Inspection report

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| **Licence holder:** Department of Defence and Australian Defence Force (Defence) | **Licence number:** S0042 |
| Location inspected: A Defence base in Western Australia | **Date/s of inspection:** 10 April 2019 |
| **Report no:** R19/03917 |
| 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 source licence S0042.  The scope of the inspection included an assessment of Defence’s performance against the Source Performance Objectives and Criteria (PO&Cs). The inspection consisted of a review of records, interviews, and physical inspection of the source. Background Defence manages explosive ordnance (EO) and responds to the identification of improvised explosive devices (IED). Various techniques are employed in order to safely dispose of EO and IEDs. One of these techniques utilises X-rays in order to radiograph the item. The information available from the image of the internal structure of the item can be used when rendering it safe.  The main codes and standards applicable to this source are:   * Radiation Protection Series C-1 - *Code for Radiation Protection in Planned Exposure Situations* (2016)(RPS C-1) * Radiation Protection Series C-4 - *Code of Radiation Protection Requirements for Industrial Radiography* (2018) (RPS C-4)  ObservationsPerformance reporting and verification A technical network supporting radiation management has been established in conjunction with the normal chain-of-command. The Defence unit (Unit) being inspected is represented on the network and uses it as a conduit for information to flow to the corporate Radiation Safety Working Group (RSWG). Information from this RSWG is also disseminated through the technical network to provide current information on radiation safety matters to Defence units.  Clarification was provided to inspectors surrounding the responsibility of compliance monitoring and by extension, reporting. The Radiation Safety Plan (RSP) supplied appeared to highlight the responsibility rested with the Commanding Officer (CO) and the Logistics Services Manager (LSM), with only contractor compliance in respect to radiation safety being monitored by the Radiation Safety Officer (RSO). In practice however, the RSO has oversight in the radiation space and will report to the LSM and CO. Configuration management Defence has a procedure it employs for those staff performing EOD or IEDD tasks, specifically for the use of the X-ray machine, which dictates safety distances for both radiation workers and the public. Rather than this procedure receive an update, amendments have been created instead and promulgated through the Units that use this piece of equipment.  The Unit being inspected has had these safety distances added to their own procedures. Whilst it was demonstrated that the most recent amendment were held by this Unit, they had not been introduced through a dedicated review of the procedures as they are not managed by the Unit itself. In practice, the safety distances employed by those personnel on the ground far outweigh those as stipulated by procedure due to other hazard management considerations.  As previously stated, though implemented at the local level, neither of the aforementioned procedures are owned by the Unit. While the former procedure is in a state of flux as its replacement is yet to be confirmed, the latter is current and receives regular revisions. Even though updates are suggested upward to the technical service who produced the higher-level document, it was observed that a comprehensive review has not been completed. This has led to inaccuracies including: action levels not being updated, old codes of practice are still referenced, equipment specifications are not aligned with those provided by the manufacturer, and some statements within the documents go against Defence requirements (key storage and dosimetry management) and RPS C-1 (which requires that dose records must be provided to an occupationally exposed person periodically, on request and on termination of employment).  Inspectors also queried the Unit’s use of safety risk assessments (SRA). At the time of inspection there were two risk assessments in place: one which had recently been developed within few weeks prior to the inspection; and another accompanying the RSP which focussed on inventory management rather than use of the equipment. The Unit confirmed prior to the recent SRA being completed, the use of the equipment had not been risk assessed in the preceding five years of use. Though in place at the time, inspectors highlighted that it is a requirement of the RPS C-1 that a safety assessment be conducted, documented and, where appropriate reviewed.  In a desktop inspection of the risk assessment, it was noted that operator/bystander protection relied on adherence to procedural and administrative controls without inclusion of quantitative data/analysis to better inform the risk assessment. Inspection, testing and maintenance A maintenance program has been implemented to ensure that the equipment is in working order. This program encompasses both Technical Inspections (TI) and Non-Technical Inspections (NTI) with a nominated frequency of yearly and six-monthly respectively. During the inspection it appeared that one of the kits held by the Unit had had its TI lapse in 2016 and 2018. Defence personnel sought to investigate and clarify this issue and supplied further information to inspectors. In 2016, the Unit had initially kept the X-ray machine while others were being maintained to ensure there was no loss of capability. When it was identified that the controlled apparatus had fallen outside the scheduled maintenance period it was then appropriately distributed for maintenance. Upon return however, the logbook which records maintenance activities was not completed. In 2018, it was recognised that the equipment had yet again not undergone its mandatory TI. Therefore, it was removed from service and at the time of inspection, was currently undergoing maintenance. Training It is a requirement for Defence personnel to complete an annual general awareness training for radiation safety. In this instance, this was presented in the form of a training DVD. Records provided to inspectors indicated that all personnel had completed this baseline training with the exception of the RSO. At the time this awareness training was being completed, the RSO was attending an external Defence specific radiation safety course.  It is also a requirement for those personnel working in the field of explosive ordnance disposal (EOD) or improvised explosive device disposal (IEDD) to be trained, certified, complete annual EOD continuation training and be requalified after a period of three years. At the time of the inspection, it appeared that only one Unit member was trained as an EOD/IEDD technician with the second operator only having completed a lower level qualification for explosive ordnance reconnaissance (EOR) which was believed to only allow those members of the Unit to maintain the equipment rather than in its actual use. Inspectors highlighted this as not meeting the requirements of RPS C-4. This has since been clarified by Defence who have highlighted that the assistant operator qualifications are in fact trained to operate the equipment but are instead not trained in the interpretation of the resultant radiographs. Event protection No credible external events could be identified which required radiation protection arrangements. Security There is a standing procedural requirement that the keys used to turn the X-ray machine on are kept separately and protected by an intruder alarm system. The equipment is locked in a secure area inside a secure building to which access can only be provided when authorised by the Commanding Officer (CO). This is in addition to the security features provided by the nature of its location within a secured Defence base. Radiation protection The operators are required to wear personal dosimetry to measure their radiation dose when performing a task involving X-rays.  The X-ray equipment is housed in a transport case alongside electronic personal dosimeters (EPDs) which are currently within calibration. Inspectors were informed that they are always worn when performing an X-ray, in conjunction with their passive dosimetry, as a real-time assurance of any dose received which was expected to be virtually none due to adherence to operating procedure. Defence personnel within the unit were unaware that their EPDs are unable to accurately respond to pulsed radiation and therefore cannot provide a realistic indication of real-time dose and were not suited for their intended purpose. However it was recognised that these may be useful for the detection of another source of radiation in the operating environment.  In terms of passive dosimetry, the unit makes use of Optically Stimulated Luminescence (OSL) dosimeters. Without wearing dosimetry, procedures state that personnel must not be involved in carrying out an exposure. At the time of the inspection, the Unit engaged a temporary replacement performing the role of the EOD/IEDD operator. The Defence member had not brought their OSL to this temporary transfer location and therefore, in accordance with procedure, would be unable to operate the equipment. At the time of the inspection, the Unit had not established any arrangements to either deliver the operators OSL to the base for the defined period or to make additional OSL’s available.  OSLs have been implemented across Defence as a replacement to the previous Thermo-Luminescent Dosimeters (TLDs). Due to their current minimum reportable dose and the associated margin of error, the RSWG introduced a new action level for investigating doses. However, this limit has not been introduced within the units working procedures as a replacement to its predecessor aligned with TLDs.  The RSP for the Unit is not specific to the Unit itself but covers a greater, multi-site jurisdiction that deals with other radiation hazards. This document then provides the user with specific examples of what would constitute a radiation safety incident or accident. However, the RSP does not consider an incident involving radiation exposures from X-rays such as an uncontrolled firing or breach of a safety barrier.  In accordance with RPS C-4, there is a requirement that applies to operators of industrial radiography equipment that details of the movement of the equipment are maintained within a radiation source movement book (RSMB). These details include an ID number, the location the apparatus is operated, the date and time of removal and return, and the name of the operator. Essentially this book acts as a simple register to track the movements of the source. Defence uses a corporate system to track ownership of the equipment and the Unit at the local level maintains a record of temporary issue (for when equipment is loaned to other Units). These two management systems do not cover the full intention of the RSMB and at the time of the inspection had not been introduced. Emergency preparedness and response Emergency response drills are conducted in accordance with Defence base requirements. The drills are performed for the base more broadly and for the building/s affected and are conducted multiple times a year. Rather than deliberately designing a specific exercise, the Unit generally conducts exercises during real events. 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. Awareness of effectiveness and suitability of the use of EPDs 2. OSL management and availability 3. Comprehensive review of technical safety documentation with procedures 4. Implementation of a Radiation Source Movement Book   It is expected that improvement actions will be taken in a timely manner. | |

*No written response to this report is required*

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