Economics Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Industry, Innovation and Science Portfolio
2016-17 Supplementary Budget Estimates
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AGENCY: AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION

TOPIC: Lucas Heights

REFERENCE: Written Question – Senator Carr

QUESTION No.: SI-79

1. What is the situation with respect to storage of radioactive waste at Lucas Heights?
2. What new scientific and industrial capabilities have been or will soon be established at Lucas Heights?

ANSWER

1. ANSTO stores inventories of both low level waste (LLW) and intermediate level waste (ILW) on an interim basis. ANSTO does not generate or store high level waste (HLW).

   Approximately 95% of the waste generated at ANSTO is LLW and includes items such as gloves, lab equipment and building materials. ANSTO currently holds approximately 7,400 200l drums of LLW that are awaiting final processing before they can be disposed of at a National Radioactive Waste Management Facility (NRWMF).

   ANSTO currently holds approximately 450m^3 of ILW, including the residual waste from the reprocessing of HIFAR spent fuel, which was returned to Australia from France in 2015, in accordance with an agreement between the French and Australian governments.

   The ILW inventory also includes an amount of waste generated from the production of nuclear medicines that will be treated and permanently encapsulated within Synroc, an Australian owned technology.

2. As the scientific and technical questions faced by Australian researchers and industry increase in complexity, recent and current capital upgrade projects at Lucas Heights are ensuring that ANSTO remains at the forefront, providing domestic access to some of the world's leading scientific facilities and capabilities.

   In addition, ANSTO is working to mitigate the global impact of recent and future closures of aging nuclear medicine production facilities around the world, ramping up production in an existing facility and establishing a new production plant that will supply up to 25 per cent of worldwide demand. These processes rely on OPAL, one of the world's newest, most reliable and most productive research reactors.

   Upgrades to existing nuclear medicine facilities
   World demand for nuclear medicine is today some 9,000 6-day Curies a week (which translates to 30 – 40 million doses a year), and up until recently 1,100 a week have come from ANSTO's existing production plant, with focus predominantly on domestic supplies estimated at 10,000 potential doses a week. ANSTO has recently completed a $1 million, year-long upgrade to this facility to almost double its output to 2,100 6-day Curies a week, and maintain this level until the

facility is decommissioned following commissioning of the ANM plant, currently under construction. This project has involved:

- Upgrading irradiation rigs to handle 12 target plates, up from eight previously.

- Engineering changes to the separation technology in hot cells, to enable it to handle the higher capacity potential from the increased rigs.

- Staffing and roster changes – including increasing manufacture rates from four 'runs' to five 'runs' per week.

- Gaining regulatory approvals from the Therapeutic Goods Administration (TGA) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

Export scale nuclear medicine manufacturing plant and Synroc waste treatment plant
In 2012, ANSTO announced that it would deliver a $168.8 million nuclear medicine and co-located waste treatment plant that will position Australia as a global leader in the manufacture of nuclear medicine. Testing and commissioning of the nuclear medicine plant will start early next year, and the plant is scheduled to reach full capacity by the end of 2017 – producing up to 3,500 6-day Curies a week.

In an average year, ANSTO expects to supply around 25 per cent of world demand. The investment will position Australia as a global leader in the manufacture of nuclear medicine.

As of October 2016, more than 800 contractors and subcontractors had been inducted, more than 486,000 hours of work performed, 5,558m^3 of concrete poured and 861 tonnes of steel installed.

Education Investment Fund projects
The $38 million Centre for Accelerator Science (CAS) capital construction project was completed in 2015, with support from the 2009 Super Science Initiative, an initiative of the Australian Government.

CAS is now Australia's leading accelerator science facility, providing the Australian research community with world class facilities for Accelerator Mass Spectrometry and Ion Beam Analysis, supporting research areas of national importance including medical science, water resource sustainability and national security.

In addition to ANSTO's added accelerator capabilities, three new neutron beam instruments originally funded by the Super Science Initiative are providing industry and researchers with unparalleled opportunities to investigate the structure and dynamics of future industrial materials, devices and systems, right here in Australia.

The three new neutron beam instruments – EMU, BILBY and DINGO – at the Australian Centre for Neutron Scattering (ACNS), at ANSTO, are helping Australian and international researchers address scientific challenges across the breadth of Australia's National Science and Research Priorities. For example, these instruments are:

- helping Australian researchers better understand the biological mechanisms involved in diseases of the brain, such as Alzheimer's and Parkinson's;

- improving scientific understanding of the growing problem of food allergies through the observation of interactions between biological molecules such as proteins, viruses and cell membranes;

- improving industrial productivity through the mapping of water damage in industrial machine components, allowing for extended operating lives;

- inspecting critical welds in the pipes used to transport energy resources around Australia, enhancing energy security;

- ensuring aircraft safety through the internal examination of parts for structural flaws or defects;

- creating more efficient and effective hydrogen fuel cells for clean energy systems; and

- characterising new battery materials with greater storage capacity and discharge capabilities, essential to improving energy efficiency and security.

Both the CAS and the new neutron beam instruments at the ACNS are supported by the Australian Government's National Collaborative Research Infrastructure Strategy.

ANSTO Electron Microscopy Facility

ANSTO's new Electron Microscopy Facility, opened in July 2015, is playing a major role in ANSTO's research and development of high-tech materials for industrial and medical applications. The $6 million facility has been purpose-built to allow ANSTO's electron microscopes to operate at their full performance capabilities, and uses advanced architectural design to mitigate external influences.

Electron microscopes use beams of electrons to create high magnification images, but external influences such as electromagnetic fields, vibrations, and temperature variation can compromise performance. Amongst many applications, electron microscopy assists in maintaining the safety and reliability of the world class OPAL research reactor, which is vital to ANSTO's production of nuclear medicines.

While electron microscopes are found in many universities and science labs, the new environment in which ANSTO's electron microscopes are housed has created a shielded laboratory that maximises microscope performance.