



Inspection report

Licence holder: Department of Defence and Australian Defence Force (Defence)	Licence number: F0213
Location inspected: Defence Base in South Australia	Date/s of inspection: 10-11 December 2019
	Report no: R20/00094

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 2018 (the Regulations), and conditions of facility licence F0213. The inspection was performed concurrently with planned Defence work, the performance of which was observed by ARPANSA.

The scope of the inspection included an assessment of Defence’s performance against the Facility Performance Objectives and Criteria (POCs). The inspection consisted of a review of records, interviews, and physical inspection of the facility.

Background

The facility houses legacy waste made up of unrepairable and obsolete equipment, instruments, repair parts and consumables containing low and intermediate level radioactive materials. The facility is closed and does not receive waste on a regular basis. Defence possesses and controls the facility in order to manage its own waste as well as waste stemming from other Commonwealth organisations.

The main codes and standards applicable to this facility are those that appear in section 59 of the Regulations plus:

1. Australian/New Zealand Standard *Safety in Laboratories - Ionizing Radiations* (AS/NZS 2243.4)

Observations

Performance reporting verification

The risks associated with this facility are managed as part of the normal operations and management within Defence. This approach involves Defence management in the assessment of the risks and the communication of these risks to senior Defence management. Although no radiological incidents or accidents have occurred at the facility, in the event that one does occur, Defence has a reporting system in place to record the incident, as well as standard practices for the investigation and reporting of what happened and identification of measures to prevent a reoccurrence. A graded approach to internal reporting of radiological issues is used. This is consistent across all Defence activities with radiation.

At the corporate level, Defence has standing committees and working groups that facilitate communication and sharing of lessons learned from operating experience. With respect to this facility, Defence is working towards compiling the common root causes or lessons learned associated with the outcomes of ARPANSA inspections of this and other Defence facilities, and it is anticipated that in the future, this data will improve the way Defence manages the facility.

Configuration management

Defence has previously developed a safety management system that was designed to comply with the Australian Standard (AS 4801). However, this standard has been withdrawn and replaced by an international standard (ISO 45001). While Defence has conducted a quick comparison of the two standards, a formal assessment of the differences has not yet occurred. Defence uses plans and arrangements for the facility as a means of knowledge management and retention. The standard operating procedure (SOP) describes what workers should do and how they should do it. The Regulations require Defence to review and update the plans and arrangements for the facility at least once every three years. This has been done several times over the last few years as Defence looks to improve the management of the facility. The reviews are conducted based on the current documentation, the outcomes of ARPANSA inspections, changes to codes and standards, and operating experience. It was indicated that there is a desire to continue to improve the management system for the facility. However, it appears that this progress is being slowed by limitations to the available resources for this activity and prioritisation of other work.

Defence has long conducted a program of internal assurance inspections to assess compliance with their safety management system. As a result, a robust process has been put in place for managing the findings from these internal assurance inspections. A similar process has been implemented for managing the outcomes of ARPANSA inspections. The facility management initially assesses the findings and assigns a priority consistent with other workloads. Root causes of the findings are identified and the most appropriate method of implementation within the Defence organisation is identified.

This facility houses radioactive waste stemming from previous uses of radioactivity. Defence policy requires that future purchases of radioactive material include the arrangement for the original equipment manufacturer or supplier to accept the material back at the end of its life. Defence has been engaging with the National Radioactive Waste Management Facility (NRWMF) Project with the aim of transferring waste to that facility in the future. However, a Waste Acceptance Criteria (WAC) for that facility has not yet been developed. If that facility does not eventuate, or if the waste held by Defence cannot be transferred to a national facility, Defence intends to reassess disposition or management options at that point. However, Defence does not have a documented strategy for managing future options whereby a national facility is unable to accept the waste. Despite this, the NRWMF Project appears to have had a positive outcome by bringing together organisations that hold radioactive waste and encouraging communication and sharing of experiences. This is seen as a positive practice.

In the event that the waste within the facility is transferred elsewhere, Defence has committed to decommissioning the facility in accordance with legislation and applicable standards. However, Defence has not developed any detail of how this would be achieved. International Best Practice in the area, such as IAEA *General Safety Requirements Part 6 Decommissioning of Facilities* (2014), recommends that a decommissioning plan is developed and maintained throughout the life of the facility. This is done in order to show that decommissioning can be accomplished safely to meet the defined end state.

Inspection testing and maintenance

At the organisational level, Defence has processes in place to ensure that buildings are sound. Maintenance is conducted as part of a planned schedule. A log recording the planned maintenance that has occurred is kept. Unplanned maintenance is requested when needed using an electronic system. The facility management has previously used this to request an assessment and repair of an external feature of the building and the compound.

The workers and management of the facility have access to a cache of radiation monitoring equipment. This is calibrated on an annual basis with records maintained with the equipment and within the Defence record management system. Half the equipment is calibrated around March, and the other half around August. This is done to ensure that equipment is always available when needed and is seen as a positive

practice. The calibration dates are tracked in a database. All equipment used by Defence during the inspection was found to be within the calibration dates.

Training

Defence has an employee development and performance review process for identifying each individual's training needs. This process is applied in the context of the management of this facility. Although training is tailored for each person based on their skills, experience and qualifications, a minimal training standard has been established for the staff that work at this facility. This includes a 3-day Radiation Safety course and on-the-job training in another radioactive waste store. The RSO for the facility undertakes a 5-day Radiation Safety course in addition to the on-the-job-training.

In accordance with the *Planned Exposure Code* (RPS C-1), Defence has identified a Qualified Expert. This individual has been accredited by the Australasian Radiation Protection Accreditation Board (ARPAB). The other personnel within this group are also in the process of achieving ARPAB accreditation. This is identified as a good practice below. In addition to this, the management for the facility have also undertaken training in root cause analysis. This is used to identify causal factors behind the findings identified in regulatory inspections and the level within the organisation that is best suited to implementing an improvement to address the issue.

Refresher training is conducted annually. This training is given by the Qualified Expert and delivered to a broad group of staff so that any of them can undertake work at the facility. Workers are taught the processes undertaken at the facility in a staged manner. First they observe the process, then they conduct the process under supervision and finally they perform the process. This methodology appeared to work well in practice as a Defence representative was able to successfully demonstrate the process even though this was his first time doing so without supervision.

Event protection

The facility is housed in a pre-existing building that was designed for the range of meteorological conditions expected at the site. A Safety Analysis Report (SAR) for the facility considers a range of human and natural phenomena that may affect the capacity of the facility to perform its safety function. Previous ARPANSA inspections in 2017 and 2018 have highlighted potential shortcomings in the SAR and the need for it to be reviewed and revised. Defence representatives have reviewed the SAR and conclude that it does not match the current configuration/arrangements. Defence has adopted a corporate approach to the development, review and revision of SARs and as such is developing a framework for these activities that can be applied to all facilities and share the lessons that have been learned in one facility to another. However, this work is still in progress. Hence a timeframe for finalising the work is unavailable. This is identified as an area for improvement below.

Security

In accordance with standard Defence practice, security exercises for the site are conducted. These test the site-wide arrangements and do not specifically relate to the security of this facility. ARPANSA recommends that drills and exercises are used to test the responses to potential or actual security incidents, and that where practicable, the security response is also tested during safety incidents, drills and exercises. The facility management recently responded to a security event. While the event itself was no cause for alarm, Defence was satisfied with their response and the ability to get the appropriate people to the facility with equipment able to assess the situation and confirm that it was a false alarm. However, no facility specific security exercises have been conducted for this facility. It is acknowledged that Defence representatives have indicated the intention to conduct an exercise in conjunction with stakeholder education. This is identified as an area for improvement below.

Radiological protection

In accordance with sound industry practice, Defence arranged for a pre-commissioning survey to be undertaken. This included contamination monitoring, a gamma dose rate survey and an analysis of a series of soil samples. This provides a baseline level of radiation within, and around, the building before the introduction of the radioactive waste. Further soil sampling has been conducted in 2015 and 2018. Although there are differences in the analysis performed (i.e. number of samples collected and nuclides assessed etc), these measurements do not show any anthropogenic nuclides in the environment nearby to the facility and do not suggest a build-up of radioactivity in the environment. The most recent soil sampling was conducted in standardised locations and targeted in a risk informed fashion with the aim of examining areas where surface water has been adjacent to the building.

Gamma radiation dose rate surveys are routinely conducted on entering the facility. These are conducted at 18 designated points external and internal to the building. These measurements provide data relevant to public and occupational exposures due to the facility, although, only workers attend/work in the facility. Defence records this data in a table and compare the measured values against the average. When personnel return to the office, the data is then input into a spreadsheet that automatically calculates a running average based on past measurements, plus or minus error margins. It was discussed, however, that the use of a running average could change over time resulting in the dose rates creeping upwards without being noticed. Defence are aware of this risk and indicated the intention to revise the approach during future reviews. Furthermore, it was observed that the make/model/serial number & calibration date of the detector used for surveys was not recorded. It is industry practice to record these details.

A basic radiological assessment of worker doses has been performed. This uses measured dose rates and assumptions of time spent in specific locations to predict future exposures and uses this to set a dose constraint for the facility which Defence has indicated will be reviewed on a 3 yearly basis. The qualified expert for the facility has reviewed the instructions for the facility. However, consultation on public exposure and environmental impact due to the facility is undertaken informally due to the close working relationship between the facility management and the qualified expert. This could be better documented in future.

The Australian Standard (AS 2243.4) includes requirements for the storage of radioactive material. The most recent review of this standard, conducted in 2018, introduced the terms 'controlled area' and 'supervised area'. Defence has not yet implemented this revised approach in the context of this facility. Furthermore, Defence has not explicitly assessed the waste in accordance with RPS 20 Safety Guide *Classification of Radioactive Waste* (2010). This is identified as an area for improvement below.

Radiation warning signs are posted on the exterior of the building. This identifies that a radiological hazard exists within. However, no warning sign is posted on the internal door leading towards the drum hall. Furthermore, the required personal protective equipment, dosimetry, training or supervision requirements for accessing the area are not specified. Neither is the contact details for the RSO posted. Moreover, while contamination monitoring equipment is present, and personnel generally do not touch the drums, a formal contamination control barrier is not present and routine screening for contamination after removal of PPE prior to exiting the facility does not occur. This is identified as an area for improvement below.

The placement of the drums within the facility inhibits the full examination of all drums. However, Defence has routinely and diligently conducted visual examination of the majority of the waste packages. Defence has not conducted any wipe or smear tests to confirm that the packages have not leaked radioactivity.

Some of the radionuclides stored in the facility emit radon gas. The design of the facility adopted a passive approach to the ventilation of radon that does not require electrical power. This is seen as a positive practice, however, the methodology behind the initial design has been lost. Defence has started an initial screening level assessment of radon levels within the facility. This aims to understand what the average radon concentration is within the facility. Defence consider the first batch of radon gas measurements to be unreliable as the detectors fell from their initial placement, and as such were outside the specifications recommended by the measurement organisation. However, they give Defence some information about the radon concentration levels present in the facility. More robust measures have been used in the placement of subsequent radon detectors. Defence withdrew the second batch of radon detectors and placed a third batch in the facility at the time of the inspection. It is envisaged that this should provide more accurate indication of the radon levels within the facility and provide a basis for whether there is a need for improved ventilation.

Predisposal management (e.g. characterisation, processing and storage) covers various stages of the management of radioactive waste that can occur prior to disposal. There are interdependencies between these stages as measures taken at one step may affect a subsequent step and the available alternatives. This facility stores waste that has previously been packaged by a third party. Defence has started to make enquiries about the finer details of the inventory of waste held in the facility and whether any conditioning has previously occurred. However, Defence does not have any documentation. This is identified as an area for improvement below. Furthermore, the current inventory records activities from 1994. While some of the nuclides stored in the facility are long-lived, hence, will not have significantly changed due to radioactive decay in the intervening period, for some other nuclides, decay can substantially decrease the amount of radioactivity present. Defence has not updated the inventory to accommodate for these natural changes. Moreover, no activities were recorded for the contents of some of the other drums.

Emergency preparedness & response

Defence has an Emergency Response Plan for the facility; this identifies a variety of emergency scenarios that could occur and broad details for the intended response. This plan includes the identification of roles and responsibilities in the initial stages of a potential accident and arrangements for communication and coordination of the emergency response and actions for escalation if needed. However, the facility has not been categorised in accordance with current international best practice in emergency preparedness for radiological and nuclear facilities. An example of this would be the IAEA *General Safety Requirements Part 7 Preparedness and Response for a Nuclear or Radiological Emergency* (2015). Furthermore, no emergency exercises have been conducted for the facility. Moreover, no preparedness planning for accident recovery (including remediation preparedness) has been undertaken yet. These three aspects are identified as areas for improvement below. The *ARPANSA Regulatory Guide: Siting of Controlled Facilities* (2014) identified the importance of remediation preparedness in helping to build trust and provide assurance to stakeholders as it is too late to begin planning for accident recovery after an accident has occurred. Defence, however, are in the early stages of planning an emergency/security exercise. Personnel with responsibility for the facility have recently been involved in two desktop exercises with another part of Defence. This included other agencies in the exercises and it is expected that a future exercise for this facility, planned for some time in 2020, will also involve external parties, such as other parties on the site and the emergency services personnel in the region. Involvement of external parties in emergency exercises is seen as a positive practice as it improves stakeholder communication and clarifies roles and expectations for what would happen in an actual emergency.

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. Reviewing and updating the SAR
2. Conducting a security/emergency exercise and planning for post-accident recovery
3. Updating details relating to the waste storage and assessment requirements
4. Improving contamination monitoring and establishment of a contamination control point
5. Refining the finer details of the inventory and documentation of any conditioning that has previously occurred
6. Reviewing documents detailing international best practice in relation to EPR and implementing any appropriate improvements.

The inspection revealed the following **good practice**:

1. The qualified expert has achieved accreditation through an independent board.

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