Inspection Report

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| **Licence Holder**: Department of Defence and Australian Defence Force (Defence) | **Licence Number:** F0252 |
| **Location inspected:** Defence base in South Australia | **Date/s of inspection:** 30 March - 7 April 2017 |
| **Report No:** R17/03877 |
| An inspection was conducted as part of ARPANSA’s baseline inspection program to assess compliance with the *Australian Radiation Protection and Nuclear Safety Act 1998* (the Act), the Australian Radiation Protection and Nuclear Safety Regulations 1999 (the Regulations), and conditions of Facility Licence F0252. The scope of the inspection included an assessment of Defence’s performance in the following areas: * Performance reporting and verification
* Configuration management
* Inspection testing and maintenance
* Training
* Event protection
* Security
* Radiation protection
* Emergency preparedness and response

The inspection consisted of a review of records, interviews, and physical inspection of the facility. Background The Defence establishment houses a 1.2-3 MeV linear accelerator (linac) which is used for radiographing explosive ordnance and weapons.ObservationsPerformance reporting and verificationDocuments describing the operation of the facility and relating to safety and explosive ordnance are reviewed on an annual basis. Other documents are reviewed on a three year cycle. The processes associated with the radiography of ordnance achieved NATA accreditation in December 2016. The Unit is in the process of transitioning from one document management system to another. This requires that the data that had previously been programmed into the system is now managed manually. The Unit was able to show that the majority of the documents had been reviewed according to their schedule. However, review of the document describing general safety at the base had been delayed within the process and had not yet been approved or published. This indicates inadequate oversight of the review process.Configuration controlThe current linac was originally procured to supplement another higher energy linac. The two linacs were housed in the same building. The safety case for the newer linac was based upon the argument that it produces less energetic radiation, and as such, the shielding and safety systems that were developed for the more powerful linac exceed those required for this newer one. That is, the newer linac operates within the safety envelope established within the safety analysis report (SAR) for the more powerful linac. Some time after procuring the lower energy linac, Defence decided there is no need for the higher energy linac. It has since been subsequently decommissioned and removed. The SAR for the higher energy linac has not been reviewed or updated to reflect the role it plays in demonstrating the safety of the newer linac. This leaves Defence at risk of losing sight of the safety margins in place.Inspection testing and maintenance Radiation surveys are performed annually, if maintenance is performed, or if the location or beam direction of the linac is changed. Records of recent surveys were supplied. This demonstrated that Defence has been monitoring the radiation around the facility. The recorded values confirm that the shielding present at the facility is effective and that occupational doses are well below the dose limits.A variety of safety features were used in the design of the facility. These include interlocks, which if tripped, prevent the linac from producing radiation, and emergency stop buttons, which if pressed, cut power to the entire system (including the chiller used to remove heat generated by the operation of the linac). Every day that the linac is operated, one of the emergency stop switches is tested to confirm that it is functional. The operator tests a different emergency stop switch each time to demonstrate that they are all functioning correctly. However, a list of all of the safety interlocks, emergency stop buttons, barriers and emergency systems does not exist. This leaves Defence at risk of losing corporate knowledge of the safety systems in place.TrainingA mandatory training program is conducted annually. This consists of briefings and awareness sessions on various topics (i.e. WHS, security and first aid). Included in this program is a session on radiation safety that covers both the fundamental physics associated with radiation protection and the specific safety systems in place at this facility. Records of attendance were kept for some of the sessions. Thereby, Defence was able to provide records demonstrating that virtually all personnel were present on two of the days that the mandatory training was held. This included the radiographer and his assistant. However, there was no record to show that personnel were present for the refresher on radiation safety. This indicates inadequacies in record keeping.Event protectionThere are plans in place for the base to deal with a multitude of different emergencies addressing a variety of possible scenarios from bushfires, aircraft accidents, storms, flooding, power failure and explosions. The range of scenarios covering external initiating events are extremely broad for a machine generated source of radiation (i.e. linac).SecurityThe security measures in place are sound for this type of source. The linac is secured within a locked building within a Defence base. Access is via a security checkpoint on the way to the facility. The keys to access both the facility and to power the linac are held securely. Access to these keys is limited to those who need them and records of who has drawn the keys are kept and auditable.Radiation protectionThe Unit has a quality system in place to create, review and manage the policies, processes and procedures associated with their examination of explosive ordnance. This includes a technical information review process. This is used to identify the actions that would stem from the adoption of best practices (i.e. a new standard or code of practice). The process is then used to implement the appropriate actions and certify that the actions have been implemented correctly. ARPANSA has previously advised Defence of the existence of an American Standard that addresses safety practices associated with this type of facility. However, Defence have not implemented the process to assess this standard.Defence initially utilised a consultant to develop the shielding design for this facility. When the facility was commissioned, a medical physicist from a nearby hospital was engaged to perform the initial survey to independently verify the shielding design. In the period since, however, no external expert has been utilised to assess the performance of the facility. This indicates that further improvements or best practices may not be identified.Emergency preparedness and responseA work instruction and an associated procedure describe what to do if an emergency evacuation is needed. This instruction applies to several buildings on site and is not unique to this facility. Emergency drills/exercises are conducted on annual basis. These can include a lockdown of the base, unplanned detonation of an explosive or a fire in a warehouse. In some instances, staff on base may be forewarned that a drill is going to be conducted, however, at other times the drills are held without warning or notice. In some instances this is done in collaboration with external bodies (such as the local emergency services). There is constant collaboration with local emergency services so that their personnel know the arrangements for accessing the base and the controls that are in place to deal with the hazards that are present (i.e. explosives). However, Defence had not considered a scenario whereby an out-of-control source of radiation emerged. For instance, if the linac continued to operate after the radiographer has commanded it to stop. While this type of event has not occurred and the Unit was able to describe a sensible way to deal with such a situation, a procedure or instruction had not been developed for training operators in how to respond to the situation. This leaves new or less experienced operators at risk of not knowing what to do in the event that this occurs. FindingsThe 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**:* Oversight arrangements associated with the review and approval of documents describing safety.
* Review and revision of the Safety Analysis Report.
* Record keeping associated with attendance at training sessions.
* Identification and assessment of best practices in the operation of the facility.

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