

## Rulemaking1CEm Resource

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**From:** RulemakingComments Resource  
**Sent:** Wednesday, September 16, 2015 10:26 AM  
**To:** Rulemaking1CEm Resource  
**Subject:** FW: Comments for Docket ID NRC-2015-0057 "Linear, No Threshold"

DOCKETED BY USNRC—OFFICE OF THE SECRETARY

SECY-067  
PR#: PRM-20-28, PRM-20-29, and PR-20-30  
FRN#: 80FR35870  
NRC DOCKET#: NRC-2015-0057  
SECY DOCKET DATE: 9/8/15  
TITLE: Linear No-Threshold Model and Standards for Protection Against Radiation  
COMMENT#: 262

-----Original Message-----

From: Ace Hoffman [mailto:rhoffman@animatedsoftware.com]  
Sent: Tuesday, September 08, 2015 7:48 PM  
To: RulemakingComments Resource <RulemakingComments.Resource@nrc.gov>  
Cc: Sahle, Solomon <Solomon.Sahle@nrc.gov>  
Subject: [External\_Sender] Comments for Docket ID NRC-2015-0057 "Linear, No Threshold"

September 8th, 2015  
Re: Docket ID NRC-2015-0057 (see below)

To Whom It May Concern, NRC

I cannot fathom a single reason to re-examine the "hypothesis" that low doses of radiation have an indisputably beneficial or "Hormetic" effect, versus the standard "Linear, No Threshold" (LNT) theory of radiation, which indicates that, all other factors being equal, doubling the dose doubles the risk, halving the dose halves the risk.

It appears that the petitioners have a vested interest in the U.S. Government relaxing the standards (and if they don't, nevertheless an entire industry does), but the petitioners do not have any significant new facts about the way radiation damages the human body. A few anecdotal reports of a potentially Hormetic effect do not overrule decades of scientific research indicating otherwise. There is plenty that is known to be wrong, or at least inadequate, about the LNT theory because by itself, it cannot account for a radiation dose recipient's age or overall health, or the targeting of individual organs. But IF these (and several other) additional factors are accounted for, LNT seems to stand up fairly well.

There are plenty of reasons why LNT is an incomplete model for radiation damage, but none of those reasons involve "Sunshine Vitamins" which seems to be what the petitioners are claiming: Namely, they are claiming that small amounts of radiation are invariably healthy and beneficial, and we all should INCREASE our dose rather than strive to DECREASE that dose -- or at least, save it for when we are sick and nuclear medicine can save our lives (see below for a further discussion of radiation in health care).

If Hormesis were fact, what is the measurable benefit from a supposedly beneficial increase in radiation that the petitioners are proposing, given that there are many variables in

people's biological profile that they cannot account for, including the incidence of latent cancers many years after exposure? What are the studies which prove indisputably (not just "indicate" or "may indicate...") that those doses are right for fetuses to absorb while in their mother's womb, or for infants, elderly, people with compromised immune systems, or, for that matter, people who don't want to be dosed up with radiation even if it IS supposedly good for you?

After all, anyone can VOLUNTARILY increase their radiation dose if they want to: Just tell a doctor you have a pain somewhere, for example. You'll get an x-ray at least, or maybe even a CT-Scan. Or go work in a nuke plant. Or if you're really sure your radiation dose is too low to be healthy, go clean up Fukushima. They need humans to do that since the robots keep breaking down. There are probably not enough scientists who believe in Hormesis to pack a busload of Fukushima cleanup workers, let alone, enough to get the job done. Let them have their wish.

The fact of life is, each of us receives a different level of radiation depending on many factors, such as where we live (altitude above sea level, proximity to uranium mines, weapons test sites or nuclear power plants, radon sources, granite walls or counter-tops, a diet rich in bananas, etc.). Another variable is how we live (airline personnel, astronauts, and nuclear power plant workers all receive higher-than-average radiation doses while on the job). Yet another variable is a byproduct of our overall health: CT Scans, X-rays, radiation treatments, etc.. Sick people can need a multitude of these things. For example, my wife had about three dozen individual, targeted radiation treatments to destroy a cancerous lymph node, as well as having multiple CT Scans and several x-rays, all because of breast cancer, all in a relatively short span of time. That's enough radiation for a lifetime! Radiation is a known cause of breast (she is a non-smoker) and many other cancers, including bladder cancer (which I had, about 9 years ago). I had one CT Scan after the surgery, to be sure it was an isolated cancer (it apparently was). My wife's cancer had spread: She also had a mastectomy, and undoubtedly would have had more CT-Scans were they not so dangerous because of the radiation. And she would have had radiation along with the chemotherapy, instead of subsequent to it, were it not so dangerous to insult the body both ways at the same time.

So where do my wife or I have any room for EXTRA radiation? There is no reason to think our exposure isn't already well above any "safe" limit -- that is, our risk of additional cancers has gone up because of the medical radiation exposures (which is not to say they were not necessary under the circumstances). Without knowing the dose that the petitioners propose is healthy and the scientific reasoning behind it, one can only hope for the best (the petitioners do not specify the proper Hormetic doses for the various groups of people listed above, they only give suggestions for what doses they do not consider harmful for anyone).

Assuming there will continue to be accidents with nuclear fuel (an inevitability because humans make mistakes and engineered nuclear waste storage solutions can be overwhelmed by natural events (earthquakes, tsunamis, asteroids, rust, embrittlement, etc.)), it is reasonable to assume everyone's daily dose of radiation will rise over time. Even just the continued spreading out of nuclear accidents that have already happened will raise millions of people's daily dose rates, over time. Everything possible should be done to prevent this increase (including shutting down the sources of new radiation: the reactors).

As we age, the likelihood of needing more and more radiation treatments, CT Scans, X-rays and other "nuclear medicine" procedures increases dramatically. Meanwhile, fortunately, the risk from each exposure probably drops, but only because the future life expectancy of a person goes down dramatically as we age: It is entirely possible that in the end stages of life, radiation is once again (as when we were very young) more dangerous than for a typical "average (white) adult male" (for which most radiation standards are designed). The long latency of some of the deleterious effects of radiation (such as most cancers) are, of course, the main reason that medical radiation (or any radiation) later in life is less risky

than when we are young. On the other hand, elderly people's physical strength is declining. Radiation causes and/or exacerbates inflammation, a common complaint of the elderly. It increases the risk of heart attacks, also a common risk of the elderly.

The petitioners do not specify what dose is right for what age groups and they certainly do not produce any strong scientific evidence to back up what claims they do make.

And speaking of young people's radiation dangers, it is well known that in the earliest stages of life, as a fetus, infant, or growing child, an individual's cells are dividing and -- more importantly in this context -- specializing at very fast rates (we each started life as a single cell (or, if you prefer, the joining of two halves)). Damaging young people's cells can have long-term health effects that the petitioners have not considered. Increased radiation levels can damage a mother, her fetus, and even that fetus's eggs -- three generations of individuals, all damaged by the same radioactive decay (especially gamma or beta radiation). It is well-known that DNA (or any other chemical bond) cannot stand up to ionizing radiation. It is also well-known that cell repair mechanisms, although they do exist (and the petitioners make it their core claim for why discarding the LNT theory makes sense to them), are in fact highly imperfect, and some amount of damage almost invariably remains after radiation exposure and after some form of cellular DNA repair.

It is also well-known that most random restructuring of DNA is not beneficial, from an individual point of view or from an evolutionary point of view.

The petitioners also do not address the different effects that different radioactive isotopes have on human health. For example, radioactive iodine is known to "target" the thyroid glands. Tritium is known to go throughout the body, and while much of it will leave the body (biological half-life) quickly, a small percentage remains indefinitely, possibly in the bones to cause cancer or leukemia, possibly in the heart to cause coronary problems. Tritium's radioactive half-life is about 12 years. The petitioners do not state if the healthy isotopes for a Hormetic effect are radioactive iodine (which I suppose could be taken as pills) or radioactive hydrogen (tritium), which can be taken as "tritiated water" -- something nuclear power plants can only release in minute quantities each year because it is known to be extremely hazardous. (Commercial nuclear power plants in America can legally release only about a thirtieth of a teaspoon of tritium per year, and must dilute that in billions of liters of water.) Or is it, perhaps, radioactive Plutonium that we all should be taking orally, or some other way? If so, the petitioners do not discuss the constant damage that occurs from the heavy metal properties of Plutonium (or those of Uranium, Thorium, Americium, etc.).

The petitioners also do not address whether this "Hormetic" radiation dose should be administered as "hot particles" (clusters of radioactive atoms) or perhaps as a highly diluted poison gas, or some other way. In conversation with scientists who have spent their lives studying the comparative effects of "hot particles" versus the same dose administered in other ways, no difference was found in dose-response rate (I'm not sure how many Beagle dogs and other advanced life forms were experimented on to confirm this, but it's in the tens or maybe even hundreds of millions of animals by now).

For these reasons, this petition should be abandoned without further consideration, the concept of "Hormesis" for radioactive particles should be discarded until and unless solid scientific proof comes in (don't hold your breath).

It is my belief that permitted radiation exposure levels should be decreased, not increased, across the board.

However, news has just arrived that a major cancer study that was being embarked on by the National Academy of Sciences at the request of the Nuclear Regulatory Commission, has been cancelled by the NRC. If there was ANY chance of a Hormetic effect appearing in a valid,

large-enough, carefully-designed study, this was as close as we could have come. But it's been cancelled.

Here is the link to the USNRC's decision: <http://www.nrc.gov/reading-rm/doc-collections/news/2015/15-055.pdf>

This study was needed, but since the NRC has cancelled it (due to "budget constraints" according to the NRC press release -- NOT because it wasn't needed), surely no one could possibly think that the NRC should then turn around and pretend it knows that a little radiation, aka Hormesis, aka "Sunshine Vitamins" are good for you.

Ace Hoffman  
Carlsbad, CA

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[Federal Register Volume 80, Number 120 (Tuesday, June 23, 2015)] [Proposed Rules] [Pages 35870-35872] From the Federal Register Online via the Government Publishing Office [www.gpo.gov] [FR Doc No: 2015-15441]

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Proposed Rules

Federal Register

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This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

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Federal Register / Vol. 80, No. 120 / Tuesday, June 23, 2015 / Proposed Rules

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NUCLEAR REGULATORY COMMISSION

10 CFR Part 20

[Docket Nos. PRM-20-28, PRM-20-29, and PRM-20-30; NRC-2015-0057]

Linear No-Threshold Model and Standards for Protection Against Radiation

AGENCY: Nuclear Regulatory Commission.

ACTION: Petition for rulemaking; notice of docketing and request for comment.

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SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) has received three petitions for rulemaking (PRM) requesting that the NRC amend its ``Standards for Protection Against

Radiation'' regulations and change the basis of those regulations from the Linear No-Threshold (LNT) model of radiation protection to the radiation hormesis model. The radiation hormesis model provides that exposure of the human body to low levels of ionizing radiation is beneficial and protects the human body against deleterious effects of high levels of radiation. Whereas, the LNT model provides that radiation is always considered harmful, there is no safety threshold, and biological damage caused by ionizing radiation (essentially the cancer risk) is directly proportional to the amount of radiation exposure to the human body (response linearity). The petitions were submitted by Carol S. Marcus, Mark L. Miller, and Mohan Doss (the petitioners), dated February 9, 2015, February 13, 2015, and February 24, 2015, respectively. These petitions were docketed by the NRC on February 20, 2015, February 27, 2015, and March 16, 2015, and have been assigned Docket Numbers. PRM-20-28, PRM-20-29, and PRM-20-30, respectively. The NRC is examining the issues raised in these petitions to determine whether they should be considered in rulemaking. The NRC is requesting public comments on these petitions for rulemaking.

DATES: Submit comments by September 8, 2015. Comments received after this date will be considered if it is practical to do so, but the NRC is able to assure consideration only for comments received on or before this date.

ADDRESSES: You may submit comments by any of the following methods (unless this document describes a different method for submitting comments on a specific subject):

Federal Rulemaking Web site: Go to <http://www.regulations.gov> and search for Docket ID NRC-2015-0057. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; email: [Carol.Gallagher@nrc.gov](mailto:Carol.Gallagher@nrc.gov). For technical questions contact the individual listed in the FOR FURTHER INFORMATION CONTACT section of this document.

Email comments to: [Rulemaking.Comments@nrc.gov](mailto:Rulemaking.Comments@nrc.gov). If you do not receive an automatic email reply confirming receipt, then contact us at 301-415-1677.

Fax comments to: Secretary, U.S. Nuclear Regulatory Commission at 301-415-1101.

Mail comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff.

Hand deliver comments to: 11555 Rockville Pike, Rockville, Maryland 20852, between 7:30 a.m. and 4:15 p.m. (Eastern Time) Federal workdays; telephone: 301-415-1677.

For additional direction on obtaining information and submitting comments, see ``Obtaining Information and Submitting Comments'' in the SUPPLEMENTARY INFORMATION section of this document.

FOR FURTHER INFORMATION CONTACT: Solomon Sahle, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington DC 20555-0001; telephone: 301-415-3781, email: [Solomon.Sahle@nrc.gov](mailto:Solomon.Sahle@nrc.gov).

## SUPPLEMENTARY INFORMATION:

### I. Obtaining Information and Submitting Comments

#### A. Obtaining Information

Please refer to Docket ID NRC-2015-0057 when contacting the NRC about the availability of information for this action. You may obtain publicly-available information related to this action by any of the following methods:

Federal rulemaking Web site: Go to <http://www.regulations.gov> and search for Docket ID NRC-2015-0057.

NRC's Agencywide Documents Access and Management System (ADAMS): You may obtain publicly-available documents online in the ADAMS Public Documents collection at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select ``ADAMS Public Documents'' and then select ``Begin Web-based ADAMS Search.'' For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-

415-4737, or by email to [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov). The ADAMS accession number for each document referenced (if it is available in ADAMS) is provided the first time that it is mentioned in the SUPPLEMENTARY INFORMATION section.

NRC's PDR: You may examine and purchase copies of public documents at the NRC's PDR, Room 01-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

## B. Submitting Comments

Please include Docket ID NRC-2015-0057 in the subject line of your comment submission.

The NRC cautions you not to include identifying or contact information that you do not want to be publicly disclosed in your comment submission. The NRC will post all comment submissions at <http://www.regulations.gov> as well as enter the comment submissions into ADAMS. The NRC does not routinely edit comment submissions to remove identifying or contact information.

If you are requesting or aggregating comments from other persons for submission to the NRC, then you should inform those persons not to include identifying or contact information that they do not want to be publicly disclosed in their comment submission. Your request should state that the NRC does not routinely edit comment submissions to remove such information before making the comment submissions available to the public or entering the comment into ADAMS.

## II. The Petitioners

On February 9, 2015, Dr. Carol S. Marcus, a Professor of Radiation Oncology, of Molecular and Medical Pharmacology (Nuclear Medicine), and of Radiological Sciences at the David

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Geffen School of Medicine at the University of California-Los Angeles, filed a petition for rulemaking with the Commission, PRM-20-28 (ADAMS Accession No. ML15051A503). Dr. Marcus was a member of the NRC's Advisory Committee on the Medical Uses of Isotopes from 1990 to 1994. The petitioner indicated that ``[t]here has never been scientifically valid support for this LNT hypothesis since its use was recommended by the U.S. National Academy of Sciences Committee on Biological Effects of Atomic Radiation (BEAR I)/Genetics Panel in 1956'' and that ``[t]he costs of complying with these LNT based regulations are enormous.''

On February 13, 2015, Mr. Mark L. Miller, a Certified Health Physicist, filed a petition for rulemaking with the Commission, PRM-20-29 (ADAMS Accession No. ML15057A349). The petitioner indicated that ``[t]here has never been scientifically valid support for this LNT hypothesis'' and that ``[t]he costs of complying with these LNT-based regulations are incalculable.''. In addition, the petitioner suggests that the use of the LNT hypothesis has ``led to persistent radiophobia [radiation-phobia].''

On February 24, 2015, Dr. Mohan Doss, filed a petition for rulemaking with the Commission, PRM-20-30 (ADAMS Accession No. ML15075A200). Dr. Doss filed this petition on behalf of Scientist for Accurate Radiation Information, whose mission is to ``help prevent unnecessary, radiation-phobia-related deaths, morbidity, and injuries associated with distrust of radio-medical diagnostics/therapies and from nuclear/radiological emergencies through countering phobia- promoting misinformation spread by alarmists via the news and other media including journal publications.''

## III. The Petition

The petitioners request that the NRC amend part 20 of title 10 of the Code of Federal Regulations (10 CFR), ``Standards for Protection Against Radiation,'' based on new science and evidence that contradicts the LNT hypothesis and request that the NRC greatly simplify and change 10 CFR part 20 to take into account the ``vast literature demonstrating no effects or protective effects at relatively low doses of radiation.''. The NRC has determined that the petitions met the threshold sufficiency requirements for a petition for rulemaking under Sec.

2.802, ``Petition for rulemaking,'' and the petitions have been docketed as PRM-20-28, PRM-20-29, and PRM-20-30.

#### IV. Discussion of the Petitions

##### A. PRM-20-28

The petitioner, Dr. Carol S. Marcus, requests that the NRC amend its regulations in 10 CFR part 20 that are based on the LNT hypothesis.

The petitioner states that ``[t]his ultra-simplistic concept assumes that all radiation absorbed doses, no matter how small, have a finite probability of causing a fatal cancer.'' The petitioner further indicates that the ``[u]se of the LNT assumption enables regulators to feel justified in ratcheting down permissible worker and public radiation levels, either through actual dose limits or use of the 'as low as reasonably achievable' (ALARA) principle, giving the illusion that they are making everyone safer (and creating ever increasing workload for themselves and their licensees).'' However, the petitioner suggests that ``there has never been scientifically valid support for this LNT hypothesis since its use was recommended by the U.S. National Academy of Sciences Committee on Biological Effects of Atomic Radiation (BEAR I)/Genetics Panel in 1956'' and that the ``costs of complying with these LNT based regulations are enormous.''

The petitioner suggests that there is ``vast literature'' that demonstrates that low doses of radiation have no deleterious effect, and some studies even suggest that low doses of radiation may have protective effects. The petitioner writes, ``[t]he literature showing protective effects supports the concept of hormesis, in which low levels of potentially stressful agents, such as toxins, other chemicals, ionizing radiation, etc., protect against the deleterious effects that high levels of these stressors produce and result in beneficial effects (e.g., lower cancer rates).'' On May 16, 2015, the petitioner submitted an additional reference to the NRC providing technical information supporting her requests.\1\

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\1\ Siegel, Jeffry A., and Welsh, James S.: Does Imaging Technology Cause Cancer? Debunking the Linear No-Threshold Model of Radiation Carcinogenesis. Technology in Cancer Research & Treatment 1533034615578011, first published on March 30, 2015 doi:10.1177/1533034615578011.  
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The petitioner recommends the following changes to 10 CFR part 20:

(1) Worker doses should remain at present levels, with allowance of up to 100 mSv (10 rem) effective dose per year if the doses are chronic.

(2) ALARA should be removed entirely from the regulations. The petitioner argues that ``it makes no sense to decrease radiation doses that are not only harmless but may be hormetic.''

(3) Public doses should be raised to worker doses. The petitioner notes that ``these low doses may be hormetic. The petitioner goes on to ask, ``why deprive the public of the benefits of low dose radiation?''

(4) End differential doses to pregnant women, embryos and fetuses, and children under 18 years of age.

##### B. PRM-20-29

Similarly, the petitioner, Mr. Mark L. Miller, requests that the NRC amend its regulations in 10 CFR part 20 that are based on the LNT hypothesis. The petitioner used much of the same information used in Dr. Marcus' petition for rulemaking. However, Mr. Miller only requests that the following changes be made to 10 CFR part 20:

(1) Worker doses should remain at present levels, with allowance of up to 100 mSv (10 rem) effective dose per year if the doses are chronic.

(2) ALARA should be removed entirely from the regulations. The petitioner argues that ``it makes no sense to decrease radiation doses that are not only harmless but may be hormetic.''

(3) Public doses should be raised to worker doses. The petitioner notes that ``these low doses may be hormetic. The petitioner states, ``[l]ow-dose limits for the public perpetuates radiophobia.''

#### C. PRM-20-30

The petition for rulemaking was submitted by Dr. Mohan Doss, on behalf of Scientist for Accurate Radiation Information, and ``supports and supplements'' petition PRM-20-28. This petitioner provides additional information suggesting that ``low-dose radiation reduces cancer risk'' (i.e., has a hormetic [beneficial] effect) and suggests that the ``LNT model is no longer justifiable.'' The petitioner further states that the use of the LNT hypothesis in the NRC's regulations has ``had a major detrimental effect on public health, since they have prevented the study of LDR [low-dose radiation] for controlling aging- related diseases such as cancer, Alzheimer's disease, Parkinson's disease, etc. in spite of studies showing the promise of LDR for the diseases.'' The petitioner suggests that ``urgency of action on this petition'' is necessary because ``any potential future accident involving release of radioactive materials in the USA would likely result in panic evacuation because of the LNT-- model-based cancer fears and concerns, resulting in considerable casualties and economic damage such as have occurred in Fukushima.'' The petitioner further suggests that the ``recognition of a threshold dose by NRC would obviate

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the need for such panic evacuations, associated casualties, and economic harm'' when radiation is released in the environment.

For additional information, see the filed petitions for rulemaking in ADAMS under Accession Nos. ML15051A503, ML15057A349, and ML15075A200.

#### V. Conclusion

The NRC will examine the issues raised in PRM-20-28, PRM-20-29, and PRM-20-30 to determine whether they should be considered in rulemaking. The NRC is requesting public comments on these petitions for rulemaking.

Dated at Rockville, Maryland, this 16th day of June, 2015.

For the Nuclear Regulatory Commission.  
Annette L. Vietti-Cook,  
Secretary of the Commission.  
[FR Doc. 2015-15441 Filed 6-22-15; 8:45 am] BILLING CODE 7590-01-P

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