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Managing existing exposure situations in the Australian context

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The ARPANSA *Guide for Radiation Protection in Existing Exposure Situations*

The *Guide for Radiation Protection in Existing Exposure Situations* (2017) published by ARPANSA with approval by the state and territory regulators through the Radiation Health Committee sets out the Australian approach to protection of occupationally exposed persons, the public and the environment in existing exposure situations. Existing exposure situations include situations of exposure to natural background radiation. They also include situations of exposure due to residual radioactive material that derive from past practices that were not subject to regulatory control or that remain after an emergency exposure situation.

The Guide was published by ARPANSA with approval by the state and territory regulators through the Radiation Health Committee. It is intended to support the implementation of the international framework for radiation protection in existing exposure situations, in particular the Requirements of the IAEA's *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards General Safety Requirements Part 3, No. GSR Part 3* (IAEA 2014).

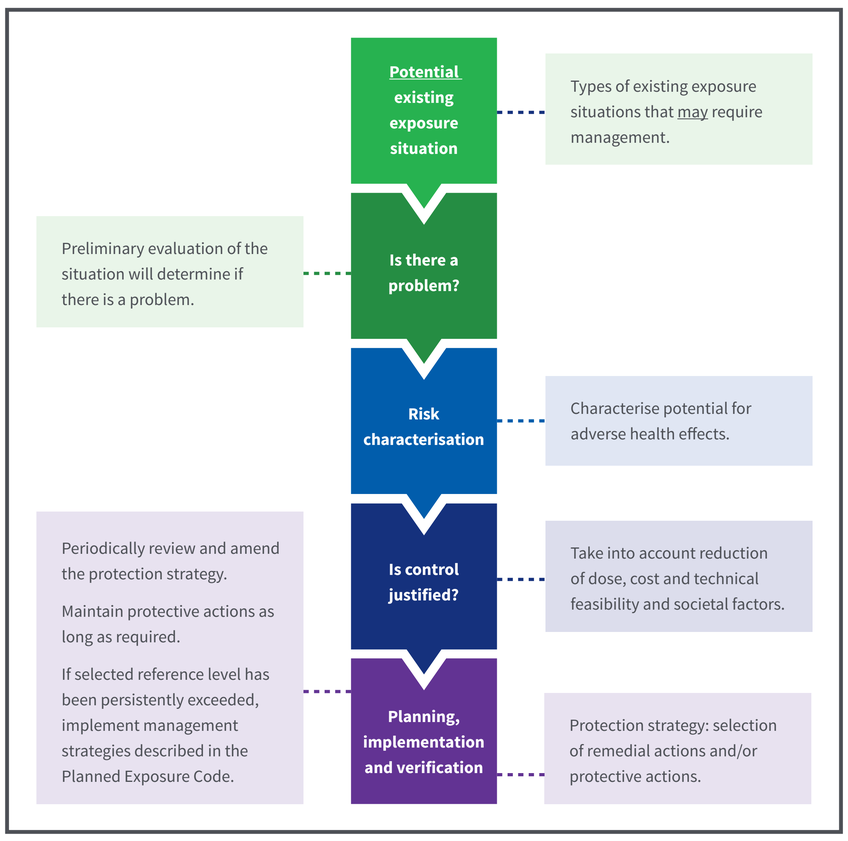

Figure 1: *Identifying and managing an existing exposure situation*

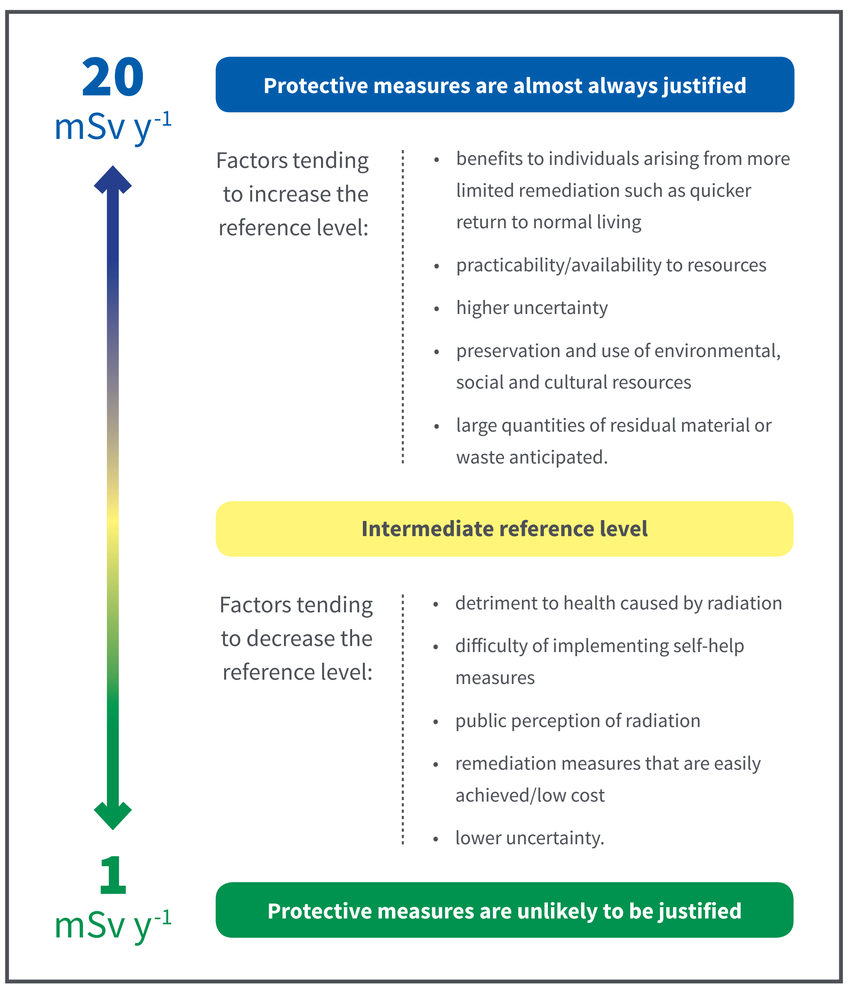

Figure 2: *Key factors informing the selection of the reference level*

Reason for review to Identifying an existing exposure

Existing exposure situations are exposures from sources that already exist when decisions to control them are made. The source of radiation exposure can be from natural, such as cosmic radiation in aviation and space flights, naturally occurring radioactive material (NORM), or radon. The source can also be artificial, such as contaminated sites from past activities or accidents.

To understand if there is a problem the exposure situation needs to be characterised to determine the nature of the source and the different exposure pathways to people and the environment. This will provide an understanding of the feasibility and net benefits of preventive measures, which would be directed in reducing or preventing exposures. Figure 1 provides a systematic process for identifying and managing an existing exposure situation.

Radon exposure in workplaces - Jenolan Caves case study

There has been a recent increase in the radiation dose to workers at Jenolan Caves. This is caused by a change in the way that radiation doses from radon are calculated (ARPANSA Advisory Note 2018), not by any change in the caves or the amount of radon that is present.

Radon levels at the Jenolan Caves are currently higher than the reference levels recommended in the Guide (~ 300 Bq·m^{-3} to 4000 Bq·m^{-3}). This does not represent an immediate short-term risk, but due to the potential harm from long-term exposure, steps will be taken to reduce staff exposure to radon. The specific actions are currently undergoing analysis and will be introduced in the coming months.

Reference level and protective measures

An appropriate reference level and protective measures should be selected based on an assessment of the exposure situation and associated projected doses, such that if:

- projected doses are above 20 mSv y^{-1} , protective actions are almost always justified
- doses are below 1 mSv y^{-1} , protective actions are unlikely to be justified
- the dose is between those two values, several factors could be considered, as illustrated in Figure 2.

Management of legacy sites - Little Forest Legacy Site (LFLS)

Between 1960 and 1968, the LFLS was used for the disposal of about 1600 m^3 of equipment and waste contaminated with low levels of radioactivity, effluent sludge, chemicals and beryllium. This was emplaced in shallow trenches dug out of the clay rich soil and then covered with a one metre thick layer of soil. This was consistent with the practice of the time.

ANSTO was able to demonstrate that the facility was performing safely. Therefore, in 2015 the CEO of ARPANSA granted ANSTO a licence to possess or control the site. However, the exposure situation already existed when a decision on control had to be taken, hence, the suitability of the site, the design of the trenches and the waste packages could not be re-visited. Although it was considered at the time, no reference level was established for the LFLS. Any future assessments will need to apply the framework of the Guide which has now been published.