



Inspection report

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| Licence holder: ANSTO Centre for Accelerator Sciences (CAS) | Licence number: F0316 (ANTARES, STAR and VEGA) and F0290 (SIRIUS) |
| Location inspected: Lucas Heights, NSW | Date/s of inspection: 17–18 September & 1 October 2019 |
| | Report no: R19/10536 |
| <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 licences F0316 (ANTARES, STAR and VEGA) and F0290 (SIRIUS).</p> <p>The scope of the inspection included an assessment of ANSTO’s performance against the Performance Objectives and Criteria (POCs). The inspection consisted of a review of records, interviews, and physical inspection of sources and facilities.</p> <h3>Background</h3> <p>The Centre for Accelerator Sciences (CAS) is authorised under section 30 of the Act for operation of particle accelerators and under section 31 of the Act for dealings with sealed sources for calibration purposes with activity 40 MBq or less. Facility licence F0316 authorises operation of the 1 MV Pelletron accelerator, known as VEGA, the 2MV Tandetron Tandem accelerator known as STAR and the 10 MV Tandem accelerator known as ANTARES. Facility licence F0290 authorises limited operation of the 6MV Pelletron accelerator known as SIRIUS with some beamlines restricted to hot commissioning and maintenance activity only at this stage.</p> <p>The CAS conducts applied research in accelerator mass spectrometry and ion beam analysis. The facilities are used for a diverse range of activities including material analysis, biological and environmental studies and basic nuclear physics.</p> <p>The main codes and standards applied to these facilities are those that appear in section 59 of the Regulations, as appropriate, plus:</p> <ul style="list-style-type: none">• Australian/New Zealand Standard: <i>Safety in laboratories Part 4: Ionizing radiations</i> (AS/NZS 2243.4:2018)• Health Physics Society (HPS) <i>Installations using non-medical x-ray and sealed gamma-ray sources, energies up to 10 MeV</i> ANSI/HPS N43:3-2008 | |

Observations

The licence holder was found to be compliant with the Act, the Regulations, Licence Conditions and the standards (as relevant). The assessment also concluded that CAS continues to reflect the principles of the POCs in its controls, behaviours and management system. Two areas for improvement (AFI) were identified relating to content of the current facility plans and arrangements and compliance with internal radiation protection guidance. Key findings are detailed in the sections below.

Areas for Improvement from last inspection

The two areas for improvement raised at the last inspection relating to overdue sealed source wipe testing and delay in scheduled maintenance were noted to have been addressed with corrective actions completed.

Performance reporting and verification

Quarterly reports since the last inspection in 2016 were examined against the requirements of ARPANSA Guide Reporting Compliance (REG-COM-SUP-270B v10.1). Safety and security reporting continues to be satisfactory and complete as per Licence Condition 1 of F0316 and F0290.

The operational documents; the *ANSTO Accelerator Facilities Plans and Arrangements* (AG-5419) and *Accelerator Operations Management* (VP-1062), which make up facility plans and arrangements, were found to be within the three (3) year statutory review period required under section 61 of the Regulations and contain up to date information about the facility including the recent authorisation of SIRIUS to move to full operation on 3 out of the 6 beamlines.

Events raised since 2016 were examined and the investigation for a radiation related event (GRC 2485) discussed in detail. No significant issues were raised with the ongoing investigation and reporting of events, noting that radiation related events are infrequent due to the nature of the facility. It was noted that a review of events over the past 5 years was conducted for the recent update of the facility Safety Analysis Report (SAC 1997/16) and no significant trends recorded.

Plans were in place to conduct a review of compliance with the codes and standards under Licence Condition 4 of both licences within the required timeframe.

CAS continues to be an active participant at the Symposium of North Eastern Accelerator Personnel (SNEAP), which regularly meets to discuss and share information including safety related issues.

Configuration control

Examples of recent changes under section 64 of the Regulations were discussed which demonstrated that potential impacts on the radiological safety margins and other potentially affected work areas had been considered and managed appropriately. The modification to the SIRIUS SNICS Ion source bias shield and ground electrode change control documentation was examined in detail, including the project scoping documents, drawings and the *ARPANSA Regulation 51 Determination Form* (AF-2388). No issues were raised.

Documentation for *the design brief and safety discussions* of an upcoming proposed modification for ANTARES to enable biological samples to be irradiated at atmospheric gas pressure were examined and no significant issues raised with the current approach to this change to date.

Testing for the installation of additional barriers (light curtains) on ANTARES was viewed during the walkthrough of the facility and the ongoing configuration control process discussed for this potential change. No issues were raised with the approach to this modification at the time of the inspection.

Radiation protection

The doses for the CAS were reviewed since the last inspection and remain well below the statutory limits set in the Regulations and well below the annual facility dose constraint of <2 mSv/year. No abnormal doses to staff have been recorded and doses continue to be reported to ARPANSA quarterly. Dosimetry for staff was checked at the time of the inspection and no issues raised.

The continuous monitoring of areas around all four accelerators by fixed gamma and neutron monitors and communication of the radiological status and condition of the work area on LCD screens around the facilities in B22 and B53 remains in place (along with the status of each accelerator) and was viewed at the time of the inspection. No issues were raised.

Records of manual radiation surveys were examined. There were survey records for ANTARES but none within the last three years could be located (a requirement of internal ANSTO document Accelerator Operations Management (VP-1062) workplace monitoring program). Digital logs were available. An area for improvement for compliance with VP-1062 (which forms part of the *ANSTO Accelerator Facilities Plans and Arrangements* (AG-5419)) was raised.

Radiological controls as claimed in the Safety Analysis Report and stated in VP-1062, such as interlocked gates and barriers were viewed during the physical inspection. Areas where the local dose was above 10 µSv/hr were noted to be either barriered off with signage and local monitors present, or the dose reduced with additional shielding etc. The temporary blue classified area for SIRIUS operation was inspected along with the controls to prevent access. No issues were raised.

Although the facility licences for CAS authorise the use of Group 1 sealed sources, the two sealed sources (SS002378/1861 Cs-137 and SS003060/1874 Sr90) in use remain under the ANSTO Source Licence (S0045). Wipe testing records (*Health Physics Radioactive Source Integrity Check Record F4144*) were in line with the ARPANSA *Guide Wipe Testing of use of sealed sources beyond recommended working life* (REG-COM-SUP-270A) and both were within the recommended working life.

The security arrangements remained appropriate for category 5 sources. However, source SS003060/1874 (Sr90) was found to have no *Local Arrangements Form* (AF-2342) associated with its location to cover its activity, ownership or general details. This omission was added to the above area for improvement to bring the management of this source into compliance with internal ANSTO CAS *Source Management Procedure* (I5516) (which requires Local Arrangements to be detailed on AF-2342 at each source location).

Inspection testing and maintenance (ITM)

Since the last inspection, ITM for CAS has been migrated from a local computerised system 'Acclog' to the ANSTO wide SAP maintenance management system. Records of completion of tasks under *Radiation Protection Maintenance* (CAS-RAD01) were inspected, including calibration of radiation monitors and testing of radiation gate interlocks. The SAP records showed that the maintenance had been completed within the required periods.

The scheduling, authorisation, Safe Work Permit, *Safe Work Method and Environmental Statement* (AF 2315), the Confined Space Permit and the *ANTARES Internal maintenance shutdown authorisations and safety checklist* (F5186) for work being conducted at the time of the inspection - Pressure Vessel entry for SIRIUS to conduct routine maintenance - were reviewed and no radiological safety issues raised.

Contractors and supply chain continue to be managed under the ANSTO central contractor management and procurement processes. No issues were raised.

Evidence of review of performance data and observations from the CAS group meetings and the SAP ANSTO monthly meetings where applicable was viewed. Although no specific issues in ITM breakdown or preventative maintenance have been identified to date, CAS are currently looking into the capabilities of the SAP system to produce analyses reports in the future to further support data trending.

Training

A number of training records (VF 5197) and the Accelerator Operator Training Information Manual were examined and found to be in line with the *ANSTO Accelerator Facilities Plans and Arrangements* (AG-5419). This requires authorisation and written and practical tests to qualify to be a grade 1 or 2 operator for each accelerator. The content of the training modules was updated in 2018 and all operators were required to take revision training to reflect the introduction of the SIRIUS instrument and as part of continuous knowledge management. The training content continues to include response to abnormal events and content on safety incidents and lessons learned which have occurred at other accelerator facilities as well as response to emergency alarms.

The pass criteria was inspected (examples of written tests and discussion of the practical training given) and three examples of where candidates were noted as requiring more training prior to sign off discussed. No issues were raised with this approach.

Staff at the facility were noted to have also conducted the central ANSTO security training and all operators the internal ANSTO Radiation Safety course and ongoing radiation safety workshop refreshers. Succession planning is being managed as per the central ANSTO procedures.

Emergency preparedness and response / event protection

The last two emergency exercise reports (AF 2609) were inspected for the facilities. These had been conducted with the 2-year requirement of VP-1062 and involved evacuation for fire and an evacuation due to SF6 plant simulated gas leak with the Emergency Response Team simulated recovery of personnel. Evidence that actions raised had been addressed was sighted. No issues were raised.

Procedures on emergency response are in place through the ANSTO Accelerator Facilities Plans and Arrangements (AG-5419) and VP-1062, although the response to the receipt of a high radiation alarm could be expanded to include more information. An area for improvement was raised to capture this.

Security

The physical security arrangements at the facilities were found to remain appropriate. The current plans and arrangements however no longer contain information on security risks, threat assessments and administrative / procedural measures specific to the CAS facilities. It was noted that this information was contained in the original licence application Security Plan which was recently superseded. This was added to the area for improvement above.

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 latest version of the CAS Plans and Arrangements document omits the local security risk, threat assessment and administrative / procedural measures that the original licence applications contained. In addition more information on the action to take on receipt of a radiation alarm could be included in this document and/or VP-1062.
2. CAS was not in compliance with internal ANSTO procedures regarding frequency of radiological surveys for ANTARES and local source arrangements for one sealed source.

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