



Inquiry into Research Training and Research Workforce Issues in Australian Universities

Submission to the House of Representatives Standing Committee on Industry, Science and Innovation

In this submission, the Australian Nuclear Science and Technology Organisation (ANSTO) aims to highlight the ways in which Government science and technology organisations contribute to research training, in addition to the role that universities play in building the nation's research skills base.

This submission addresses five aspects identified in the Committee's terms of reference for this inquiry, namely:

- The contribution of research training programs to Australia's competitiveness in the areas of science, research and innovation
- The effectiveness of current Commonwealth research training schemes
- The adequacy of current research training schemes to support Australia's anticipated future requirements for tertiary-qualified professionals in a wide range of disciplines
- Opportunities for career advancement for research graduates and staff
- Australia's ability to compete internationally for high quality researchers

Commitment to research training

Research institutions are a major training ground for researchers and higher levels of skills. The *ANSTO Act 1987* mandates the Organisation to be engaged in research training. ANSTO's functions under the Act include:

- (e)(a) 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...
- (j) To arrange for training, and the establishment and award of scientific research studentships and fellowships, in matters related to its activities

ANSTO's Strategic Directions for 2005–10 set out several ways in which the Organisation is improving its research training activities, most notably:

- Building research teams around high profile, effective research leaders, who will also train and develop future research leaders
- Collaborating with universities and other research organisations on joint appointments
- Placing a greater emphasis on our role in training the next generation of scientists and nuclear medicine practitioners through their postgraduate and postdoctoral studies and work

The Organisation's role in research training takes several forms. The primary role is based on its collaborations with universities and enabling university students and academics to use its facilities, notably its research reactor and particle accelerators. ANSTO has also greatly expanded its contribution to postdoctoral research training in recent years and jointly funds research training positions. These activities are discussed in greater detail below.

In addition, ANSTO staff jointly supervise postgraduate research students, complementing the work of university supervisors (ANSTO staff jointly supervised 143 undergraduate or postgraduate students in 2006-07). The Organisation also cofunds joint positions at

selected universities, and approximately one in seven ANSTO researchers hold an adjunct, honorary or similar role at a university, which in many cases includes some teaching or training aspect.

These research training activities are *not* funded through the research training schemes managed by the Department of Education, Employment and Workplace Relations. Rather, ANSTO funds its research training activities through Appropriation. In 2007 the Department of Finance and Administration agreed that ANSTO could amend its outcome-output framework to bring its training and education activities together in a single, dedicated output (Output 3.4) in recognition of this important aspect of ANSTO's functions. This distinction between direct funding of research training programs at universities and research training activities funded in other ways by the Commonwealth has implications for the scope that the Committee considers in examining the effectiveness and adequacy of current Commonwealth research training schemes.

Importance of access to facilities

Access to scientific research facilities is critical in all fields of scientific training. Many of the nation's major research facilities are located in Government science and technology organisation. For example, ANSTO's research infrastructure includes a research reactor, two accelerators and associated instruments as well as workshops and specialist laboratories. ANSTO's new research reactor, OPAL, is a world-class multi-use facility.

To maximise the benefit of the nation's research facilities for research training, it is important to have:

- *Clear, open arrangements for access that give priority to high quality research* – Access to both OPAL research reactor and the accelerators is via peer review of proposals. The former process managed by ANSTO and the latter by the Australian Institute for Nuclear Science and Engineering (AINSE)¹. Both peer review processes involve ANSTO and university personnel and other eminent researchers, to ensure a broad, independent perspective. In addition, structures such as Cooperative Research Centres (CRCs) provide research trainees with access to facilities.
- *A user-focus* – This especially building awareness of the potential of particular techniques and helping users in selecting and applying techniques. ANSTO's Bragg Institute regards its primary role as running a user-oriented facility for the OPAL neutron beam instruments. ANSTO's Institute for Environmental Research operates the two accelerators and is responsible for the establishment of the National Deuteration Facility, which has funding support from the National Collaborative Research Infrastructure Strategy (NCRIS). CRCs have also helped ANSTO to reach new potential users, such as in the application of neutron and synchrotron radiation scattering to polymer science.
- *Funding to support travel and accommodation* – This ensures no disadvantage to researchers (particularly students and early career researchers) who are located at a distance from unique facilities, such as ANSTO's.
- *Access to facilities outside Australia as well as within it* – ANSTO manages the Access to Major Research Facilities Program, funded by the Government's International Science Linkages program to provide Australian researchers with access to major overseas facilities such as neutron spallation sources, physics facilities such as CERN, synchrotrons and astronomy facilities. It has also managed the Australian Synchrotron Research Program (ASRP) since the early 1990s, which has provided Australian researchers with access to three overseas synchrotrons. The remaining aspects of this

¹ AINSE has made a separate submission to this inquiry.

program are now being handed over to the Australian Synchrotron to manage, using NCRIS funding.

ANSTO would like to emphasise the importance of world-class research facilities to Australia's ability to compete internationally for high quality researchers. OPAL provides a strong example. The opportunity to work at this facility, which has instruments that are each among the best in the world, has drawn Australians back to their home country and attracted top international researchers to Lucas Heights.

Postdoctoral fellowships

In considering the research training programs that exist in Australia and the opportunities for career advancement for research graduates and staff, it is worth considering programs and opportunities outside the university sphere. ANSTO would particularly like to highlight its postdoctoral fellowship program.

ANSTO now averages between about 35 and 50 postdoctoral fellows on its staff at any time. It views postdoctoral fellowships as an important way to propagate skills in nuclear science and engineering in the broader Australian economy and to build national and international networks. Its approach is founded on these being clearly recognised as fixed term positions, with an expectation that the holders move on to other organisations.

Postdoctoral fellows undertake a defined research activity within ANSTO's research portfolio, and in doing so build skills and experience that will contribute to the broader Australian economy and develop their careers as researchers. They differ from general ANSTO researchers in that they have defined supervisors and work on a defined project for the period of their contract. ANSTO has a formal process for the management of postdoctoral fellowships.

Joint funding of research training

In addition to its own programs, ANSTO supports researcher training as part of collaborative arrangements. This can be by directly funding or co-funding post-graduate scholarships or postdoctoral fellowships. This is often in the context of projects within CRCs or supported by Australian Research Council funding. It is being expanded to projects and research programs in which we co-invest with organisations such as CSIRO.

AINSE programs

ANSTO is a member of the Australian Institute for Nuclear Science and Engineering, along with Australian universities and several New Zealand institutions. In addition to access ANSTO facilities by students directly or their supervisors as discussed above, AINSE provides postgraduate research awards as specific top-up scholarships for Australian PhD students, as well as targeted fellowships. Both programs encourage students to undertake research related to applications of nuclear techniques, which is an area of growing demand internationally, complements the nation's investment in OPAL and addresses some of the major challenges of our time, such as climate change.

The training role and access provided by AINSE ensures that research trainees – both students and early career researchers – learn and develop to a standard that enables them to win access through peer review processes.

Internships

The Committee might be interested in the model provided by the Australian Synchrotron Research Program internships. These enabled current or prospective PhD students to gain operational experience of synchrotron radiation facilities. The internship was served entirely at an overseas facility (either the Advanced Photon Source in the USA or at the Australian

beamline at the Photon Factory in Japan). Interns were employed by a host university as a research assistant grade 1 (or equivalent). They received costs at a set rate and a grant covering their airfare and accommodation costs at the facility. Among the bases of selection were a short essay about why the candidate sought the internship, what benefit he or she expected to gain from the experience, and detailing relevant skills or interests. These interns provided assistance to Australian researchers visiting the synchrotron facility through the ASRP. This gave them wide exposure to many applications of this technology and has provided Australia with skills it needs now that it has its own synchrotron.

ANSTO also offers internships, which include training across the spectrum of its activities.

Conclusion

ANSTO would be happy to expand on any points raised in this submission or otherwise where the Committee regards its experience as relevant to the scope of the inquiry.