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Linear No-Threshold Model and Standards for Protection Against Radiation

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Linear No-Threshold Model and Standards for Protection Against Radiation; Extension of Comment Period

Document: NRC-2015-0057-DRAFT-0448

Comment on FR Doc # 2015-20722

Submitter Information

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General Comment

My comment on "Linear No-Threshold Model and Standards for Protection Against Radiation" is being uploaded as a PDF file.

The name of the file is: LTR_TO_NRC_on_LNT_MODEL.pdf. Thank you very much for the opportunity to comment on this

very important issue. Sincerely, Jeffrey S. Philbin, PhD

Attachments

LTR_TO_NRC_on_LNT_MODEL

Comments on Docket Numbers PRM-20-28, 20-29, and 20-30,
80FR35870

Docket ID NRC-2015-0057, "Linear No-Threshold Model and Standards for Protection
Against Radiation"

U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852
Attention: Annette L. Vietti-Cook, Secretary

Dear Ms Vietti-Cook
<http://www.regulations.gov> Docket ID NRC-2015-0057

I support the 10CFR20 rule change suggested by Dr. Mohan Doss, et al, Dr. Carol Marcus and Mark Miller in their petitions to amend 10 CFR Part 20, "Standards for Radiation Protection Against Radiation" so that nuclear safety policies and regulations are no longer based on the Linear No-Threshold (LNT) hypothesis.

The LNT hypothesis was adopted years ago (for convenience and simplicity) without definitive scientific justification. See Edward Calabrese [1]. The attendant assumption of the LNT hypothesis is that there is no safe level of radiation exposure. A public safety arena where this hypothesis creates problems is when it is used to define exclusion boundaries and emergency evacuation guidelines, as mandated in NRC safety regulations. Let's assume that a large number of persons (10s of thousands) are exposed to a level of radiation well below the level where harmful effects have been observed (see below). Let's assume the source and intensity is from a "brief unintended release" from a nuclear power plant. Further, assume that the off-site dose to persons living or working just outside the exclusion boundary is ~ 10 times natural background ($10 * 0.310 \text{ Rem} = 3.1 \text{ Rem}$) or ~ 5 times the average yearly dose from *all* sources of radiation, including medical x-rays, etc. This accidental, acute exposure (3.1 Rem) is a factor of 3.2 below the dose levels where the most minor (and recoverable) health effects have been observed in humans (i.e., $10 \text{ Rem} = 100 \text{ mSv}$) - for acute doses. [Ref. 3, U.S. NRC web site]. The threshold for any health effect from chronic doses is higher.

The LNT hypothesis estimates risk from low level radiation exposure based on *total* person-rem. This method of determining risk could easily trigger fear and a needless and disruptive evacuation of 10s of thousands of persons in circumstances similar to my example. This is precisely what happened at Fukushima, resulting in up to 1656 premature deaths due to stress of relocation - not radiation [Ref. 2 Japan Today, Feb. 14, 2014, web edition]. The *average* person-rem exposure, for the "hypothetical" example cited in the previous paragraph, would be no cause for concern or evacuation and staying put would result in extremely low risk of harmful health effects or pre-mature deaths.

Policymakers and individuals must balance all of the risks and make intelligent decisions based on *unbiased* scientific data. The concept that low levels of radiation, such as we've discussed here, could be harmful is intuitively and scientifically wrong to me, a

professional who's worked around radiation most of my adult life. Small amounts of radiation result in *extremely* low cancer risk. I am much more at risk for harm, illness or loss of life from walking around the block.

Application of the LNT hypothesis has also led to errors in evaluating relative risks for certain medical procedures. A medical patient who has 5 CT head scans has a 1 in 1000 chance of developing cancer. In comparison 420 people out of 1000 have a chance of developing cancer unrelated to radiation during their lifetimes. [Ref. 4, Danbury Hospital website]. The benefit of obtaining potentially lifesaving diagnostic information from a CT scan far out-weighs the risk of developing cancer from subjecting oneself to that medical procedure. Who is most at risk in these situations? The developing fetus, infant, and a very young child are at "several times" higher risk from exposure to radiation than a middle-aged adult, but the risk is still very, very low.

Recent studies have shown that the "no safe level" of radiation paradigm is no more valid than it is for other regulated hazards, including concentrations of carcinogenic chemicals in the air we breathe and the water we drink. [See Ref. 5, 6, 7 and 8]. Additional authoritative references may be found in the 3 Petitions: PRM 20.28, PRM 20-29, and PRM 20-30. Think of it this way: an individual can have one alcoholic drink or one glass of tap water and have no ill effects. But if he drinks one (or more) bottles of scotch or bourbon, or 15 gallons of water, the intake could well be lethal. Low levels of radiation and other toxic substances can be tolerated by the body without harm and in some cases it can, in fact, be beneficial (hormesis).

References:

1. Calabrese, Edward, "U.S. Risk Assessment Policy: A History of Deception", Chicago Law Review (2012)
2. Japan Today (Feb 14, 2014) Web Edition,
<http://www.japantoday.com/category/national/view/post-tsunami-deaths-due-to-stress-illness-outnumber-disaster-toll-in-fukushima>
3. NRC Website, "Backgrounder on Biological Effects of Radiation",
<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bio-effects-radiation.html>
4. Danbury Hospital Website, "What Raditaion Levels are Considered Safe?",
http://www.danburyhospital.org/~media/Files/Patient%20Education/patiented-english/pdf_Diagnostic/SafeRadiationLevels.ashx
5. Jaworowski, Z., 'The paradigm that failed', Int. J. Low Radiation, Vol. 5, No. 2, pp.151–155 (2008)
6. Jaworowski, Z. and Waligorski, M., "Problems of U.S. Policy on Radiation Protection", EIR Science and Technology, p. 18-26 (16 May 2003),
http://larouchepub.com/other/2003/sci-techs/3019us_nuke_safety.html
7. Cohen, Bernard, "The Linear No-Threshold Theory of Radiation Carcinogenesis Should Be Rejected", Journal of American Physicians and Surgeons Volume 13 Number 3 (Fall 2008)
8. Tubiana, M., et al., "Recent Reports on the Effect of Low Doses of Ionizing Radiation and Its Dose-effect Relationship", Radiat Environ Biophys 44: 245-251 (2006)

Sincerely,

A handwritten signature in black ink that reads "J. S. Philbin". The signature is written in a cursive style with a large, stylized initial "J".

Jeffrey S. Philbin, PhD Univ. of Illinois (Nuclear Engineer)
Sandia National Laboratories (retired)
Research Reactor Designer, Operator, Supervisor
Nuclear Criticality Officer, Nuclear Criticality Safety Engineer