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## RESIDUAL RISKS AND LOSS OF SEALED RADIOACTIVE SOURCES IN AUSTRALIA

Dear Dr Hirth,

The Radiation Health and Safety Advisory Council (**Council**), as the statutory advisory body to the CEO of the Australian Radiation Protection and Nuclear Safety Agency (**ARPANSA**), has considered recent incidents in Western Australia and South Australia involving misplaced sources and the potential for residual risks arising from lost sealed radioactive sources. Council considers that whilst in general location and retrieval of misplaced sources is done well, the data may be improved to provide greater assurance that all episodes and risks are identified, and optimally managed. Council offers the following observations:

### National uniformity

The National Directory for Radiation Protection (**NDRP**), published by ARPANSA and endorsed by the COAG Health Council (**CHC**), captures national agreements on standards, legislation and regulation. This document has been developed by the Commonwealth, States and Territories of Australia, and the Australian Health Protection Committee is responsible for updating it periodically.

enHealth oversees implementation of the NDRP and facilitates cross-jurisdictional dissemination of national and international experience that has been gained in the implementation of radiation safety legislation, in order to continuously improve the consistency and rigour of the national framework for radiation protection. Relevant sections of the NDRP state:

#### ***Part A Agreed legislation***

*21. As a minimum, jurisdictions' legislation will:*

*h) require responsible persons to establish a radiation risk management system that ensures:*

- i) a culture of safety*
- iii) reduction of the probability of human error that could lead to accidents*
- iv) prevention of accidents and mitigation of consequences of accidents on and off-site*
- vi) safety and security of radiation sources over their lifetime (including disposal)*
- viii) undertaking safety assessments to verify safety and security*
- m) provide for the establishment and maintenance of a register of radiation sources*
- o) include provisions to plan for, and provide advice in the case of, an emergency with radiological implications*
- p) include provisions requiring notification of radiation incidents to the radiation regulatory body (the Authority), investigation of radiation incidents, and notification to other jurisdictions, as appropriate.*

### **Part B Agreed regulation**

26. Jurisdictions agree to implement the regulatory arrangements in this Part and acknowledge that their legislation may require amendments from time to time to implement these agreed arrangements in a timely manner.

### **National radiation incident reporting framework**

32. Jurisdictions agree that Authorities will report radiation incidents of the types described in Schedule 4 to ARPANSA for inclusion in the Australian Radiation Incident Register (ARIR). (Nb. Schedule 4 3. Lost or stolen radioactive sources or radiation apparatus.)

33. Jurisdictions agree to develop and implement a system to assess the lessons learnt from the incidents reported to the ARIR and update relevant regulatory requirements or guidance.

Council reinforces the position that ARPANSA is the Australian Government's primary authority on radiation protection and nuclear safety, and that states and territories have committed through NDRP to reporting incidents to the Australian Radiation Incident Register (**ARIR**), which is facilitated by ARPANSA, assessing lessons learned and updating regulatory requirements or guidance, as required.

## **Incident Reporting Arrangements**

Council considers that Australia's incident reporting arrangements for lost or misplaced sealed radioactive sources are potentially incomplete, are not necessarily timely, and may not satisfactorily close the quality assurance loop. This has been highlighted by independent regulatory reviews.

The IAEA Integrated Regulatory Review Service (**IRRS**) Mission to Australia in 2018 states:

An annual report summarising events reported in the Australian Radiation Incident Register (ARIR) is published by ARPANSA. No structured assessment is conducted by any regulatory bodies regarding the need to update their respective regulatory requirements or guidance or review and assessment or inspection and licensing processes as a result of the lessons learned from these events.

**BASIS: GSR Part 1 (Rev 1) Requirement 15** states that *“The regulatory body shall make arrangements for analysis to be carried out to identify lessons to be learned from operating experience and regulatory experience, including experience in other States, and for the dissemination of the lessons learned and for their use by authorized parties, the regulatory body and other relevant authorities.”*

**BASIS: GSR Part 1 (Rev 1) Requirement 15 para 3.5** states that *“To enhance the safety of facilities and activities globally, feedback shall be provided on measures that have been taken in response to information received via national and international knowledge and reporting networks. Such measures could comprise promulgating new regulatory requirements or making safety enhancing modifications to operating practices or to equipment in authorized facilities and activities...”*

**Recommendation 7 (R7):** *Regulatory bodies should assess the need for updating regulatory requirements or guidance, review and assessment, inspection and licensing processes after considering the events reported in ARIR, especially the noteworthy events highlighted in the annual ARIR report.*

In the IRRS Follow-up Mission to Australia in 2023, the draft finding on this subject was:

**Recommendation 7 (R7)** *remains open as while the Radiation Health Expert Reference Panel (RHERP) did review and discuss ARIR incidents across the jurisdictions, there is no structured approach to recommend improvements to regulatory requirements or guidance in relation to incident reporting or follow up*

In general, state and territory legislation requires owners to report the loss or theft of radioactive sources to the regulatory authority. Subsequently, state and territory regulators provide de-identified, preliminary reports to the ARIR. However, this may not always be the case. The initial reports are rarely updated, so there are gaps in the capture of lessons learned and remedies applied. It is noted that information regarding immediate actions and recommendations is provided, however the level of detail is variable, hindering analysis of trends and preventing identification of opportunities for improved regulation or guidance.

As incidents are often not reported for a year or more, ongoing safety risks could continue in other similar settings without awareness or mitigation. Ideally, near misses should also be reported with a view to preventing more serious risks in radiation safety in a timely fashion. Council is aware that plans to upgrade the ARIR system are pending when further resources are available. Consideration could be given to benchmarking the current incident reporting system against effective incident reporting frameworks in other Australian and international safety sectors.

The ARIR annual report provides a snapshot of events, however longer-term trends are difficult to identify from annual data alone. A detailed review of the sealed source incidents from the ARIR (or state and territory-run databases) would be beneficial. The review may be able to identify such aspects as: recurring themes, whether learnings and improvements were identified and implemented, and whether information has been shared and documented to inform new guidance or regulations.

Review of responses to incidents could also contribute to improvements in emergency preparedness for radiological incidents. This information is not necessarily captured with the current reporting system but could facilitate greater interoperability and national uniformity.

## **Recent Incidents**

Availability of information plays an important part in continually improving the standards of radiological protection for Australians. There is no publicly available report with root cause analysis and recommendations from the WA lost source incident, despite this occurring over 12 months ago, or from the South Australian lost source incident in 2023. It is acknowledged that some information may need to be redacted for the public due to source security implications.

It is important that a root cause analysis includes assessment of the effectiveness of state, territory and Commonwealth regulatory frameworks, and the appropriateness of design standards and safety behaviours of owners and operators.

Apart from the issues with incident reporting arrangements already identified, transparency provides assurance to the public that incidents are resolved, or circumstances contributing to the incident have been ameliorated, maintaining the public trust in regulatory authorities and their respective governments.

## **National Sealed Radioactive Source Register**

A national sealed radioactive source register may provide a consolidated database that could contribute to better outcomes where design flaws are identified for a particular sealed radioactive source design. This would enable rapid identification of other sources of the same design and sharing of information or safety alerts.

Considerations for a national sealed source register include:

- Cooperation between jurisdictions and an appropriate methodology to minimise the administrative burden.
- Technological approaches to geolocation or tracking of sealed sources to collate data automatically, provided this did not increase security risks.
- Capturing source identification when import permits are issued.

The opportunity to backfill a national register from the existing ARPANSA Import Permit records may also be an option.

## **Sealed Source Ownership**

At a practical level, ensuring that source owners carry out their statutory duties regarding sealed source handling, storage, and transport can be difficult, perhaps due to a lack of clear operational advice, or lack of understanding of the safety risks. Periodic and 3-yearly compliance inspections are required, although sometimes the implementation of recommended remedial actions may be

misunderstood as “recommendations” not instructions. Strengthening the authority of licensed Radiation Safety Officers to be delegates of the regulator in specified circumstances could be considered.

Increased regulatory inspection may drive better owner behaviours, although better methods of ensuring responsibility by the owner should be considered.

### **Orphan Sources**

An “orphan source” is a radioactive source that is not under regulatory control. This can be because it was never under regulatory control, was abandoned, lost, misplaced, stolen, or transferred without proper authorisation. The term generally refers to a sealed source of radioactive material that is in uncontrolled condition that requires removal to protect public health and safety.

Management of these types of sealed sources is important and usually results in change of ownership “by default”, generally to the state, territory or Commonwealth. Disposal could be costly. Guidance for the management of orphan sources would be useful.

### **Recommendations:**

Sealed radioactive sources present potential radiation safety risks that are likely to require national uniformity. There is an opportunity for ARPANSA to lead on this issue. Council presents the following recommendations for your consideration:

1. Review known previous sealed source incidents to identify:
  - a. root causes
  - b. recurring themes
  - c. learnings and subsequent improvements
  - d. information that was shared with regulators and industry; and
  - e. whether incidents have been satisfactorily resolved or finalised.
2. Review current reporting arrangements for timeliness and completeness, or entry categorisation.
3. Identify any residual safety risk from missing sealed radioactive sources currently recorded in the ARIR database.
4. Review the format of the ARIR Annual Report to establish whether the information identifies trends and opportunities for improvement with regulators, owners and operators to seek to close the quality assurance loop.
5. Review comparable radiation incident reporting databases from other jurisdictions, and other Australian and international safety industries, and identify options for improving the ARIR database.
6. Explore options for a National Register of sealed sources, possibly including capturing source identification when import permits are issued.
7. Consider enhancement of safety and security of sources, possibly through the adoption of a tracking system.
8. Consider options to ensure responsible persons comply with regulatory requirements for sealed source management, including periodic and compliance inspections, and the implementation of remedial actions.
9. Develop guidance for the management of “orphan” radioactive sources in Australia.

Kind regards

*Jane Canestra*

**Jane Canestra**

**Chair**

Radiation Health and Safety Advisory Council