



Australian Government

Australian Radiation Protection and Nuclear Safety Agency

INSPECTION REPORT

Licence Holder: CSIRO Hangar 5 Annex	Licence Number: S0013
Location inspected: Woomera, SA	Date of inspection: 27-29 April 2016
	Report No: R16/05292

An inspection was conducted under Part 7 of the *Australian Radiation Protection and Nuclear Safety Act 1998* (the Act). The purpose of the inspection was to assess compliance with the Act, applicable regulations, and licence conditions. The inspection was conducted as part of ARPANSA's baseline source inspection program.

The inspection consisted of a review of records, interviews, a series of radiological measurements, and a physical inspection of radioactive material stored at Woomera. In addition, soil samples were collected in order to establish a baseline of the background environmental conditions at the site.

Background

CSIRO Business Infrastructure Services (CBIS) is licenced under section 33 of the *Australian Radiation Protection and Nuclear Safety Act 1998* to store low-level radioactive material in approximately 10,000 drums at one site at Woomera.

Observations

In general the management of the drums at Woomera has not changed significantly over the previous eight (8) years. However, the inspection found concerns regarding the future integrity of the drums. Evidence was sighted that indicates that the drums are now beginning to deteriorate rapidly. Significant rust on a number of the drums, deterioration of the plastic drum-liners and crushing of some stacked drums were observed. At one location, a radiation measurement was taken that had elevated from $90\text{nSv}\cdot\text{hr}^{-1}$ to $2\mu\text{Sv}\cdot\text{hr}^{-1}$ when compared to the same measurement conducted by ARPANSA eight (8) years ago. A spectrum was taken at this location confirming the presence of ^{226}Ra . It was unclear whether the elevated dose rate was due to the in-growth of daughter products or due to material that may have leaked from the drums.

Moreover, research conducted recently by CSIRO has indicated that many of the drums contain industrial chemicals and biological hazards. There is also the potential for the buildup of hydrogen gas within the drums due to the hydrolysis of water mixed with concentrated thorium.

It was noted that chemical baiting of pests has occurred in the past at this site. A concern was the existence of deceased animals located in and around the site. Although unlikely, there is the possibility that the presence of deceased animals (such as rodents and birds) may indicate that some of the drums, which contain industrial chemicals, may be leaking into the environment.

As a result of these observations, the inspectors decided to collect environmental soil samples to be analysed for any radiological signatures that exceed the normal environmental background levels. Additional soil samples were also collected by ARPANSA for chemical analysis to be performed by *Chem*

Centre in Western Australia. Chem Centre will be analysing the samples for heavy metals, acids and alkalines, solvents and hydrocarbons, and pesticides. The results of these environmental assessments will be provided to CSIRO.

CSIRO was unable to provide a detailed inventory of the drums. Although the inspectors recognize that this is a legacy issue where historical records of the contents of the drums are difficult to locate, the drums should be characterised as a matter of priority. Without the full knowledge the contents of the drums, risks cannot be fully identified, and risk controls cannot be appropriately implemented to protect people and the environment.

The CSIRO representatives provided a copy of the *Woomera (Hangar 5) Risk Management Plan (04/04/16)*. Based upon the observed conditions of the drums, and new historical research which highlights evidence of the presence of combined chemical, biological and radiological hazards, the risk assessment provided failed to adequately address all of the presented hazards. On page 5 for example, Hazard 4 states “various hazards on site” but does not adequately consider the chemical hazards which are now known to exist at the site.

Being explicit about the potential risks will allow for more adequate controls to be put in place. Page 1 of the supplied *Hazardous Substances Risk Control Plan (01/03/16)* highlights radiological and miscellaneous substances as the Dangerous Goods Classification for the site. The newly acquired historical information on the site suggests that 2.1 Flammable Gases (hydrogen), 6.1 Toxic Substances, 8.0 Corrosive Substances should also have been highlighted. Moreover, the identified *Exposure Route* only considers inhalation. Ingestion, absorption and external irradiation should also be considered as pathways for the complex hazardous materials at the site.

When observing the entry and exit procedures for the storage annex, a range of contamination controls were not present. It is usual practice to have an established contamination control line, with appropriate quantities of gloves, booties, suits and respirators, a waste bin and calibrated contamination monitors. For chemical hazards, additional requirements such as a spill kits, decontamination agents and rinse stations may also be required.

These observations also demonstrate that the CSIRO staff could coordinate and communicate more effectively. Sharing new information about the history of the stored material, when discovered, would assist those charged with the responsibility to implement risk management strategies for the site.

Findings

Performance may be improved by addressing the following deficiencies:

Performance Deficiencies:

1. CSIRO was not able to provide a comprehensive inventory of the radiological material stored in the drums.
2. As a result of an inadequate inventory, CSIRO were unable to develop or implement an adequate risk assessment, risk management plan, and risk control plan for the site.
3. The procedural arrangements for protecting personnel entering or operating around the site could be enhanced. Contamination control was not established to address all types of hazardous materials located at the site.
4. Communication within across the various business units of CSIRO was not evident; the sharing of information relating to the likely contents of the drums has not occurred.