



Australian Government



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Incident response and safety at ANSTO





ANSTO (Australian Nuclear Science and Technology Organisation) operates the HIFAR (High Flux Australian Reactor) at Lucas Heights as an important part of its research and radiopharmaceuticals production activities.

A new research reactor, OPAL, is planned to be operational in 2006. It is normal practice to have emergency response plans in place for these types of activities, and such plans have been in place at Lucas Heights since the early 1960s.

The current Response Plan for Accidents and Incidents at ANSTO's Lucas Heights site is on the ANSTO website, www.ansto.gov.au/ansto/safety/Response_Plan_Final.pdf. It provides arrangements for coordinating the response by ANSTO and NSW Emergency Services organisations, such as the police, fire, and ambulance. It sits within the framework provided by the NSW State Emergency and Rescue Management Act. The plan is complemented by training and detailed response procedures that are regularly exercised and reviewed.



ANSTO Background

Why is there a reactor at ANSTO?

The reactor is used for the production of radioisotopes. These are the radioactive component of radiopharmaceuticals which are used to diagnose and treat disease. ANSTO produces more than 70% of Australia's radiopharmaceuticals. On average, every Australian will have a nuclear medicine procedure using an ANSTO radiopharmaceutical during their lifetime.

The reactor is also used by scientists and post-graduate students from around Australia and from other countries for research in the areas of neutron scattering, materials, radiopharmaceutical and environmental science. Specialised radioisotopes are made for industrial applications and environment assessment such as tracing the movement of sand in Port Hacking and of sewage along the Sydney coastline. One industrial application of the reactor is silicon irradiation (the irradiated silicon is used to make high quality computer chips).

The HIFAR research reactor is not used for electrical power generation or any military purpose.

More information about HIFAR can be found at www.ansto.gov.au/natfac/hifar.html

HIFAR is approaching the end of its life and will be replaced by the new OPAL research reactor. Outperforming HIFAR in every respect, OPAL will significantly increase Australia's nuclear science and technology capabilities.

More information about OPAL can be found at www.ansto.gov.au/info/brochures/OPALlr.pdf

OPAL



How big are the reactors at ANSTO?

HIFAR is a fraction of the size of a power reactor. Its core is about the size of a domestic washing machine. It consists of 25 fuel elements containing a total of approximately 7kg of uranium. This amount of uranium would fit into a coffee cup. The core is a cylinder about 80 centimetres in diameter and about 60 centimetres high. HIFAR operates at atmospheric air pressure. At normal operating capacity, HIFAR produces 10 megawatts of thermal energy.

The heart of OPAL is a similar-sized compact core of 16 radioactive fuel assemblies interspersed with control rods. OPAL will use low enriched uranium fuel, produce 20 megawatts of thermal energy and operate 340 days per year. OPAL will also operate at atmospheric air pressure.

By comparison, a typical electricity-generating reactor holds more than 150 tonnes of fuel, operates at several times atmospheric pressure and produces 3 000 megawatts of thermal energy.

Who regulates ANSTO?

ANSTO's operations are regulated from a safety point of view by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA - www.arpansa.gov.au) (for ionising radiation) and Comcare (for other safety issues - www.comcare.gov.au).



Reactor Safety at ANSTO

What sorts of safety systems are used at ANSTO's reactor?

Both HIFAR and OPAL have multiple layers of safety protection, with separate control and safety systems engineered to prevent any overheating of fuel. It would require simultaneous failures of multiple components in both systems before any release of radioactivity could occur.

As a further safety measure, a buffer zone prevents any residential development within 1.6 km of HIFAR and OPAL. This zone is extremely large by international standards.

HIFAR was designed and is maintained so that in the case of an incident within the reactor ANSTO's on-site safety procedures would ensure the situation is managed effectively. The steel containment building housing HIFAR is designed to contain any release of radioactivity. If there were an abnormal situation, the reactor would automatically close down, or be shutdown manually within seconds. The reactor is staffed by trained operators 24 hours a day, every day of the year.

OPAL has been designed and constructed in line with the most modern safety standards according to international best practice. OPAL's automated and highly reliable safety features include two independent safety systems to quickly shut down the reactor core in the case of an emergency. In addition, the core of the reactor can be cooled by natural circulation of the coolant, without the need for pumped flow.

In the unlikely event of an accident which damages even a small part of the core, both reactors have a containment system in place to ensure minimal amounts of radioactivity escape to the environment. The containment includes systems to trap radioactive material in high efficiency particulate filters (these filters physically remove contaminants), as well as activated charcoal for trapping radioactive iodine. With these containment systems in place, conservative modelling demonstrates that radiation doses to members of the public would be well below acceptable limits.



How safe is the reactor in a major earthquake?

HIFAR and its attached buildings are able to withstand much greater earthquake loads than other industrial buildings, high rise units and dams. A very severe earthquake, much greater than has ever been recorded in the Sydney Basin, would be required to cause any damage to HIFAR in which radioactivity could be released. In the same way, OPAL has also been designed to withstand major earthquakes.

Have members of the general public ever been affected by an accident at a research reactor like ANSTO's?

In the hundreds of research reactors operating around the world, which have more than 16 000 combined years of reactor operation, there has never been an event with off-site health consequences. Many operate on university campuses, and many have housing close by.

The Response Plans

Are there plans for dealing with accidents and incidents at ANSTO?

The ANSTO Response Plan provides the framework for responding to all incidents and accidents at Lucas Heights. It is supported by internal standing operating procedures and specific plans and arrangements for the research reactors.

The Response Plan also sets out arrangements for incidents where support from the NSW emergency service organisations is needed. The plan has been developed by ANSTO operations and safety specialists. It has been reviewed and endorsed by the ANSTO Local Liaison Working Party (LLWP), which comprises representatives from NSW Police, NSW Fire Brigades, NSW Rural Fire Service, Ambulance Service of NSW, and other bodies including the Australian Federal Police and Sutherland Shire Council. ARPANSA is an observer at LLWP meetings.



What happens if there is an incident at ANSTO which requires external assistance?

The NSW emergency service organisations respond to requests for assistance from ANSTO in the same way they do for all organisations. These organisations operate within a framework of state, district and local level emergency plans, and each organisation has its own plans and supporting standing operating procedures. Normal requests for assistance from ANSTO to the NSW Fire Brigades and the Ambulance Service of NSW occur under these general arrangements.

In the unlikely event of a major radiological incident at ANSTO's Lucas Heights site, emergency support for the organisation would be managed at the state level. The State Emergency Management Committee has issued the State Lucas Heights Emergency Sub Plan, which is supported by the Lucas Heights Emergency Evacuation Sub Plan.

Can I see these plans?

The ANSTO Response Plan can be viewed at www.ansto.gov.au/ansto/safety/Response_Plan_Final.pdf

Further information on emergency management arrangements in NSW and the State Lucas Heights Emergency Sub Plan and supporting Lucas Heights Emergency Evacuation Sub Plan can be found at www.emergency.nsw.gov.au/content.php/363.html

To learn more...

Can I get more information about ANSTO and its activities?

ANSTO provides considerable information through its website. Briefings can also be arranged for individuals or community groups.

Phone (02) 9717 3111 or visit the website at www.ansto.gov.au

Can I visit ANSTO?

Public tours are available free of charge. Bookings are necessary, and can be made by phoning (02) 9717 3111 or emailing enquiries@ansto.gov.au
Special interest tours can also be arranged.

Information for residents within a 3 km radius of ANSTO

It is highly unlikely that there will be a radiological risk requiring evacuation of anyone outside the ANSTO site. If evacuation is required it will be coordinated by the NSW Police. Remember that, unlike a bushfire, the threat is not an immediate threat.

If alerted to a radiological emergency at ANSTO you are advised to follow the CALM procedure:

- **Close** all doors and windows, turn off air conditioning and stay indoors.
- **Await** further information from emergency services by listening to radio or television stations.
- **Locate** a change of clothes, identification and any vital medication in case you are advised to evacuate.
- **Move** to allocated evacuation centres if you are advised to do so. Once inside your car, turn off the air conditioning and ensure vents and windows are closed. Remain calm and courteous.

Will I need to evacuate?

Not necessarily. If there ever is a need to evacuate, NSW Police or other identifiable emergency service personnel will specifically request you to do so.

What if my children are at school or child care?

If an evacuation is required, DO NOT collect your children from school or child care centres unless advised by emergency services. There are specific arrangements in place to both notify and evacuate schools and child care centres, if necessary, in the case of all emergencies. These arrangements would also apply in the event of an accident or incident at ANSTO.



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