executive Officer, has decided against accepting an extension of his four-year contract and his term of appointment will therefore end on 17 May 2008. Dr Ziggy Switkowski, Chair of the ANSTO Board, announced that Dr Ron Cameron, presently Chief of Operations, would be the Acting Chief Executive while an international search is made for a new CEO (See: [www.ansto.gov.au](http://www.ansto.gov.au)).

**New uranium mine for South Australia** - Quasar Resources, an affiliate of Heathgate Resources, has reported "outstanding exploration success" at its Four Mile East deposit in South Australia. There are reported to be three mineralised layers between 190 and 210 m deep with grades up to 1.73%. The company plans to proceed to in-situ mining as soon as a lease is granted, possibly in late 2009, with a planned initial production rate of 680 t U3O8/year.

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Heathgate Resources currently operates the Beverley in-situ mine about 6km away.

**Silex** - Global Laser Enrichment (GLE), a subsidiary of GE-Hitachi, has selected a site at Wilmington, North Carolina, USA, for a potential commercial uranium enrichment plant using the Australian-invented Silex laser isotope separation technology. GE-Hitachi operates a nuclear fuel manufacturing plant at the site. A start up date of 2012 has been suggested *subject to the results of a demonstration test loop now under construction*. A final decision on construction is expected in 2009 for a commercial plant with a capacity of 3.5-6M SWU/year. Editor - This step is a further indication that the company believes that it can commercialise the Silex technology in contrast to many other organisations that have failed to commercialise their forms of laser technology over the last 20 years at a cost of billions of dollars

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**ANA NEWS**  
**TECHNICAL PROGRAM FOR 2008**

The next meeting for 2008 in the combined program of the ANA and Engineers Australia's Nuclear Panel will be held on **Wednesday, 28 May 2008**, in the Engineers Australia Lecture Theatre at 8 Thomas St, Chatswood at 5.30 pm for a 6 pm start (see box)

**“Rebirth of the Russian Nuclear Industry”**

By Dr Clarence Hardy, ANA

**Summary** - Russia has had a long and successful nuclear industry for over 50 years. It has 31 nuclear power stations with seven under construction and eight planned. Russia also has all stages in the nuclear fuel cycle from uranium mining to reprocessing and waste disposal. Last year, under President Putin's direction, the Russian nuclear industry underwent a major reorganisation to enable it to compete more effectively on the world stage. Russia has the largest enrichment capacity in the world and supplies over half of the USA's enrichment requirements. Russia has exported nuclear power stations to China and Iran in recent years based on its experience of over 40 years in building reactors in Russia, Eastern Europe and Finland and plans to build reactors in India. Dr Hardy will review the giant Russian nuclear industry based on briefings he received last year from Russian experts. See how the Russian Bear is stirring.

**Biography** - Dr Hardy has two doctorates, has published over 100 scientific papers, and has given over 100 talks to technical and non-technical audiences in Australia. He had a 40-year career in nuclear science and technology in senior positions in national nuclear laboratories in the UK, USA and Australia. He worked for 20 years from 1971 to 1991 as Chief Scientist at the AAEC/ANSTO's Lucas Heights Research Laboratories. Dr Hardy has been a consultant to the nuclear industry since 1991. He is Secretary of the Australian Nuclear Association and President of the Pacific Nuclear Council, which represents over 60,000 nuclear scientists and engineers in the Pacific Region. Dr Hardy is also Managing Director of Nuclear Fuel Australia Ltd set up in 2007 to examine the feasibility of building an enrichment plant in Australia.

The technical meetings for the rest of 2008 are:

- 26 June Host: ANA at the AINSE Theatre at Lucas Heights at 1 pm.  
**“The World of Molybdenum-99”**  
By Mr Ian Turner, General Manager, ARI, ANSTO
- 23 July Host: Nuclear Panel, Engineers Australia Theatre at 8 Thomas St, Chatswood at 5.30 pm refreshments for 6 pm start.  
**“The Nuclear Research Program at ANSTO”**  
By Dr George Collins, Director, Research, ANSTO
- 28 August Host: **Annual General Meeting** of the ANA at the AINSE Theatre at Lucas Heights at 12.30 pm, followed by talk at 1.00 pm.  
**“Progress on Small and Medium Reactors”**  
By Dr Clarence Hardy, ANA
- 24 Sept. Host: Nuclear Panel, Engineers Australia Theatre at 8 Thomas St, Chatswood, at 5.30 pm refreshments for 6 pm start.  
**“The Australian Synchrotron”**  
By Dr Steve Gower, AS Project, Melbourne
- 23 October Host: ANA at the AINSE Theatre at Lucas Heights at 1 pm.  
**“Mini-Cyclotrons and PET in Australia”**  
(PET is Positron Emission Tomography)  
By Mr Ian Turner, General Manager, ARI, ANSTO
- 23 or 24 October Host: ANA with date, venue and timing to be confirmed.  
**ANA 25<sup>th</sup> Anniversary Lunch and Award Presentation**
- 26 Nov. Host: Nuclear Panel, Engineers Australia Theatre at 8 Thomas St, Chatswood, at 5.30pm refreshments for 6pm start.  
**“Nuclear Education”** (Title to be confirmed)  
By Professor V. G. Agelidis, Univ. of Sydney

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**THE ANNUAL GENERAL MEETING**

The AGM will be held on 28 August in the AINSE Theatre at Lucas Heights at 12.30 pm. Nominations for the positions of President, Vice-President, Secretary, Treasurer and three Committee Members should be sent to the Secretary before 1 July at PO Box 85, Peakhurst, NSW 2210. Nominations for the Annual Award for 2008 are also invited.

**REPORT ON THE MEETING OF THE  
FOUR SOCIETIES, 5 MARCH 2008**

The traditional annual meeting of the four societies, the ANA, the Nuclear Panel of Engineers Australia, the Australian Institute of Energy and the Royal Society of NSW, was addressed by Associate Professor Keith Lovegrove, ANU Department of Engineering, Canberra, and was well attended at the Darlington Centre, University of Sydney. The topic was **“Future Prospects for Large Scale Solar Thermal Power Technologies”**.

Professor Lovegrove reviewed the work overseas and particularly at ANU. Dish concentrators, trough shaped concentrators and central receiver towers with heliostat fields are the basic approaches for solar thermal systems. The last two years has seen a worldwide resurgence in this field. ANU has been working on paraboloidal dish solar concentrators since the early 1970s. Construction has just begun on a new 500m<sup>2</sup> dish prototype that will be the basis for commercial plants by Wizard Pty Ltd which has an exclusive ANU licence.

Professor Lovegrove was very enthusiastic about the prospects for this type of solar thermal system being able to contribute significantly to renewable energy needs especially in Australia. It also has the potential for solar thermo-chemical production of fuels for transport and export because it can provide a high temperature source of energy in a concentrator system.

While several years of further development of large prototypes is needed, Professor Lovegrove was confident that the solar thermal concentrator system could provide continuous electrical energy because it could be coupled to water-based or liquid metal-based energy conversion and storage systems which would continue to operate when the sun was not shining. He also believes that a commercial scale system can produce electricity at a price competitive with wind energy farms or wave energy systems. Time will tell.

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**The Latest News on Synroc**

ANSTO's Synroc technology is to be demonstrated as a way to immobilise a range of radioactive legacy wastes at the US Idaho National Laboratory (see [www.ansto.gov.au](http://www.ansto.gov.au)). One of the wastes is “calcine”, arising from the reprocessing of spent naval fuel. There are 4,400 m<sup>3</sup> to be disposed of safely, possibly eventually at the Yucca Mt site in Nevada. ANSTO will demonstrate its Hot Isostatic Pressing technique on calcine alone and on a calcine-synroc mixture.

**REPORT ON ANA MEETING  
24 APRIL 2008**

Dr Robert Robinson, Director of the Bragg Institute at ANSTO, spoke on the topic of **“The First Results on Neutron Beam Research at the OPAL Reactor”** at 1pm in the AINSE Theatre at Lucas Heights.

Dr Robinson explained that the OPAL research reactor was officially opened by the Prime Minister on 20 April 2007 and operated at its full power of 20MW for the first half of 2007, after which it was shut down for modifications. During that time it produced excellent results in neutron scattering experiments on a range of materials. All of the measured neutron fluxes in the mirror-lined beam tubes exceeded the specifications given to the designer, INVAP of Argentina. Dr Robinson considered that the results were equivalent to the most recent advanced research reactor, FRM2 in Germany, which operates with over 90% enrichment compared with less than 20% in OPAL.

Dr Robinson explained the major pieces of equipment to carry out advanced neutron measurements on samples varying in size from 20mg to 20g or on surfaces and over a range of temperature in some of the equipment. The six operational pieces of equipment have been given typical Australian names, eg. Wombat, Taipan, Quokka, Platypus, Koala and Kowari. A seventh project is named Pelican, but is not yet operational. Most of these are the result of major collaboration with university and other groups in Australia and overseas.

Samples included geological specimens typical of the deep mantle, steels, lithium battery materials, strain testing of welds, and surface coatings.

A “Call for Proposals” sent out in Australia resulted in 81 proposals for 357 beam-days of work over 6 months, and these are all peer reviewed. There is therefore great interest in Australia and also overseas in the capabilities available. The Bragg Institute has been designated as an “IAEA Collaborative Centre for Neutron Scattering Applications”.

Dr Robinson also referred to the Australian Synchrotron in Melbourne which operates in close collaboration with ANSTO and provides complementary research capabilities in the detailed analysis of the structure of materials.

There were a large number of questions and Dr Robinson was congratulated on the excellent progress made in setting up such a comprehensive range of equipment in such a short time. The only problem now is to get OPAL operating again and research results flowing.