

July 19, 2014

The Honorable Gina McCarthy, Chief Administrator
U.S. Environmental Protection Agency
Michael P. Flynn, Director
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Comment submission address:
<http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2013-0689-0001>

Re: Protective Action Guides for Radionuclides
(Docket ID No. EPA-HQ-OAR-2013-0689)

Dear Administrator McCarthy, Director Flynn, Director Edwards and Director Veal:

The American people are counting on you to protect them. Any changes to radionuclide limits should strengthen, not weaken, the regulations. Research shows our cells and genes are more vulnerable to ionizing radiation than previously thought – especially in embryos, infants and children – so exposure limits should be for lower concentrations of radionuclides in our environment, not legalizing more damaging radionuclides. We ask that you adhere to the standards of science, and not slacken EPA standards for protecting U.S. citizens from exposures to ionizing radiation.

EPA's mission is to protect the beautiful environment we depend upon and to protect the people of our country from toxic pollutants. Because ionizing radionuclides are among the most toxic pollutants known to man, some remaining harmful for millions of years, they should be at the top of your list of toxins that are not to be tolerated at levels known to harm humans – in fact, a strong case could be made for banning them entirely. Last year, you heard from 100 environmental groups regarding proposed revisions to your radionuclide exposure guides, and we support those comments written by Hirsch and D'Arrigo and endorsed by 100 ENVIRONMENTAL GROUPS,¹ which urged you to examine the problems with your PAG proposals which they delineate, and to adhere to guidelines based on sound science to protect

¹ Daniel Hirsch and Dianne D'Arrigo, + 100 Environmental Groups, Letter to EPA Administrator Gina McCarthy Re: Protective Action Guides for Radionuclides (Docket ID No. EPA-HQ-OAR-2007-0268), submitted September 16, 2013. <http://committeetobridgethegap.org/over-100-groups-call-on-epa-to-withdraw-dramatically-weakened-radiation-guides/>

us from these toxic isotopes, rather than condone exposing us to even more ionizing radioactivity. In response to EPA's Advanced Notice of Proposed Rulemaking (ANPR) request for public comment, we respectfully submit the following comments and information.

As an Agency charged with protecting the people and the environment of the United States, we ask that you adhere to verifiable dose exposures, not statistical risk scenarios. This is not accident risk analysis, this is verifiable health science. The EPA should only express radiation exposure limits in terms of scientifically verifiable radiation dose exposures, NOT the more easily manipulated risk probability scenarios.

EPA's ANPR misrepresents the history of standards, implying nothing has changed since 1977, whereas it has repeatedly diluted the standards and just last year EPA adopted Proposed Action Guidelines (PAG 78 FR 22257-60) even as you called for public comments on those very "proposed" guidelines.

The ANPR also manipulated its presentation of the issues, diverting the public to tangential technical studies (rather than referring relevant studies) by stating that the EPA "believes" that it would be useful to commenters in "evaluating the merits of a risk standard" to be referred to the 1995 "National Research Council/National Academy of Sciences (the NAS committee) ...report, *Technical Bases for Yucca Mountain Standards.*" EPA claims this report recommends the risk-based over the dose-based standard, "because it represents a societal judgement regarding health impacts and therefore 'would not have to be revised in subsequent rulemakings if advances in scientific knowledge reveal that the dose-response relationship is different from that envisaged today."²

This is a blatant admission that the proposed risk-based standard is a "societal judgment", evidently using cost and convenience as criteria for a "judgment" of the actual health risks to the public from commercially released radioactive pollutants. It also is an admission that any "advances in scientific knowledge" would be an imposition on the Agency and/or nuclear industry and therefore could be conveniently ignored in favor of a risk-based dose-response relationship "envisaged today." This radiation risk limit would not be determined through verifiable data analysis, but rather "envisaged," apparently for convenience and profit over actual, scientifically verifiable, public health dose-response risks.³

Your ANPR requested comments and information on EPA's "Environmental Radiation Protection Standards for Nuclear Power Operations" (40CFR part 190) and specifically asked about risk limits, yet you only offer two reference studies in your ANPR section titled, "What Agency and national policies and approaches could be relevant?," the 1995 Yucca Mountain technical study and a footnote stating, "A different NAS committee expressed similar views in a 2002 report, *The Disposition Dilemma*, pp. 33-34." This is both telling and disturbing.

² Environmental Protection Agency (EPA), "Environmental Radiation Protection Standards for Nuclear Power Operations," Federal Register /Vol. 79, No. 23 /Tuesday, February 4, 2014 / Proposed Rules, pg. 6514 (pdf pg. 6).

³ EPA, Advance Notice of Proposed Rulemaking (ANPR) requesting public comment and information on potential approaches to updating EPA's "Environmental Radiation Protection Standards for Nuclear Power Operations" (40 CFR part 190), Federal Register Vol. 79 Number 23 (2014-02307). Section II "Issues for Public Comment" A.4, pg. 6516 (pdf pg.8).

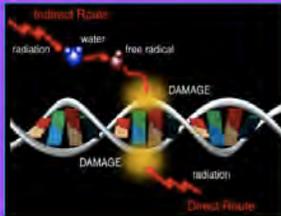
Why would the EPA present these tangential studies (the 1995 Yucca Mountain study and the 2002 disposition study) rather than EPA's own clearly and specifically pertinent 335 page, 1999 Federal Guidance Report, *Cancer Risk Coefficients for Environmental Exposure to Radionuclides*;⁴ and the additional, directly relevant, 2006 study from the National Research Council/ National Academy of Sciences' committee of scientists and educators with expertise in Radiation Biology, Radiology, Cancer Biology, Epidemiology, Genetics and Physics – entitled *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII - Phase 2* (<http://www.nap.edu/catalog/11340.html>) to determine ionizing radiation exposure limits for the public? EPA's current bias is glaringly revealed in your attempts to manipulate information offered to the public on this issue in the ANPR, and seriously need to be acknowledged and adjusted.

Both the EPA and BEIR reports specifically focus on health risks to the public from ionizing radiation exposures, the very standards you are proposing to change. The BEIR committee's very name explains its relevant purpose, Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation. The EPA,, charged with protecting public health, apparently cherry-picked two technical storage and disposition reports as examples for the public to supposedly become informed about the proposed radiation exposure limits and health rules, instead of recommending clearly pertinent studies, such as the EPA's 1995 FGR-13 and the NAS's 2006 *Health Risks from Exposure to Low Levels of Ionizing Radiation (BEIR VII - Phase 2)* report. This is worrisome. It appears the EPA is ignoring sound scientific data and highly respectable recommendations supporting human health, in favor of cost-effective policies protecting nuclear industry liabilities over the health and safety of our citizenry.

The BEIR VII - Phase 2 Statement of Task states. "The primary objective of the study is to develop the best possible risk estimate for exposure to low-dose, low linear energy transfer (LET) radiation in human subjects."⁵ This is precisely the kind of radiation you are purporting to request comments and information about, yet you are ignoring two respected in-depth studies most pertinent to your inquiry. One must ask why?

Mechanism of Cancer Induction

- ✓ Damage to DNA
- ✓ Single strand breaks
- ✓ Double strand breaks
- ✓ Oxidative changes in nucleotide bases
- ✓ DNA deletions; gene and chromosome damage



The BEIR VII report is based on radiation effects research, defining a low dose of radiation as less than 100 mSv, which is equal to approximately 40 times the average yearly background radiation exposure from all sources worldwide (2.4 mSv), or 10 times the exposure from a CT Scan, or 1000 times the exposure from a chest film. The illustration at left is taken from Stanford University Professor of Radiology and BEIR VII Committee member, Herbert Abrams, from his slide presentation at Helen Caldicott's Fukushima Symposium in New York, March 12, 2013. He notes that "high radiation doses

⁴ EPA, Air and Radiation, *Cancer Risk Coefficients for Environmental Exposure to Radionuclides*, Federal Guidance Report No. 13 (FGR-13), EPA 402-R-99-001, September 1999, <http://www.epa.gov/rpdweb00/docs/federal/402-r-99-001.pdf>

⁵ National Research Council/ National Academy of Sciences/ National Academy of Engineering/ Institute of Medicine, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII - Phase 2*, 2006, pg. vii (pdf pg.8). (<http://www.nap.edu/catalog/11340.html>)

tend to kill cells, while low doses tend to damage the genetic code (DNA).”⁶ He pointed out that not only cell damage, but also DNA damage provides a mechanism to induce cancer as well as genetic defects.

Abrams also noted the BEIR VII report conclusion that, “Significant lifetime excess risks were determined for 12 cancers, including lung, liver, breast, prostate, stomach, colon, thyroid and leukemia.”⁷

“The [BEIR VII] committee concludes that current scientific evidence is consistent with the hypothesis that there is a linear, no-threshold dose-response relationship between exposure to ionizing radiation and the development of cancer in humans.” The linear association means, “as the level of exposure to radiation increases, so did the occurrence of solid cancers.”⁸ And no-threshold means there is no safe dose of exposure to ionizing radiation.⁹

This Abrams chart shows the excess cancers and deaths per 100,000 persons exposed, cancers that could be prevented if people were not exposed to 100 mSv of low-dose radiation. With one in three or 100 million Americans now living within 50 miles of a nuclear power plant, many of us are at risk of exposure. An accident inland in the United States would contaminate far more property and human beings than the Fukushima accident’s spread of ionizing radiation washed and blown onto the Pacific Ocean.

Excess Cases of Cancer per 100,000 Exposed Persons
 (Exposed at 30, Attained Age 60)

ALL SOLID CANCER		
	Males	Females
Excess Cases from Exposure to 100 mSv	800	1300
Number of Cases in the Absence of Exposure	45,500	36,900
Excess deaths from Exposure	410	610
Number of Deaths in the Absence of Exposure	22,100	17,500

So the question arises, is EPA even aware of the bias their examples represent – suggesting the public review technical storage and disposal studies rather than actual radiation health studies? You are proposing drastic weakening of radiation exposure limits, even though the scientific data and medical studies conducted since the last rulemaking provide solid data and conclusions that the risks for our women and children are far higher than previously thought. To protect the people, standards must become stricter not more lenient. So, is the EPA a science-based Agency dedicated to protecting human health and the environment, or has the EPA become a nuclear industry puppet-agency, managed by individuals who are dedicated to future jobs for

⁶ Herbert L. Abrams, BEIR VII Committee member, presentation at Helen Caldicott Symposium: Medical and Ecological Consequences of the Fukushima Nuclear Accident, March 12, 2013, slides 20 and 22. <http://www.totalwebcasting.com/view/?id=hcf#>

⁷ Ibid, Abrams, slide 24.

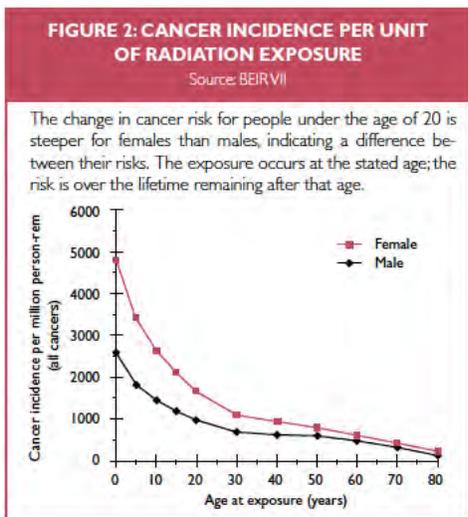
⁸ National Research Council/ National Academy of Sciences (National Academy of Engineering/ Institute of Medicine), *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII - Phase 2*, 2006, pg. 6 (pdf pg.23). (<http://www.nap.edu/catalog/11340.html>)

⁹ Ibid, NRC/NAS, pg. 323 (pdf pg. 340).

themselves in the very industries the EPA is charged with regulating. We depend upon you to protect the people – our and your family and friends and the biosphere upon which we all depend – from harmful pollutants, including ionizing radiation.

Although most people within the EPA are dedicated environmental stewards, trying to protect the public, we ask each member of the EPA and the rulemakers: to ask yourselves, before you go to sleep or when you look at your face in the mirror – to ask yourselves, if you are faithful to the trust put in you by the American people, or whether you betray that trust by subtly manipulating information and the details of rules in favor of industry over our human health and the environment that sustains us?

Arjun Makhijani and his colleagues make a strong and compelling case for reexamining some assumptions used to determine dosimetry methodologies and dosage standards. One assumption they challenge is the traditional use of a Reference Man, without accounting for dosages to women and children. Below you will see what I call the “Women and Children First” data, because the EPA will be sacrificing them first.

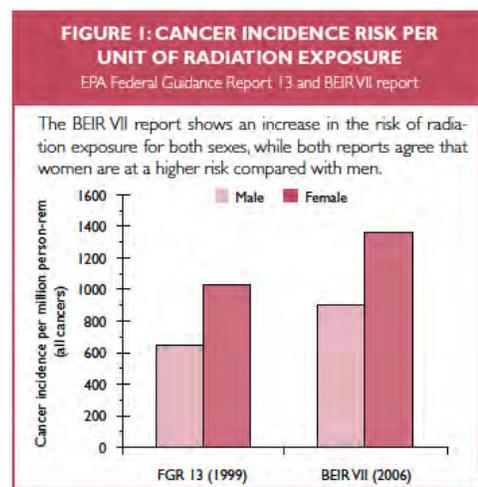


In 1999, the EPA’s Federal Guidance Report 13 (FGR-13) concluded that the cancer mortality risk due to radiation exposure was 48% higher for women than for men. The 2006 BEIR VII report found the mortality risk to be 37.5% higher for women than for men., and Figure 2 illustrates just how high the risk is for children, especially females.

“Considering cancer incidence makes the differences between men and women even more pronounced. In FGR-13, the EPA estimated that women would be 58 percent more likely to develop cancer than men for the same level of exposure. The BEIR VII Committee estimated the figure at 52 percent.” (See Figure 1.)¹⁰

Please note the astute observations of Makhijani, Smith and Thorne: “Despite these well-documented differences, the EPA continues to average the risks to men and women in setting regulations. . . . In effect, there is an implicit discrimination against women in the EPA’s approach.

“If current dose limits were updated to protect women using the EPA’s estimates of mortality risk, the dose limits would be reduced by about 18 percent. If the standards were updated to reflect the most recent estimates of cancer incidence published by BEIR VII, dose limits would be reduced by about a factor of two compared to



¹⁰ Arjun Makhijani, Brice Smith and Michael C. Thorne, “Healthy from the Start: Building a Better Basis for Environmental Health Standards – Starting with Radiation,” Science for Democratic Action, Vol. 14, No. 4, February 2007, pg. 3. <http://ieer.org/wp/wp-content/uploads/2012/01/SDA-14-4.pdf>

the present.”¹¹

As reliable research has shown repeatedly since the last rulemaking, the risks of cancer per dose are greater than previously known, so any changes to exposure limits should only strengthen protections for the public, not weaken them as proposed.

Below is a graph from the BEIR VII report showing radiation-associated risks of leukemia cancer mortality regardless of gender, if a person is exposed to 1 Sv at age 10 years old (solid line), 20 years old (dashed lines) and 30+ years old (dotted lines) over time. Clearly, any EPA changes in exposure limits must use the FGR 13 and BEIR VII reports for data and recommendations in choosing methods of research and reports to the public.

ESTIMATING CANCER RISK

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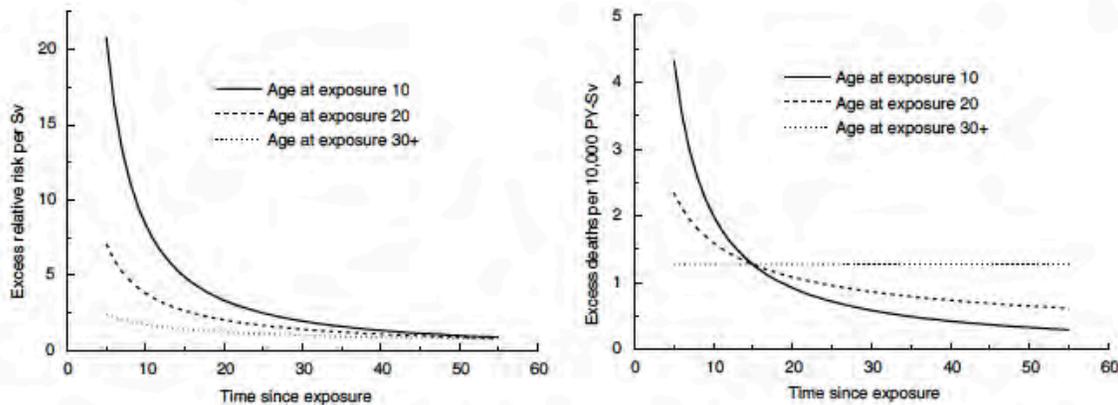


FIGURE 12-2 Age-time patterns in radiation-associated risks for leukemia mortality. Curves are sex-averaged estimates of the risk at 1 Sv for people exposed at age 10 (solid lines), age 20 (dashed lines), and age 30 or more (dotted lines). Estimates were computed using the parameter estimates shown in Table 12-3.

If EPA radiation exposure limits are changed at all, they must become more protective, not less – in order to be scientifically, as well as humanely, justifiable. We strongly urge you to protect our children. This must be paramount over any other consideration.

A 2013 Biomedical Journal article, “Long Term Local Cancer Reductions Following Nuclear Plant Shutdown,” states:

‘Children age 0-2 and 2-16 years have been estimated to be 10 and 3 times more sensitive to radiation exposure, respectively, than adults. The developing fetus undergoes rapid cell proliferation, self-programmed cell death (apoptosis), and cell rearrangement. The developing infant is similarly susceptible to cellular and metabolic damage. Unrepaired damage becomes magnified with time.’¹²

¹¹ Ibid, Makhijani, Smith and Thorne, pg 3.

¹² Joseph J. Mangano and Janette D. Sherman, Biomedical International Journal, Vol. 4 No. 1, 2013, pg. 3. <http://www.bmijournal.org/index.php/bmi/article/viewFile/115/82>

Multiple excellent studies around the world have shown a high risk of leukemia for children living near nuclear power plants, and a

Over 60 studies worldwide have examined childhood cancer near nuclear plants, and “over 70% of them revealed pronounced cancer increases.¹³ Of those, about 40 studies specifically indicate increased leukemia risks among children living near nuclear power plants. The 2008 KiKK case-control study, commissioned by the German Government, found a 2.2 fold increase in leukemia risks among children living within 5 km of its 16 German nuclear power stations.¹⁴ “This authoritative report led to geographical studies [“all very large studies commonly with over 100,000 data points”] sponsored by the governments of France, UK, Switzerland and Germany. These have now been published and all four had similar findings, ie 30% to 40% increases in child leukemias near NPPs [nuclear power plants].”¹⁵

The KiKK study referred to was published by the German Childhood Cancer Registry (GCCR), in December of 2007, titled “Epidemiological Study on Childhood Cancer in the Vicinity of Nuclear Power Plants (KiKK Study)”. There was understandably much concern about this study; and, in its wake, additional analyses of the KiKK Study and independent verifications were commissioned. The Federal Office for Radiation Protection [Germany] published their concluding statements in September of 2009:

“The KiKK-study concludes that increased cancer rates in children below 5 years of age have occurred in Germany in the vicinity of 16 locations with a total of 22 nuclear power plants between 1980 and 2003. This increased risk has mainly manifested itself in the form of leukaemia.

“In the vicinity of nuclear power plants, an increased risk of 60% was observed for all types of cancer taken together and for leukaemia, the risk doubled, equalling a risk increase of approximately 100%. ...

“The study was conducted as thoroughly as possible. The findings can be deemed as being sound; independent findings of different groups have confirmed these findings. It can therefore be assumed for the risk for a child younger than 5 years to contract cancer increases the closer it lives to a nuclear power plant to be a fact that has been proven in Germany through the KiKK study as well as an assessment of the findings by panels of experts.”¹⁶

¹³ Ian Fairlie, MD, “Infant Leukemias Near Nuclear Power Stations,” CND London, Jan. 2010, www.cnduk.org/campaigns/anti-war/item/download/42

¹⁴ Peter Kaatsch, Claudia Spix, Irene Jung, Maria Blettner, “Childhood Leukemia in the Vicinity of Nuclear Power Plants in Germany,” Journal of the German Medical Association, Dtsch Arztebl Int 2008; 105(42), <http://www.aerzteblatt.de/pdf.asp?id=62000>

¹⁵ Ian Fairlie, “Recent Evidence of the Risks of Low-Level Radiation,” Jan. 2013, <http://www.ianfairlie.org/news/recent-evidence-on-the-risks-of-very-low-level-radiation/>

¹⁶ Federal Office of Radiological Protection [Germany], “Concluding Statement on the Epidemiological Study on Childhood Cancer in the Vicinity of Nuclear Power Plants - KiKK Study,” September 2009. http://www.bfs.de/en/kerntechnik/kinderkrebs/statement_kikk_en.pdf

The Federal Office for Radiation Protection noted that the nuclear power plant emissions may not be the only factor causing the high leukemia rates, and we agree that combinations of toxics may be involved and urge further study of mixed toxins. However, we all know that does not diminish the role of radionuclides in high incidences of childhood cancer near nuclear power plants.

An earlier study in England, by radiation expert and independent researcher Dr. Chris Busby, found that children up to age four living in the town of Chepstow, 5 miles from the Oldbury Nuclear Power Station, have a risk of developing myeloid leukaemia 11 times higher than the national average. All the children in Chepstow had a cancer risk 3.54 times the national average. Oldbury nuclear power station is on the banks of the River Severn, in which nuclear particles have been found. "Myeloid leukaemia is a very rare form of cancer which is strongly associated with radiation."¹⁷ The response of European Member of Parliament, Michael Holmes seems highly appropriate for our own EPA, "How many more clusters will have to be discovered before this government recognises that its existing models do not address the environmental causes of cancer."¹⁸

Here I will quote the excellent letter endorsed by 100 Environmental Groups, written by Daniel Hirsch and Dianne D'Arrigo, and submitted to the EPA last year in response to your pre-emptive change to the Protective Action Guides for Radionuclides (PAG). This quote addressed the Department of Homeland Security PAG recommendation to effectively only require long-term clean-up after an incident if the public's exposure level is over 10 rem/yr:

"According to the EPA's own current risk estimates per unit dose in its most recent "Blue Book,"^[3]¹⁹ derived from the National Academy of Sciences' Report on the Biological Effects of Ionizing Radiation (BEIR VII), 1 rem per year over the first thirty years of life would result in an excess cancer in every 17th person exposed.^[4]²⁰ At 10 rem/year, EPA's own estimate is that one in every 1.7 people exposed would get a cancer from the radiation."^[5]²¹, ²² (Note: 10 rems = 100 mSv)

¹⁷ BBC News, "Power Station: Cancer Link Claim" April 30, 2001. http://news.bbc.co.uk/2/hi/uk_news/wales/1304438.stm

¹⁸ Ibid, BBC News

¹⁹ "EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population, EPA 402-R-11-001, April 2011. The Blue Book sets the excess cancer risk at an age- and sex-averaged value of 1.16×10^{-1} per Gray, with the first 30 years of life the risk being approximately 1.8 times higher. EPA standard practice when one doesn't consider lifetime exposure is to presume exposure over the first 30 years of life for residential scenarios and over the first 40 years for farmer scenarios."

²⁰ "1 rem/year x 30 years x 2×10^{-3} cancers per rem during the first 30 years = 6×10^{-2} cancers = 1 cancer per 17 people exposed."

²¹ "These are gender-averaged risk figures. Females are at even greater risk than males from the same levels of exposure meaning their risks are even higher than these estimates."

²² Daniel Hirsch and Dianne D'Arrigo, + 100 Environmental Groups, Letter to EPA Administrator Gina McCarthy Re: Protective Action Guides for Radionuclides (Docket ID No. EPA-HQ-OAR-2007-0268), submitted September 16, 2013, includes the 3 above quoted footnotes, pgs. 2-3.

To even consider not requiring clean-up of radioactive contamination that would result in up to one in 1.7 people being stricken with cancer is a betrayal of all that these standards are supposed to accomplish. Surely this is clear to each of you working on these potential new rules.

Regarding radionuclide release limits, we strongly urge the EPA to strengthen the means of fully measuring the exposure doses to the public, and suggest you require and implement comprehensive radiation monitoring within a minimum of 50 mile radius of all nuclear facilities, where one in three Americans now live. The Nuclear Regulatory Commission (NRC) is responsible for enforcing limits within nuclear power plants, but radionuclides are not cooperative – they simply do not respect boundary lines. The individual power companies monitor their own radionuclide releases inside nuclear plants, reporting their quarterly averages annually, but averaging is untimely and can misrepresent exposure levels, especially since radionuclide exposures are cumulative, and monitoring outside the plant has been inadequate. Again we remind that ionizing radiation does not respect property boundaries. Once it enters the biosphere, it incorporates and becomes difficult, if not impossible, to extract.

In 2010, Dr. John Till (President of the Risk Assessment Corporation, who served in the U.S. Navy Nuclear Submarine Program, received his PhD from the Georgia Institute of Technology, and is a retired Rear Admiral in the U.S. Navy Reserve), testified before the NRC Workshop on Policy Issues Related to Groundwater Protection, that in his opinion once radioactive materials or chemicals are released into the atmosphere or public waters, crossing the facility boundary, that they then become public pollutants and the public should be provided immediate information about potential exposures.²³

In the “Make Radiation Visible” fact sheet presented to EPA Radiological Directors on January 22, 2014, we make the case for public health alerts, or at least online postings, of routine and unplanned radionuclide releases into the biosphere.²⁴ The State of Connecticut has established a legal precedent, *Public Act 08-20: An Act Concerning Radiation*, which not only requires very specific reporting of unplanned releases, but also requires in section (c), that, “Licensees shall post on their web sites all plans for routine and continuous releases of radiation to the atmosphere, including dates, times and fissile materials, as soon as such releases are scheduled.”²⁵

In the White Paper, “Monitoring Matters,” we state, “Without comprehensive monitoring to determine actual levels, it is impossible to enforce regulations which limit allowable levels of manmade radiation in the U.S. environment.”²⁶ We also call for interagency cooperation between the EPA, the NRC, and Homeland Security to connect-the-dots in providing

²³ Dr. John Till, EPA Transcript of Proceedings, Public Workshop to discuss Potential Policy Issues Related to Groundwater Protections,” ML102861795, October 4, 2010, pg. 112 line 14-15.

²⁴ Gretel Johnston, “Make Radiation Visible” Fact Sheet, BEST/MATRR, January 12, 2014, pg.1. <http://best-matrr.org/MakeRadiationVisible-Facts.pdf>

²⁵ Connecticut General Assembly of Senate and House of Representatives, *Public Act No. 08-20: An Act Concerning Radiation Releases*,” effective October 1, 2008. <http://www.cga.ct.gov/2008/ACT/PA/2008PA-00020-R00HB-05329-PA.htm>

²⁶ Susan Shapiro and Gretel Johnston, “Monitoring Matters” White Paper, Feb-April, 2014, <http://best-matrr.org/Monitoring.Matters.White.Paper.pdf>

comprehensive, real-time radiation monitoring online for our citizens. We think this is important for our health and for our security, and call on you to take the lead in perfecting and expanding your RadNet program to be preemptively protective, inclusive, precise, and transparent.

The most abundant waste product of nuclear power is tritium, which can easily replace natural hydrogen in water to become highly radioactive tritiated water which is inseparable from regular water and behaves as such in living organisms, including humans. Tritium decays by emitting relatively weak beta-particles and has a fairly short half-life of 12.3 years, which means it remains radioactive for over 100 years. Organically bound tritium, however, can become incorporated into DNA, where it preferentially irradiates the nucleus, creating a higher risk of damage and adverse health effects than if the “tritium expended its energy in the cytoplasm of the cell.” Tritium can cross the placental barrier and, “can then be incorporated into an embryo/fetus and irradiate rapidly dividing cells, thereby raising the risk of birth defects, early miscarriages, and other problems.” As this paper points out, tritium provides a strong case study for examining protection standards ‘in light of risks to those who are not adult men.’²⁷

Only, “one gram (approximately the weight of a quarter of a teaspoon of salt) of tritium in tritiated water will contaminate almost 500 billion gallons of water up to the current drinking water limit of 20,000 picocuries per liter set by the U.S. Environmental Protection Agency (EPA). One ounce of tritiated water (HTO) would contaminate the entire annual flow of the Savannah River above the present drinking water limit.”²⁸

In concert with the endorsement of 100 Environmental Groups of the Hirsch and D’Arrigo letter, we also “oppose any weakening of drinking water standards for radioactivity. The SDWA [Safe Drinking Water Act] limits should be complied with.”²⁹

Hirsch and D’Arrigo have thoroughly analyzed this issue and have clearly stated the position that we, and the other environmental groups who signed that letter, stand by:

“Rather than proposing to force people to drink water contaminated at levels hundreds, thousands, or even tens of thousands of times higher than the EPA has historically considered acceptable under the Safe Drinking Water Act, the PAGs should instead do what they are supposed to do: provide protective action guidance for authorities on how to treat contaminated water or provide alternative drinking water supplies after the immediate emergency has passed. This is, of course, what EPA has historically done in the wake of other emergencies—arranged for treatment or alternative water supplies.

²⁷ Arjun Makhijani, Brice Smith and Michael C. Thorne, “Health Risks of Tritium: The Case for Strengthened Standards,” *Science for Democratic Action*, Vol. 14, No. 4, February 2007, pg. 10.

²⁸ Arjun Makhijani and Michele Boyd, “Nuclear Dumps by the Riverside: Threats to the Savannah River from Radioactive Contamination at the Savannah River Site,” 2004. <http://ieer.org/resource/reports/nuclear-dumps-riverside-threats/>

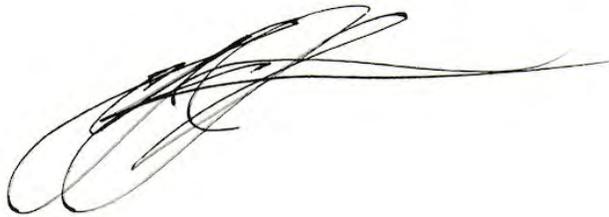
²⁹ Daniel Hirsch and Dianne D’Arrigo, + 100 Environmental Groups, Letter to EPA Administrator Gina McCarthy Re: Protective Action Guides for Radionuclides (Docket ID No. EPA–HQ–OAR–2007–0268), submitted September 16, 2013. <http://committeetobridgethegap.org/over-100-groups-call-on-epa-to-withdraw-dramatically-weakened-radiation-guides/>

“We recommend EPA abandon all efforts to set water PAGs that are weaker than the Safe Drinking Water Act limits, and instead, provide real, concrete guidance to authorities on how to safeguard water supplies so as to protect the public.”³⁰

Again, we ask that EPA strengthen, not weaken, ionizing radiation exposure and release limits from nuclear power plants to protect U.S. citizens and our environment from these insidious, extremely long-lived and highly toxic pollutants.

Thank you for your time and consideration, and for your service to the people of the United States.

Respectfully,

A handwritten signature in black ink, appearing to read 'Gretel Johnston', with a long horizontal flourish extending to the right.

Gretel Johnston, Vice President/Secretary
BEST/MATRR
Bellefonte Efficiency & Sustainability Team/
Mothers Against Tennessee River Radiation

³⁰ Ibid, Hirsch and D'Arrigogg, 5.