



Inspection report

Licence holder: ANSTO	Licence number: F0184
Location inspected: HIFAR Reactor, Lucas Heights, Sydney	Date/s of inspection: 23–25 September 2019
	Report no: R19/10717
<p>An inspection was conducted as part of ARPANSA’s baseline inspection program to assess compliance with the <i>Australian Radiation Protection and Nuclear Safety Act 1998</i> (the Act), the Australian Radiation Protection and Nuclear Safety Regulations 2018 (the Regulations), and conditions of facility licence F0184.</p> <p>The scope of the inspection was an assessment of ANSTO’s performance at the High Flux Australian Reactor (HIFAR) against the Facility Performance Objectives and Criteria (POCs). The inspection consisted of a review of records, interviews, and physical inspection of the facility.</p> <h3>Background</h3> <p>ANSTO is authorised under section 32 of the Act to Possess or Control HIFAR. HIFAR was Australia’s first nuclear reactor, built by the Australian Atomic Energy Commission Research Establishment (later ANSTO). HIFAR is a tank reactor that was fuelled with enriched uranium and cooled and moderated by heavy water. There is a graphite neutron reflector surrounding the core. HIFAR was built as a nuclear materials testing reactor but was later used extensively for neutron beam research, production of neutron transmutation doped (NTD) silicon, and for production of radioisotopes. HIFAR was permanently shut down in 2007, and is defueled with the heavy water removed.</p> <p>The licence requires ANSTO to care and maintain the facility so that radiation risks are appropriately managed before it is eventually dismantled during decommissioning. In 2008 when the licence was issued it was expected that ANSTO would apply for a decommissioning licence within a ten year period, however, for reasons outside of ANSTO’s control (i.e. the absence of a national radioactive waste management facility), this has not happened and it remains unclear when decommissioning will take place. ANSTO may undertake activities to characterise the facility and plan for its decommissioning but no radiological decommissioning is permitted under the Possess or Control licence.</p> <p>The main codes and standards applicable to this facility are those that appear in section 59 of the Regulations plus details provided in the licence application including the Safety Analysis Report (SAR). International best-practice is reviewed against the International Atomic Energy Agency (IAEA) safety standards. Specific IAEA standards referenced in this report are:</p> <ul style="list-style-type: none">• GSR Part 2: <i>Leadership and Management for Safety</i>• SSR-3: <i>Safety of Research Reactors</i>	

- GS-G-3.5: *The management System for Nuclear Installations*

Observations

Generally the facility was found to be in good physical condition and well-managed. The reactor containment building which houses the reactor block was found to be well-maintained and there was nothing to suggest that the hazardous materials contained were not being properly controlled. However a number of areas for improvement (AFI) were identified in regard to the documented management of the facility. These are described in the sections below together with supporting evidence.

Performance reporting and verification

The licence holder is expected to have an open internal reporting culture that supports organisational learning and continuous improvement. Reporting to ARPANSA should meet the requirements specified in the facility licence basis and should be accurate and complete.

Generally ANSTO has a good record of communicating regulatory matters relating to HIFAR. ANSTO has proactively sought to keep ARPANSA well-informed of any non-routine work well in advance and provides a good standard of quarterly reporting. ARPANSA is routinely invited to briefings on the projects relating to radiological characterisation and planning for the future decommissioning.

A review of internal records concluded that ANSTO has met its obligations for quarterly reporting that includes information of characterisation activities, changes and any operational events relating to safety.

Internal reporting is managed through a central ANSTO event reporting system (GRC). In the period since the last inspection (in March 2018) no events were rated above minor significance. A number of events were reviewed. The range of GRC events reported by HIFAR suggested that reporting practices are effective and that the GRC system is well used. It was found that an improved triage system is now in place for GRC events to ensure that they are appropriately graded and managed. Despite being of either minor or low significance, none of the events reviewed had been closed without identifying causes and lessons to learn. This represented an improvement from a previous inspection that identified that minor events had been closed without the identification of causes or lessons for improvements.

Configuration management

The licence holder should, at all times, have knowledge of the physical configuration and operational methods of the facility. Safety margins should be met and operations should remain within the constraints of the safety case and licence. The impact of any changes should be characterised and understood.

The general condition of the facility was found to be acceptable. ANSTO has retained a number of dedicated staff who have in-depth knowledge of the facility from its operational period. This staff is experienced in the maintenance processes and requirements. Inspectors consider that this is valuable to retain corporate knowledge of the system which also supports project work that ANSTO has undertaken to document and characterise the facility in order to support the planning for decommissioning.

One exception to the good overall general condition of the facility was the condition of the No.1 Storage Block Cooling System that is located outside of the reactor building (Building 15). Whilst no longer used, this system is known to be contaminated. It was found to be in a deteriorating condition with visible corrosion in places including the surface of the ion column and supporting structures. Corrosion, including on the same ion column, was identified on an inspection in March 2018 and it was apparent that no remediation actions have been undertaken. ANSTO explained that a program of work was being set up to address this corrosion and that there was an intention to put a roof over the cooling system to

reduce future weathering. Although its integrity is not currently compromised, the condition of this system is an area for improvement.

The HIFAR Plans and Arrangement include a small number of Operational Limits and Conditions (OLCs) that, when met, provide assurance that the facility is being managed within an envelope demonstrated to be safe by the facility safety case. OLCs include three monthly functional tests of area radiation monitors and an annual calibration of tritium monitors. Records demonstrated that these tests have been undertaken. A third OLC regards avoiding the presence of hazardous materials within the reactor building. A walk around of the building did not identify any significant quantity of hazardous materials.

The current HIFAR SAR (ANSTO/060749/3 Rev 0) was prepared in 2007 to support the application for HIFAR to be managed under a Possess or Control Licence. The SAR is a major document that draws on the safety assessment to describe how the facility will be managed safely during its lifetime. IAEA GSR Part 4 Requirement 24 articulates international best practice in regard to the periodic review and update of the safety assessment. ANSTO stated that a review of the SAR is currently taking place. However there has been no update of the SAR or its supporting safety assessment since 2007. This is an area for improvement.

ANSTO last reviewed and updated the contents of its plans and arrangements in early 2018 and has met its compliance responsibilities under section 61 of the Regulations. In October 2018, ANSTO further consolidated its plans and arrangements into a single volume to better meet current and future needs for the prolonged care and maintenance period rather than relying on operational instructions from the operating period before 2007. The streamlined management system is now reduced in size. ANSTO has reported the changes to ARPANSA in accordance with section 64 of the Regulations.

These changes are a useful move towards an integrated management system identified as best practice in standards such as the IAEA safety requirements (GSR Part 2 Requirement 6 and SSR-3 Requirement 4). However, the plans and arrangements remain largely individual within the single volume. A number of features of the plans and arrangements have common, effectively duplicated elements including but not exclusively, responsibilities, accountability, records and reporting. In other cases, a number of plans do not identify responsibilities. This is an area for further improvement that may assist HIFAR to adopt a more holistic approach to safety.

The plans and arrangements specify that categorisation of any changes must be undertaken in accordance with form AF2388, however there is no instruction regarding how a change should be managed, including the determination of options through to evaluation of the completed change. ANSTO has some overarching requirements for change but these are not referred to from the HIFAR Plans and Arrangements. The clarification of effective change processes within the plans and arrangements is an Area for Improvement.

Many maintenance tasks are undertaken under directions included in the SAP work order rather than traditional procedures and instructions. IAEA safety standards including GSR Part 2 (Requirement 10), SSR-3 (Requirement 74) and GS-G-3.5 (Paragraph 2.44) refer to the scope and detail of procedures and instructions. The work orders do not meet normal convention for procedures and instructions and do not contain important information for managing the task safety, such as precautions, as are included in other HIFAR instructions. As a result HIFAR may be overly reliant on the knowledge and experience of long serving workers. This is particularly relevant as the licensing period is now extended significantly beyond stated intentions at the time of licensing and both the plant and workforce are ageing. It remains unclear when decommissioning will be undertaken. The lack of detailed instructions for maintenance tasks relating to safety is an Area for Improvement.

Review and updates of the Plans and Arrangements are undertaken by HIFAR staff and management without a requirement for agreement by Subject Matter Experts (SME) in regard to specialist areas such as radiation protection, security and emergency preparedness and response. SME agreement is

important to ensure that changes to requirements and operational experience in other business areas are properly considered for HIFAR.

Inspection, testing and maintenance

ARPANSA expects Inspection, Testing and Maintenance (ITM) to be undertaken in a manner which ensures the safe operation of the facility. Workers undertaking ITM should be suitably qualified and experienced and demonstrate competence at all times.

The facility was observed to be in a neat and tidy condition with safety and security systems operating normally. With the exception of the cooling system mentioned previously, there was no indication of maintenance problems. A number of records for maintenance were inspected including those for OLCs reported previously. No issues were found with these records.

Training arrangements

A systematic approach to training should be used, i.e. where training programs are the result of analysis of training needs, design and development, effective implementation and evaluation of outcomes.

The HIFAR training procedure provides a framework for training, however the training system does not specify pass/fail criteria or have a system of evaluation. Current training arrangements fail to meet the concept of a systematic approach to training for this reason. This is an Area for Improvement.

A review of selected training records indicated that the HIFAR training procedure was being followed. In addition HIFAR is conducting customised induction training to familiarise specialist responders such as emergency workers and security officers.

Event protection

The licence holder should consider and implement controls to protect the facility from external hazards such as fire, flood and storms and human interference.

No safety issues were identified either inside or outside the building. It was noted that some wire mesh had been erected to deter birds from roosting or nesting around the facility. There was evidence of pest control around the facility but no indication that actual infestation was a concern for its safety. Records indicated that an annual bush fire inspection had been undertaken the previous month and ANSTO stated that some leaf litter was removed following this. There was no build-up of fire loading anywhere nearby at the time of the inspection.

Security

ARPANSA expects effective security measures to prevent unauthorised access or damage to the loss, theft or unauthorised transfer or unauthorised use of a radiation source of facility.

HIFAR security systems were found to have been regularly maintained and operational to restrict access to the facility to authorised personnel. Around the perimeter of the facility, HIFAR remains protected by the general site security arrangements. ANSTO stated that there had been no security events at HIFAR.

Radiological protection

The exposure to radiation and its effects should be controlled, thereby protecting people and the environment from the harmful effects of exposure to radiation and radioactive materials.

Radiological material in HIFAR is mostly contained in its reactor structures and experimental devices that are now largely in passive care and maintenance and which present a relatively small hazard to workers. The dose records of HIFAR workers were inspected and found to be very low. For the 2018–19 financial year, the highest annual effective dose was 0.07 mSv effective and 2.18 mSv extremity. These doses are a small fraction of the annual dose limits. ANSTO stated that, given the very low doses received, a reduction in the dose constraint is under consideration.

ANSTO explained that its Radiation Protection Services Group remain actively involved at HIFAR especially during any characterisation work.

Emergency preparedness and response (EPR)

The licence holder should anticipate hazards and threats, assess consequences and prepare appropriate systems and measures to ensure an effective, timely, integrated, controlled and coordinated response to any nuclear or radiological emergency.

Current EPR arrangements are informed by the SAR which, as reported previously, is now in the process of being updated. This will inform a review of current EPR arrangements.

ANSTO undertakes an annual response exercise/drill at HIFAR. The last took place in April 2019. Records showed that the exercise went well. Some recommendations were identified and have been actioned.

Findings

The licence holder was found to be in compliance with the requirements of the Act, the Regulations, and licence conditions.

The inspection revealed the following Areas for Improvement:

1. The Safety Analysis Report has now gone more than ten years without revision.
2. Plans and Arrangements for managing safety contain the following weaknesses:
 - a lack of consolidation of individual plans, duplicated requirements and omission of responsibilities
 - a lack of change control arrangements
 - a lack of detailed instructions for maintenance tasks relating to safety
 - no system that requires subject matter experts to agree specialist aspects of the HIFAR Plans and Arrangements.
3. Deteriorating condition of the No.1 Storage Block Cooling System external to Building 15.
4. HIFAR training arrangements do not fully meet the concept of a 'systematic approach to training' for example, there is no specified pass/fail criteria or system of evaluation.

It is expected that improvement actions will be taken in a timely manner.

No written response to this report is required
THIS REPORT WILL BE PUBLISHED ON THE ARPANSA WEBSITE