

How to make better decisions at very low dose exposures

Roger Coates

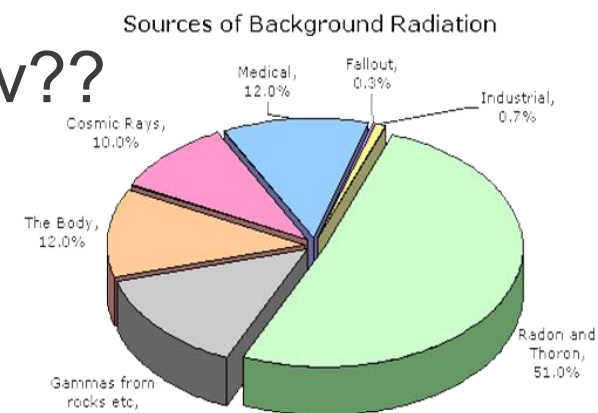
Consultant to World Nuclear Association
Fellow, Society for Radiological Protection

UK



■ ■ ■ What is a 'very low dose'??

- An exposure that makes almost no difference to the total dose received by an individual from all sources
- A dose within the normal variability of natural background exposure – not counting those areas of higher natural dose present in almost all countries
- Doses up to 'a few tens of μSv '. Or even a few mSv ??



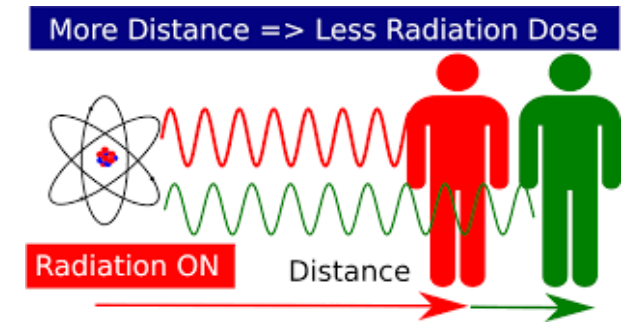
■ ■ The broader context for decision-making

But its not just an issue for the ‘system of protection’ itself – its also **how we implement it!**

- As RP professionals
- In public policy and as regulators

As a profession we are perhaps too cautious – and we are certainly very conservative in our general approaches.

Are we fixated on ‘ever lower doses’ and forever chasing μSvs ?



Public 'Concern'

Sometimes we seem to default to imposing very low dose outcomes, because of perceived 'public concern'.

But:

- Does driving to low doses really ease public concern?
- Or does it make the public think: 'if it needs to be that low, this man-made radiation must be really dangerous'
- Hence it actually feeds 'radiation phobia'

So, we should beware reacting to 'perceived public concern' by imposing very low dose decisions:

And we should make use of the context of natural background, and its variability, in our public interactions

The System of Protection itself, and how we implement it, should not try to anticipate any perceived public concern by reinforcing low dose expectations



The broader context for decision-making

Within this established practice of conservatism, especially in a regulatory environment (and in particular in any ‘nuclear’ context) there seems to be an embedded fear of ‘public perception/concern/reaction’.

But it can be argued that driving to low doses actually feeds ‘radiation phobia’

What is really driving this trend??

Are we too fixated on the LNT approach?

This is NOT a scientific theory – it’s a model for the purposes of a radiation protection system. But sadly it feeds the ‘*no safe level of radiation*’ perspective.

We need more emphasis on what we really know about the risks of very low level radiation:

“If there is a risk - which has never been scientifically demonstrated - it is bounded and comparable with risks widely accepted in society.”

■ ■ Lets consider two different exposure situations: Cornwall & Clearance

Cornwall: High natural background area in the UK - UK average dose + 6mSv/y



Granddaughter at university – extra 3 mSv/y

- should I tell her about radiation?
- what advice should I give? Its perfectly acceptable in the System of Protection!

About five million holidaymakers each year

- each person gets at least several tenths mSv additional dose

No-one is remotely concerned or interested: indeed – not usually aware of any radiation

The classic example

Clearance — the 10 $\mu\text{Sv/a}$ criterion

Actually its below 1 $\mu\text{Sv/a}$ because of conservatism!

Doses to a very few individuals!

- total dose up from 2mSv/a to 2.0001mSv/a

It costs many hundreds £M to implement in the UK





Does this lead to an imbalance?

An Illustrative example - Compare and contrast two examples of exposure:

Exposure from the clearance system

whereby doses to a few individuals are controlled - only allowed to receive no more than about one $\mu\text{Sv}/\text{y}$ – at significant societal cost



versus

Exposure from a holiday

whereby several million persons per year unknowingly receive a good fraction of a mSv





Low Dose Decisions

Around 'a few mSv' and lower

The Basic Issue

Why do we allocate significant societal resources to reduce some relatively low exposure levels to even lower levels?

- Such exposures are often well within the variability of natural background, including the consequences of individual day to day decisions
- They often make no significant difference to the total exposure of any individual
- We are contributing to poor utilisation of societal resources, and risk bringing our profession into disrepute.
- This is at variance with the common-sense way we all live in a radiation environment

Quote from ICRP Publication 104

Scope of radiological protection control measures

“Based on general principles of good governance, governments have obligations to pursue the optimal use of societal resources and ***‘not allow such resources to be squandered on unproductive legislation and fruitless regulatory control’***”

Great sentiment – but where is the practical follow-up?



Conclusions (1) ICRP

- (1) ICRP should consider how best to resolve/explain the perceived imbalance between acceptance of many mSv-level exposures, whilst some activities are regulated/restricted to μ Sv-level. This can be viewed as contra to common sense, thereby confusing and impeding public understanding and acceptance of the system of protection.
- (2) ICRP should include a visible top-tier statement in the system of protection supporting wider proportionality in the regulation of very low dose activities and drawing attention to the need to avoid multiple conservatisms in assessment regimes.



Conclusions (2) Authorities

- (3) Authorities should consider the disproportionate regulatory burden and potential mis-use of public resources before imposing μ Sv-level exposure restrictions on any regulated activity. *

*However, in some low dose situations there may be appropriate measures that could reasonably be taken by the respective local interested parties: for example, to implement actions arising from stakeholder engagement where these improve overall confidence and well-being without imposing a disproportionate burden on society's resources, even if there is no significant benefit in direct safety terms.

- (4) The relevant authorities should review the clearance regime with a view to reducing the disproportionate regulatory burden, whilst supporting the UNDG sustainability and circular economy (recycling) intents.



Conclusions (3) The RP profession

- (5) The RP profession should make better use of natural background exposure (and its variability) in public discussion of radiation risk in order to give a realistic context to the level of risk at very low exposures, whilst also being cautious of using the LNT concept to discuss/define risk at these very low exposure levels.

Helping the global nuclear industry
deliver 24/7 clean energy for all

