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Uranium Mining and Nuclear Facilities (Prohibitions) Repeal Bill 2019

Site visit report

Australian Nuclear Science and Technology Organisation (ANSTO), Lucas Heights
24 July 2019

Site visit to ANSTO, Lucas Heights

On Wednesday 24 July 2019, the Standing Committee on State Development (the committee) visited the Australian Nuclear Science and Technology Organisation (ANSTO) in Lucas Heights. The site visit included a working lunch and a tour of the following three sections of ANSTO:

- the Open Pool Australian Lightwater reactor (OPAL): a national nuclear science research reactor
- Minerals: a mineral research laboratory, and
- the Synroc Pilot Plant: a nuclear waste management unit.

During the visit, the committee was briefed, or met, by the following ANSTO representatives:

- Adi Paterson, Chief Executive Officer
- Steve McIntosh, Senior Manager, Government and International Affairs
- Geordie Graetz, Government and International Affairs Advisor
- David Vittorio, OPAL Reactor Manager
- Matthew Richards, OPAL Shift Manager
- Robert Gee, General Manager, ANSTO Minerals
- Rohan Holmes, Chemical Process Engineering
- Daniel Gregg, Nuclear Wasteform Engineer
- Lyndon Edwards, National Director Australian Gen IV Research
- Mark Ho, Nuclear Engineer
- Sjaan Kuiper, Departmental Advisor, and
- Rod Dowler, Discovery Centre Leader.

About ANSTO

ANSTO is a nuclear science and technology research facility with a primary focus on the production and applications of neutrons for medical, scientific, and industrial purposes. ANSTO also has a mandate to responsibly manage its radioactive wastes. ANSTO houses two research nuclear reactors: the High Flux Australian Reactor (HIFAR) and the Open Pool Australian Lightwater reactor (OPAL). HIFAR was Australia's first national research reactor built in 1958. It was superseded by the OPAL reactor in 2007.[1] While HIFAR is no longer active, it is yet to be decommissioned pending the availability of a disposal pathway for the resulting waste.

Safety of the OPAL reactor

The OPAL reactor is one of the most reliable nuclear research reactors in the world, with an operational reliability of 93.8 per cent. The OPAL reactor is considered safer than its predecessor, HIFAR. Among many safety and cooling features, it has two independent water tanks that help cool the core in the event that a loss of coolant occurs and other safety systems are rendered inoperable. The design of this cooling system prevents incidences similar to the one in Fukushima, where nuclear power reactors lost their ability to cool the heat generated by the fuel assemblies.

[1] ANSTO, ANSTO's First Research Reactor: HIFAR, accessed 13 September 2019, available at https://www.ansto.gov.au/about/what-we-do/our-history

The OPAL reactor is monitored twenty-four hours a day, seven days a week. After every operational period of 30 days, the plant has a planned maintenance shut down for approximately five days. If maintained well, the projected life span of the OPAL reactor is up to 40 to 70 years.

It is noted that the OPAL reactor is a research reactor. It generates about 20 megawatts of heat that is only enough to warm the reactor pool to about 40 degrees Celsius. It is different from a nuclear power generator which requires more uranium and higher temperature to generate high pressure steam to drive turbines.[2]

Nuclear waste management

Synroc is a nuclear waste management research unit in ANSTO. It is also the name given to a technological solution that mimics the natural ability of rocks to lock up radioactive elements for hundreds of thousands of years for the disposal of nuclear waste. The technology was first investigated in 1980s and can handle both solid and liquid nuclear wastes. The technology reduces the volume of nuclear waste by an average of 40 per cent.

Economic values

ANSTO provides high economic value to the Australian economy. It produces nuclear medicines, irradiates silicon to make them more conductive, and serves as an open lab for domestic and international clients to conduct science, medical or industrial research. It is estimated that ANSTO has a capacity of producing nine million doses of nuclear medicines per year.

Working lunch – issues raised

Dr Paterson and other ANSTO staff provided the following commentary during the working lunch:

- in-situ leaching (ISL), also known as in-situ recovery (ISR), is a new generation mining solution. It requires no geological changes and no underground miners. Currently, Beverley uranium mine in South Australia uses this technique to recover uranium
- all forms of energy generation, including nuclear power, should be considered in the planning for the national grid, especially in the wake of climate change
- Australia currently has expertise in the nuclear fuel cycle and needs to engage in the global/Asian nuclear community to maintain its nuclear knowledge and competitiveness
- Australia is a participant of the Generation IV International Forum that aims at the international development of advanced nuclear energy systems
- the latest nuclear power generation technology is the Small Moderate Reactors (SMRs). SMRs require a shorter construction time comparing to large reactors. They are cheaper and more economical when multiples are constructed. They can be integrated with other sources of energy (for example, wind).
- Electricity Map website: https://www.electricitymap.org/?page=map&solar=false&remote=true&wind=false

[2] ANSTO, How safe is OPAL?, accessed 13 September 2019, available at https://www.ansto.gov.au/about/how-we-work/how-safe-is-opal