

RulemakingComments Resource

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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 am submitting the attached letter in support of the February 9, 2015 petition by Dr. Carol S. Marcus that requests the NRC to amend 10 CFR Part 20, *Standards for Radiation Protection Against Radiation* so that radiation and nuclear safety policies and regulations no longer be derived from the LNT model.

Sincerely

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August 11, 2015

Annette L. Vietti-Cook
Secretary, USNRC
Attention: Rulemaking and Adjudications Staff
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852, USA

Dear Ms. Vietti-Cook:

<http://www.regulations.gov> Docket ID NRC-2015-0057

I submit this letter in support of the February 9, 2015 petition by Dr. Carol S. Marcus that requests the NRC to amend 10 CFR Part 20, *Standards for Radiation Protection Against Radiation* so that radiation and nuclear safety policies and regulations no longer be derived from the LNT model.

In June 1956, the National Academy of Sciences (NAS) Biological Effects of Atomic Radiation (BEAR) Genetics Panel recommended that the linear no-threshold (LNT) model be used to assess the risks of radiation-induced mutations and fatal cancers. In this letter, I provide new information to demonstrate that this NAS recommendation was the result of scientific misconduct. Since the NAS recommendation is not based on good science, the NRC should change its present radiation protection policy to comply with the 1934 ICRP recommendation, which is based on 38 years of operating experience of many thousands of radiation practitioners, since 1896, and had been accepted internationally. It limited radiation exposures to a "tolerance dose" rate of 0.2 roentgen per day, a threshold level that amounts to an annual dose of about 500 mGy (Cuttler 2015b).

The tolerance dose method is far simpler and more convenient to use than the LNT model and the policy of ALARA. Compliance with a tolerance dose limit was accepted by the British radiologists in 1920. It provided more than 35 years of satisfactory protection, as determined in subsequent studies demonstrating they had *lower* cancer mortalities and *lower* mortalities from all causes, when compared with unexposed groups. Since many observed responses of organisms, including humans, to low doses and low dose-rates of ionizing radiation contradict the predictions of the LNT model, the scientific method requires that the LNT model be rejected. It is simply wrong (Cuttler 2014, 2015a).

The July 17th article by Calabrese (2015) is substantial, extremely well documented and very troubling. It provides strong evidence that the NAS BEAR Committee, Genetics Panel, as a group, falsified and fabricated the research record, thus committing scientific misconduct at the highest possible societal level and on a topic of continuing profound scientific and public significance. Its unscientific recommendation and very fearful information were communicated worldwide in the journal *Science* (NAS BEAR 1956).

The 1956 *Science* paper has a strong, continuing and harmful impact on humanity. This article was the basis for the national and international change from the 1934 threshold dose-response model to the linear no-threshold (LNT) model for assessing the risk of radiation-induced cancer and predicting the number of hypothetical excess deaths. The LNT model still dominates essentially all regulation of carcinogens. This influence is enormous, affecting vast public and private resources, affecting many activities of the international scientific community, personal behavior, education programs and how children are raised. Its fearful influence is pervasive.

Following the discoveries of x-rays and radioactivity in the mid-1890s, many powerful medicinal properties of x-rays and gamma-rays were soon observed, and thousands of physicians began to cure many illnesses using these radiations in imaging and therapies. No significant increases in the incidence of cancer nor any other late adverse effects were apparent following these treatments. Over the past ~120 years, many tens of thousands of medical practitioners and scientists around the world have published the results of their remarkable treatments and studies in peer-reviewed medical and scientific journals (Cutler 2013 2014 2015a). Since the introduction of the LNT model, nearly all beneficial effects of low radiation have been ignored because radiation protection organizations focus on minimizing exposures and the risk of hypothetical excess cancers, which cannot be observed. As a result, humanity risks losing many very important medical applications of ionizing radiation (Calabrese 2012).

Nuclear energy projects that were affordable in the 1970s are no longer affordable due to the continuously upward ratcheting safety requirements to minimize potential releases of radioactive materials. The experience of such releases, in rare nuclear reactor accidents, indicates that the radiation intensities in residential areas are increased to levels that are comparable to those in natural high background radiation areas where no adverse health effects have been observed. The implementation of extreme, precautionary emergency measures to minimize exposures to such radiation has resulted in many deaths and much hardship and suffering from fear. Had the residents remained in their homes, no increase in the incidence of adverse health effects would have been observed (Cutler 2015a). The economic consequences of the precautionary measures implemented following the tsunami-induced damage to three of the reactors at the Fukushima-Daiichi power plant are enormous.

Rockwell (1997) pointed out, "The cost of trying to reduce harmless radiation exposures even more is exorbitant, and "predicting" casualties from such exposures generates groundless fear and distorts public policy. It is time to bring radiation protection policy into line with the data. WHEN YOU PRESS them, many regulators will admit there is

really no science to support the notion that any amount of radiation, no matter how small, can be harmful. They say, "We're not really saying it is harmful; just that it might be." But then they ask: "What's wrong with being cautious? We tell people it might hurt them, and perhaps it won't. Can that do any harm?" The answer is: You bet! Plenty of harm. Let me describe ..."

Taylor (1980) stated, "Today we know about all we need to know for adequate protection against ionizing radiation. Therefore, I find myself charged to ask: why is there a radiation problem and where does it lie?" "No one has been identifiably injured by radiation while working within the first numerical standards (0.2 r/day) set by the NCRP and then the ICRP in 1934." "An equally mischievous use of the numbers game is that of calculating the number of people who will die as a result of having been subjected to diagnostic X-ray procedures. An example of such calculations are those based on a literal application of the linear, non-threshold, dose-effect relationship, treating the concept as a fact rather than a theory. ... These are deeply immoral uses of our scientific knowledge."

I urge the NRC to examine the scientific evidence of radiation-induced beneficial health effects, which contradict the predictions of the LNT model. This natural phenomenon is due to low-dose stimulation of the adaptive protection systems that enable every organism to adapt to changing environmental conditions over the range of their capabilities. The dose rates of naturally-occurring ionizing radiation average 2.4 mGy per year, but extend up to hundreds of mGy per year in high natural background areas. When a large, short-term radiation dose is absorbed, the immediately-acting protection systems respond to prevent, repair and remove damage and restore DNA, cellular, tissue and organism health. The adaptive protection systems (more than 150 genes) are stimulated when a significant radiation increase occurs repeatedly or persists for a long time. They activate at different dose thresholds and can persist for days, weeks and even years (Feinendegen et al. 2011, 2012).

The protection systems act, not only against the damage that was, or is being induced by the radiation increase, but *also* against the much more extensive damage or damage rate that is occurring due to natural endogenous processes (Billen 1990) and the damages induced by exogenous causes, such as injuries, infections, and ingestion of chemicals. The overall response to a *low* radiation increase is a beneficial effect, an improvement in health that may include a *reduction* in the risk of cancer. When a *high* radiation increase occurs, protection systems are inhibited or damaged, resulting in overall harmful effects that may include an *increase* in the risk of cancer. Figure 1 is the dose-response model that corresponds to this biological behavior, low dose stimulation of protection and high dose inhibition. It shows the *no observed adverse effects level* (NOAEL), which is the threshold for adverse health effects, such as a reduction of expected lifetime or an excess cancer mortality, compared to the control group.

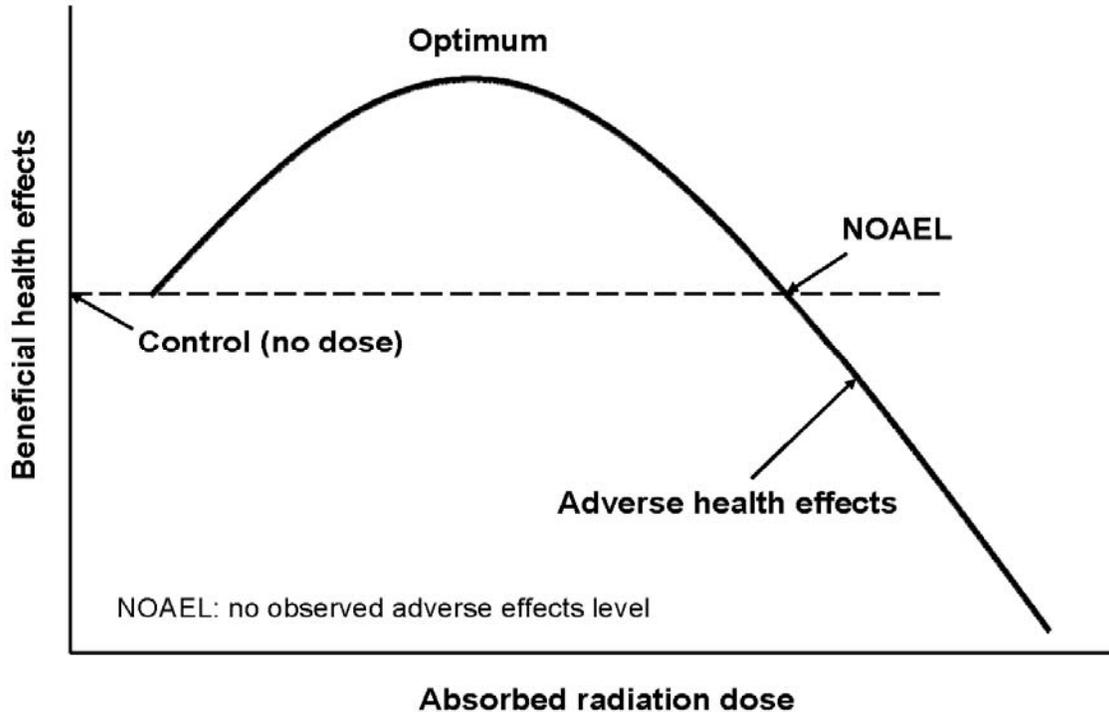


Figure 1. Radiation hormesis dose-response model showing the no observed adverse effects level (NOAEL), which is the threshold for adverse effects, such as reduction of expected lifetime or excess cancer mortality.

Changing NRC radiation protection policy, to discard the unscientific LNT model and recognize the reality of beneficial health effects of low radiation exposures, will likely be opposed by a consensus of many international organizations that favor its ongoing use. To overcome this resistance, it will be necessary to assess the serious harm that has been and is being caused by retaining ALARA and emphasize the very important benefits to humanity of bring radiation protection policy into line with the biological data. A public education program will be needed to dispel the widespread fear of low radiation.

Sincerely,

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