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Regulating radiation exposures from naturally occurring radionuclides (NORs) in Western Australia's mining industry

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WA's mineral deposits typically contain levels of the naturally occurring radionuclides (NORs) thorium-232 and uranium-238 that are elevated above the global crustal average. Workers are exposed to NORs during the mining and mineral extraction processes, and radiation doses that exceed applicable exposure standards may eventuate.

The lithology of WA is replete with mineralisation that hosts uranium and "critical minerals" required for the global renewable energy sector. The state's first uranium mine is under development, and high levels of activity are occurring in the state's nascent critical minerals sector, with 168 WA-based companies pursuing rare earths-bearing minerals, 52 of which are actively drilling on their tenements.

The increase in activity coincides with a revision of the dose coefficients (DCs) associated with the intake of radionuclides. Modelling predicts that despite the atmospheric concentration being unchanged, the dose delivered by the inhalation of dusts containing NORs will double as a result of the revised DCs 2020. Estimates of WA mine worker radiation doses commenced in a systematic fashion in 1977. In the 1980's the maximum worker was 163.4mSv, more than eight times the current derived annual dose limit, and when the revised DCs are taken into account, might result in a dose of circa 250 mSv, over 12 times the current annual derived exposure limit. Whilst doses reported recently have been lower than investigation levels, the ubiquitous presence of the NORs in processing circuits serves as a constant reminder of the need for vigilance in ensuring worker doses are maintained as low as reasonably achievable.

The paper outlines the regulatory approach of the Mines Safety Directorate in light of the recently introduced radiation in mines component of the Work Health and Safety (Mines) Regulations, especially the need for effective long-term management of NOR-contaminated residues and wastes arising from mineral processing activities.