Australian Government
Radiation Health and Safety Advisory Council

Ref No. D1714617

16 May 2017

Dr Carl-Magnus Larsson
Chief Executive Officer
Australian Radiation Protection and Nuclear Safety Agency
619 Lower Plenty Road
YALLAMBIE VIC 3085
(carl-magnus.larsson@arpansa.gov.au)

Dear Carl-Magnus

Re: Position statement on the use of the linear no-threshold model in radiation protection

I am pleased to provide the attached statement resulting from the Radiation Health and Safety Advisory Council's consideration of the above matter.

I commend the statement to you for consideration and look forward to your advice on how Council may further assist ARPANSA in areas of radiation protection.

Yours sincerely

<signed>

Dr Roger Allison
Chair

Australian Government

Radiation Health and Safety Advisory Council

Position Statement on the use of the linear no-threshold model in ionising radiation protection

The Radiation Health and Safety Advisory Council supports the continued appropriate use of the 'linear no-threshold' (LNT) model as a regulatory tool.

The effects of high doses of radiation are extensively researched and well known. Radiation effects at low doses and dose rates remain a subject of scientific research and the focus of investigation by major international organisations.

There is established evidence of harm at exposures of populations at ionising radiation doses above approximately 100 mSv. "However, as the dose decreases, the power of epidemiological studies becomes less and less, although there may be sensitive subgroups within the population for which increased frequency of occurrence of specific disease types may be discernible"[1].

Within the radiation protection community, the LNT approach is used as a basis for developing radiation safety and protection measures for situations where radiation doses and dose rates are below those for which there is established evidence of harm, e.g. in the setting of regulatory limits. It assumes that the long term, biological damage caused by ionising radiation (i.e. the risk of cancer) is directly proportional to the radiation dose. In other words, the LNT model assumes ionising radiation is always harmful with no safety threshold and that the sum of several small exposures has the same effect as one large exposure. The LNT model is used as part of a precautionary approach to ensure radiation protection where there is no established evidence of harm to humans.

However, while the LNT model can be used to infer health risks associated with low radiation doses and dose rates, projections of absolute number of cancer cases in a population may not be valid and could be increasingly misleading as doses decrease.

The appropriate use of the LNT model has enabled effective radiation protection systems. However, the inappropriate use of the LNT model has inadvertently increased community fear of ionising radiation. The Council advises that extremely low doses of ionising radiation may be associated with no or an extremely low risk of harm.

Incorrect emphasis on potential risks associated with low radiation doses and dose rates can have negative impacts as it can prevent health, medical, environmental, social and economic benefits being realised. In adopting the LNT model it remains essential to balance the low risks of low-dose ionising radiation exposure against the benefits of the radiation.

The LNT model remains a practicable approach for ensuring radiation protection at high doses. For low radiation doses and dose rates, the LNT model, when judiciously applied, can also be a practicable approach for ensuring radiation protection. The Radiation Health and Safety Advisory Council supports the appropriate use of the LNT model as a regulatory tool in situations where radiation doses and dose rates are low, but cautions that the risks from radiation exposure at these levels are commensurately low, and any protective action must be balanced against the benefits of the radiation.

[1] Scientific Annex A, 2012 Report, United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) to UN General Assembly.

an advisory body to the CEO of ARPANSA established under the ARPANS Act 1998
Secretariat: ARPANSA, Office of the CEO
619 Lower Plenty Road, Yallambie, Victoria, 3085
Tel: 03 9433 2322 Fax: 03 9433 2353
Email: council@arpansa.gov.au Web: www.arpansa.gov.au